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THE NEW INTERNATIONAL ENCYCLOPÆDIA

SECOND EDITION

VOLUME XXIII

NEW YORK
DODD, MEAD AND COMPANY
1928

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KEY TO PRONUNCIATION

For a full explanation of the various sounds indicated, see the KEY TO PRONUNCIATION in Vol. I.

ā as in ale, fate.
ä " " senate, chaotic.
â " " glare, care, and as *e* in there.
ă " " am, at.
ä " " arm, father.
a " " ant, and final *a* in America, armada, etc.
a " " final, regal, pleasant.
a̤ " " all, fall.
ē " " eve.
ė̄ " " elate, evade.
ĕ " " end, pet.
ē " " fern, her, and as *i* in sir, etc.
e " " agency, judgment.
ī " " ice, quiet.
i̤ " " quiescent.
ĭ " " ill, fit.
ō " " old, sober.
ȯ " " obey, sobriety.
ô " " orb, nor.
ŏ " " odd, forest, not.
o " " atom, carol.
oi " " oil, boil.
o͞o " " food, fool, and as *u* in rude, rule.
ou " " house, mouse.
ū " " use, mule.
u̇ " " unite.
ŭ " " cut, but.
u̯ " " full, put, or as *oo* in foot, book.
û " " urn, burn.
y " " yet, yield.
ƀ " " Spanish Habana, Córdoba, where it is like English *v* but made with the lips alone.

ch as in chair, cheese.
D " " Spanish Almodovar, pulgada, where it is nearly like *th* in English then.
g " " go, get.
G " " German Landtag = *ch* in Ger. ach, etc.
H " *j* in Spanish Jijona, *g* in Spanish gila; like English *h* in hue, but stronger.
hw " *wh* in which.
K " *ch* in German ich, Albrecht = *g* in German Arensberg, Mecklenburg, etc.
n̤ " in sinker, longer.
ng " " sing, long.
N " " French bon, Bourbon, and *m* in the French Étampes; here it indicates nasalizing of the preceding vowel.
sh " " shine, shut.
th " " thrust, thin.
TH " " then, this.
zh " *z* in azure, and *s* in pleasure.

An apostrophe ['] is sometimes used as in tā'b'l (table), kăz"m (chasm), to indicate the elision of a vowel or its reduction to a mere murmur.

For foreign sounds, the nearest English equivalent is generally used. In any case where a special symbol, as G, H, K, N, is used, those unfamiliar with the foreign sound indicated may substitute the English sound ordinarily indicated by the letter. For a full description of all such sounds, see the article on PRONUNCIATION.

A PARTIAL LIST OF THE LEADING ARTICLES IN VOLUME XXIII

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THE NEW INTERNATIONAL ENCYCLOPÆDIA

VALJEAN, vål'zhăN', JEAN. The hero of Hugo's romance *Les misérables*, an ex-convict, converted through the kindness of an ecclesiastic. On regaining his liberty he devotes his life to rearing Cosette, the child of Fantine, whom he has saved from cruelty and sorrow. See COSETTE.

VALK, vålk. A town of Livonia, Russia, 102 miles northeast of Riga. Pop., 1910, 20,500.

VALKYRIE. An English cutter, 126 feet in length, with which Lord Dunraven competed for the *America's* cup in the races in 1893, when she was defeated by the *Vigilant*. She was sunk in a collision in the Firth of Clyde in the following year. See YACHTING.

VALKYRIES, vål-kĭr'ēz (Icel. *valkyrja*, chooser of the slain). In Scandinavian mythology, the maidens, usually nine in number, who attend on Odin (q.v.). Adorned with golden ornaments, they ride through the air in brilliant armor, order battles, and distribute the death lots according to Odin's commands. Fertilizing dew drops on the ground from the manes of their horses, light streams from the points of their lances, and a flickering brightness announces their arrival in the battle. They conduct the souls of the heroes who fall in battle to Valhalla (q.v.), where they act as his cup bearers. Two valkyries, Hrist and Mist, are cup bearers to Odin himself.

The valkyries are of diverse origin. Some of them spring from elves and other superhuman beings, and some are the daughters of princes, who in their lifetime are numbered among the valkyries, showing all their qualities, and becoming valkyries when they die. They ride generally in companies of three, or of three times three or four times three. The valkyries represent the clouds, especially those of the storm. As the white clouds, however, they are regarded as swan maidens, one of the most widespread beliefs in folklore. Whosoever gains possession of their feathered robes has them in his power. Their evolution into the maidens of Odin seems to be of later origin. Still later, in the Icelandic versions of the Nibelung Saga, Brunhilda (q.v.), the daughter of Odin, is represented as a valkyrie. The myth of the valkyries has been treated in *Die Walküre*, the second of the four divisions of Wagner's music drama, *Der Ring des Nibelungen*.

VALLA, vål'lå, LORENZO or LAURENTIUS (c.1407–57). An Italian humanist of the early Renaissance. He taught at Pavia, Milan, and Naples, and wrote theological and critical works whose departure from established points of view stirred up heated polemics with Filelfo and Poggio. About 1448 he was saved from the Inquisition only by his patron, King Alfonso V, who assisted him to flee to Rome. There he was befriended by Popes Nicholas V and Calixtus VI. In 1450 he was appointed to a professorship of rhetoric in the University of Rome. Of especial importance is his *De Elegantia Latinæ Linguæ* (6 books, 1471), which went through 59 editions in less than a century and is still consulted. He was a pioneer in the higher criticism by writing his comparison of the Vulgate New Testament with the Greek originals. He made Latin translations of Homer, Herodotus, and Thucydides, and a careful edition of Quintilian. His collected *Opera* were published in Basel, 1543. For his biography consult: Vahlen (Berlin, 1870); Mancini (Florence, 1892); Wolf (Leipzig, 1893); Schwan (Berlin, 1896); Barozzi (Florence, 1891); consult also J. E. Sandys, *A History of Classical Scholarship*, vol. ii (Cambridge, 1908).

VALLADOLID, văl'yå-dō-lēd'. The capital of the Province of Valladolid, Spain, 102 miles northwest of Madrid, on the left bank of the Pisuerga River (Map: Spain, C 2). The plain bordering this river is well irrigated and very fertile. The climate is genial, because of the moderate elevation, pure air, and generally cloudless sky. The city was long the capital of Castile and León, and later of all Spain, and contains many marks of its former greatness. The Campo Grande is larger than the Plaza Mayor at Madrid. Upon the Plaza del Campanillo, now a modern market, fronts the house once occupied by Cervantes (q.v.). Near the church of the Magdalen, on a street named after the great discoverer, stands the house in which Columbus died. From the side of the Plaza de Portugalete rises the cathedral, a Renaissance structure begun by Juan de Herrera, during the reign of Philip II, and yet incomplete. Santa María la Antigua, the most interesting church of the city, a Gothic creation of the twelfth century, enlarged in the fourteenth, contains a retable, which is the masterpiece of Juan de Juni. The thirteenth-century church of San Pablo, remodeled by Cardinal Torquemada in the fifteenth century and mod-

ernized by the Duke of Lerma 200 years later, was often the meeting place of the ancient Cortes. This and the Colegio de San Gregorio, now occupied by municipal offices, are two of the finest examples of Gothic architecture in the world. The Colegio de Santa Cruz now contains the provincial library and museum, which preserves some fine paintings. The university (see VALLADOLID, UNIVERSITY OF) has an elaborately sculptured façade. The ancient royal palace now serves the sessions of the provincial audiencia. The city has manufactures of chocolate, flour, woolen and silk goods, iron and metal ware, gloves, and pottery. Pop., 1910, 67,742. The Roman origin of the city is in dispute. Two important church councils were held here during the twelfth century (1124 and 1137), and another in 1322. In 1808 it took a prominent part in the uprising against the French, and, as a result, suffered severely at the hands of the invaders.

VALLADOLID. The capital of Michoacan, Mexico. See MORELIA.

VALLADOLID. A town of Yucatan, Mexico, situated 100 miles southeast of Mérida (Map: Mexico, P 7). The town is well laid out, and possesses a Jesuit college and the remains of a fine Franciscan convent. It manufactures cotton goods. Pop., about 5000, mostly Indians and mestizos. Valladolid was founded in 1544.

VALLADOLID. A town of Negros, Philippines, in the Province of Negros Occidental, situated on the coast, 16 miles southwest from Bacólod. It is an important military post. Pop., 1903, 10,550.

VALLADOLID, UNIVERSITY OF. A Spanish university, one of the oldest foundations in Europe, in existence at least since 1260, and raised to the rank of university in 1346. With many gifts and privileges from kings and popes alike, it flourished greatly until the eighteenth century. It has faculties of law, medicine, natural science, and philosophy and letters. There are about 4600 students.

VALLANDIGHAM, văl-lăn'dĭ-găm, CLEMENT LAIRD (1820–71). An American politician, born at New Lisbon, Ohio. After a year in Jefferson College, Pennsylvania, in 1837–38, he taught for two years in Maryland; was admitted to the Ohio bar in 1842; was elected to the Ohio Legislature in 1845; edited the Dayton *Western Empire* in 1847–49; and from 1857 until 1863 was a member of the National House of Representatives. In politics he was an extreme States-rights Democrat. He violently attacked the Lincoln administration both in and out of Congress, and his conduct led to a resolution for an inquiry into his loyalty, while numerous petitions for his expulsion were presented. After his term in Congress expired he continued to make incendiary speeches against the government. As a result he was arrested in May, 1863, by order of Gen. Ambrose E. Burnside (q.v.); was tried by court-martial; and was sentenced to be imprisoned in Fort Warren. President Lincoln, however, changed the sentence to deportation into the Confederate lines. Thence Vallandigham made his way to the Bermudas, and thence to Canada. In the same year he was nominated by his party for the governorship of Ohio, but was defeated by the overwhelming majority of 100,000 votes. He was allowed to return in the following June; became supreme commander of the Sons of Liberty (see KNIGHTS OF THE GOLDEN CIRCLE); and took an active part in the Democratic convention of 1864. In June, 1871, while acting as counsel in a murder trial, he attempted to illustrate his theory of how the shooting had been done, and was killed by the accidental discharge of the pistol. Consult J. L. Vallandigham, *Life of Clement L. Vallandigham* (Baltimore, 1872), and J. F. Rhodes, *History of the United States from the Compromise of 1850* (New York, 1907).

VALLE, văl'lā, PIETRO DELLA (1586–1652). An Italian traveler, born in Rome. He was educated in the arts and sciences and became a member of the Roman Academy of the Umoristi. In 1611 he took service against the Moors of Barbary. He traveled extensively in the Orient during the years 1614–26, going to Turkey, Egypt, Palestine, Persia, and India, studying the languages and the customs of these countries. In 1621 he visited the ruins of Persepolis, and copied several of the characters of the cuneiform inscriptions there. While in India in 1623 he first drew attention to the existence of the ancient Sanskrit language. Of his works, which are all marked by careful observation, but also betray a weakness for the miraculous, the most famous is the *Viaggi in Turchia, Persia ed India descritti in 54 lettere famigliari* (2 vols., 1650–58; 2d ed., 1662–63), translated into French (4 vols., 1661–63), German (1674), and English (1664), while a new translation in the latter language was made by Grey, *Travels of Pietro della Valle in India* (2 vols., 1892).

VALLE CAMONICA. See CAMONICA.

VALLE DEL CAUCA, val'yā dĕl kou'kä. A western department of the Republic of Colombia. It borders the Pacific Ocean and extends across the western Cordillera and the valley of the Cauca River in its upper course. Its area is variously estimated from 4179 to 10,808 square miles. The climate varies from frigid to tropical in different parts of the department, with an average temperature of 77° F. The chief products are cacao, coffee, tobacco, corn, rice, bananas, sugar cane, and potatoes. Stock raising is carried on extensively. The mineral wealth consists of gold, silver, and platinum. There are also factories of cigars, matches, chocolate, pottery, and straw hats. Pop., 1912, 217,159. The capital is Cali, which was founded in 1536 and had a population of 27,747 in 1912.

VALLE DE SANTIAGO, văl'yā dā sän'tē-ä'gō. A town in the State of Guanajuato, Mexico, situated in a fertile valley, 45 miles south of the city of Guanajuato (Map: Mexico, H 7). It has a celebrated parish church, built during the early years of the eighteenth century. Municipal population, 1910, 12,737.

VALLEJO, văl-yā'hō. A city in Solano Co., Cal., 30 miles north by east of San Francisco; on San Pablo Bay, and on the Southern Pacific, and the San Francisco, Napa, and Calistoga railroads (Map: California, C 4). It has public and convent schools and a Carnegie library. Other features include the city hall, the buildings of the various fraternal organizations, the Home for Orphans, and the Sailors' Club House. Vallejo is surrounded by a rich farming section and is of considerable industrial importance. The leading establishment is the Mare Island Navy Yard, which gives employment to nearly 2500 men. There are also a cement plant, a fish cannery, flour and planing mills, and a tannery. A quicksilver mine is operated near the city. Vallejo was founded in 1851 to be the capital of the State, and the Legislature met here in 1851, in 1852, and for a time in 1858.

Pop, 1900, 7965; 1910, 11,340; 1915 (U. S. est.), 13,119; 1920, 21,107.

VAL'LENTINE, BENJAMIN BENNATON (1843–1926). An American journalist and author, born in London and educated at King Edward VI's school at Birmingham. He went to the United States and wrote for various New York papers, becoming dramatic critic for the New York *Herald* He was one of the founders of *Puck* in 1877, and was its editor down to 1884 To this periodical he contributed a series of humorous observations on current events under the titles "Fitznoodle in New York," "Fitznoodle in America," and "Fitznoodle at Home" (1877–84). He wrote the plays *Fitznoodle; A Southern Romance; In Paradise* (1899); *Fritz in New York;* and *Madame Saccard* (adapted from Zola's drama *Renée*).

VALLEY. A depression in the land surface usually occupied by a river. The chief agency in the formation of a valley is erosion carried on by the running streams and assisted by the natural decay or weathering of the rocks in which the channels lie The relative rapidity with which the two agencies of erosion and weathering perform their work determines to some extent the form of the valley. In dry regions where erosion along the river bed proceeds at a rapid rate compared to the weathering of the rocks on the sides the valley may be narrow and bordered by steep walls. With the lapse of time, however, erosion alone will widen the valley as the stream tends more and more to cut away the walls in proportion as the channel is lowered to base level, and when this stage is reached the course of the stream wanders from one side to the other, forming a flood plain by deposition of the silt that has been brought down from above. See RIVER.

VALLEY CITY. A city and the county seat of Barnes Co., N. Dak., 58 miles west of Fargo, on the Northern Pacific and the Minneapolis, St. Paul, and Sault Ste. Marie railroads (Map: North Dakota, F 4). A large flour mill is situated here, and there are important agricultural and nursery interests. The institutions include a State normal school and a Carnegie library. There is also a fine natural park. The place was settled in 1875–76 and incorporated in 1887. Pop., 1900, 2446; 1910, 4606.

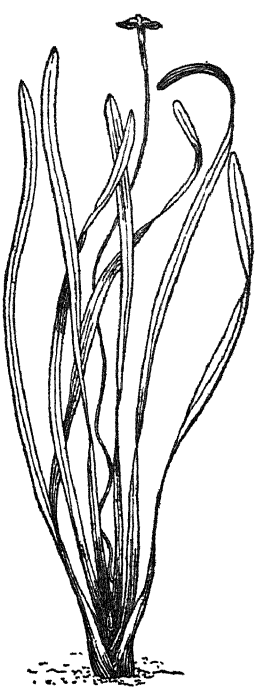
VAL'LEYFIELD. The capital and a port of entry of Beauharnois County, Quebec, Canada; on the St. Lawrence River and Lake St. Francis, and on the Grand Trunk and the St. Lawrence and Adirondack railways, about 40 miles southwest (direct) of Montreal (Map: Quebec, F 6). It is the western terminus of the Beauharnois Canal. It has a Roman Catholic cathedral, a college convent, and a hospital; and there are various manufactures. The city owns its water works and electric-lighting plant. Pop., 1901, 11,055; 1911, 9449.

VALLEY FORGE. A small village on the Schuylkill River, in Chester Co., Pa.; on the Philadelphia and Reading Railroad, 24 miles west-northwest of Philadelphia. Here on Dec. 17, 1777, after the battles of Brandywine and Germantown and the occupation of Philadelphia by the British, the American army, of about 11,000, encamped for the winter. Washington chose this place partly for its defensibility and partly to protect Congress, then in session at York, Pa., from a sudden British attack. Owing largely to the incapacity of the quartermaster-general and of the Commissary Department the men were left without adequate shelter, food, or clothing, and in consequence suffered terrible hardships, many dying of starvation and cold. At no time were more than half of their number fit for active service. It was here, however, that Baron Steuben (q.v.) trained, disciplined, and reorganized the army, and thus enabled it to fight with greater efficiency in subsequent campaigns, and it was here (May 1, 1778) that news reached Washington and his troops of the consummation of the French alliance. On June 18, 1778, Washington abandoned his camp and reoccupied Philadelphia preparatory to pursuing the British across New Jersey. A State commission, appointed in 1893, has purchased about 475 acres of the original camp ground and converted it into Valley Forge Park, containing Washington's headquarters and other historic landmarks that have been preserved or restored. Maine (1907) and Massachusetts (1910) have erected memorials to their soldiers who were encamped there.

VALLEY JUNCTION. A city in Polk Co., Iowa, 5 miles west of Des Moines, on the Chicago, Rock Island, and Pacific and the Minneapolis and St. Louis railroads (Map: Iowa, D 3). There are large railroad repair shops, several coal mines, Portland cement works, and extensive stockyards. Pop., 1900, 1700; 1910, 2573; 1915 (State census), 3026.

VALLEY QUAIL. See PARTRIDGE.

VALLGREN, val'grĕn, VILLÉ (1855–). A Finnish artificer and sculptor. He was born in Borgå, and resided long in Paris, whither he went in 1878, after studying architecture in the Helsingfors Polytechnic. He entered the Ecole des Beaux-Arts, and studied under Cavalier. His small bronzes, urns, candelabra, etc., which are distinguished by elegance, truthfulness, and intense artistic feeling, rank him as one of the foremost of modern decorative artists. His subjects are sometimes idealistic and symbolical, sometimes sternly realistic, and their effect is heightened by a patina of varied tints. Of his statues and portraits, several are in New York in the Vanderbilt collection, and he is well represented in the Imperial Castle and National Museum at Helsingfors, in the Museum of Arras, and in the Berlin National Gallery.



EEL GRASS (*Vallisneria spiralis*).

VAL'LISNE'RIA (Neo-Lat., named in honor of Antonio Vallisneri, an Italian botanist of the eighteenth century). A genus of small, stemless, aquatic plants, with grasslike leaves, belonging to the family Hydrocharitaceæ, and

found in the warm parts of both hemispheres They generally grow in running waters. *Vallisneria spiralis* is particularly celebrated on account of its peculiar process of fecundation. The flowers of the female plants rise to the surface of the water by uncoiling their long spirally twisted stalks; the flowers of the male plants become detached, having previously grown on short spikes at the bottom of the water, and expand, floating about upon the surface. After fecundation, the female flowers return under the water by the recoiling of their stalks and the fruit is ripened under water. The plant is found in ditches and bogs in Italy, southern France, and the United States, where it is called wild celery, and is famous as the food of the canvas-back duck

VALLOMBROSA, väl'ôm-brō'za, CONGREGATION OF. A branch of the Benedictine Order, founded in the eleventh century and taking its name from its mother house, a celebrated abbey of Tuscany, situated among the Apennines in a valley surrounded with forests, whence the name. Its founder was St. John Gaulbert, born at Florence either in 985 or 995 The congregation was a contemplative one and observed strict silence. It spread into France and through Italy, but never had more than 60 houses. Its decline was hastened by the vicissitudes of the mother house, which was pillaged in 1527 by the troops of Charles V. It was plundered in 1808 by the French troops. In 1866 it was appropriated by the Italian government, and since 1870 has been used as a school for the Royal Academy of Forestry. A few monks still remain, partly occupied in the duties of the meteorological station founded in 1654. Vallombrosa was visited by Dante, celebrated by Ariosto in the *Orlando Furioso*, and mentioned by Milton in a famous passage of *Paradise Lost*.

VALLS. A town in the Province of Tarragona, Spain, 50 miles west of Barcelona, on the left bank of the Francolí (Map: Spain, F 2). It has textile factories, potteries, flour mills, and distilleries Its ancient walls give it a picturesque aspect. Pop., 1910, 11,911.

VALMORE, val'môr', MARCELINE DESBORDES. A French poet. See DESBORDES-VALMORE.

VALMY, val'mē'. A village of France, in the Department of Marne, 36 miles southeast of Rheims (Map: France, N., K 3). It is noted as the scene of a battle (Sept. 20, 1792) in which the French under Kellermann (q.v.) and Dumouriez repulsed the Prussians under the Duke of Brunswick, after displaying fine bravery under a furious cannonade from the enemy. The battle or skirmish, frequently spoken of as the cannonade of Valmy, did not cost either army more than 800 men, but, though from a military point of view an insignificant affair, it produced moral effects of the greatest importance. It was the first triumph of the Republican arms, and freed the French nation from the temporary panic inspired by the foreign invasion. Napoleon made Kellermann Duke of Valmy in 1809.

VALMY, DUKES OF. See KELLERMANN, F. C. and F. E.

VALOIS, FELIX OF. See FELIX OF VALOIS.

VALOIS, va'lwä', HENRI DE. See VALESIUS, HENRICUS.

VALOIS, HOUSE OF. A branch of the Capetian dynasty (q.v.) which occupied the throne of France from 1328 to 1589. It originated in the person of Charles, second son of King Philip III, who obtained in 1285 the County of Valois as an appanage from his father. Philip IV, the elder brother of Charles, left three sons, who reigned one after the other and died without male issue, and the succession fell, by the Salic law, to the eldest son of Charles, who accordingly ascended the throne as Philip VI (q.v.). The elevation of the house of Valois to the throne of France gave rise to long and bloody wars with Edward III of England, who claimed the crown through his mother, Isabella, the daughter of Philip IV. (See HUNDRED YEARS' WAR) The French crown fell by regular succession of son to father to John the Good (1350–64), Charles V (1364–80), Charles VI (1380–1422), Charles VII (1422–61), Louis XI (1461–83), and Charles VIII (1483–98). Charles VIII having died without male issue, the crown fell to the representative of the nearest collateral male line, Louis, son of Charles, Duke of Orléans and grandson of Louis, Duke of Orléans, the younger brother of Charles VI, who ascended the throne as Louis XII (1498–1515), the first of the Valois-Orléans house; but, he also dying without male issue, the succession devolved upon the descendants of his uncle, Count Jean d'Angoulême, whose grandson, Francis I (1515–47), succeeded. Francis I was followed by his son Henry II (1547–59). Henry's three sons, Francis II (1559–60), Charles IX (1560–74), and Henry III (1574–89), occupied the throne in succession, but, none of them leaving male heirs, the crown devolved upon Henry IV of Navarre of the house of Bourbon (q.v.), which was descended from Robert, a younger brother of Philip III.

VALONA, va-lō'na, or **AVLONA**, åv-lō'nå (the ancient Greek Αὐλών, *Aulōn*). A seaport in Albania, on the Gulf of Avlona (Map: Turkey in Europe, B 4). It has a safe and spacious harbor and considerable trade in the products of the surrounding region, especially oil, wool, grain, cattle, and hides. The inhabitants manufacture arms and engage in fishing. It was held by the Turks from 1464 until the Balkan War of 1912–13 (q.v.), being incorporated in the Vilayet of Janina. In 1913 it became the seat of government of the newly erected Principality of Albania. It was occupied by the Austrians in the great war which began in 1914. (See WAR IN EUROPE.) Pop., about 6500.

VALO'NIA (It. *vallonia*, from Gk. βάλανος, *balaños*, acorn; connected with Lat. *glans*, Lith. *gile*, OChurch Slav. *zlendĭ*, acorn). The acorn cup of *Quercus ægilops*, a species of oak indigenous to Asiatic Turkey. It is rich in tannic acid, in consequence of which it is extensively used by tanners. The tree is cultivated along the Mediterranean shores. The exportation of the acorn cups or valonia is quite an important industry of Smyrna. They contain as much as 32 per cent tannin and are in especial demand for the production of high-grade leathers of light color and firm texture. In Algeria the tree is used for reforesting the mountains, as it grows rapidly and seems well adapted to its surroundings. See LEATHER, *Manufacturing Processes*.

VALORIZATION, or VALORISATION. A term applied to the equalization of the market prices of commodities by regulating their available supply. It is especially applied to such a plan when carried out by government aid. It is, however, best known in connection with the Brazilian Coffee Valorization Plan. For several years preceding 1905 Brazilian coffee growers

had suffered from very low prices due to large crops and unregulated methods of marketing. The result was that the prosperity and even to a large extent the existence of the industry were threatened Under an act of 1905 passed by the State of São Paulo the government was authorized to purchase coffee and dispose of it in the markets of the world The plan was backed by the Brazilian government The entire record crop of 1906–07 was bought up and withheld from the market. Loans to the amount of $75,000,000 issued by the State of São Paulo and guaranteed by the Brazilian government were negotiated through London and New York bankers to finance the scheme. In 1909 an international syndicate or committee was created to regulate the disposal of the coffee and secure the retirement of bonds based thereon. The coffee held in this manner increased to over 7,000,000 bags at one time. Portions of the holdings were sold semiannually at auction in New York, London, Havre, Rotterdam, and elsewhere. The effect of the scheme was shown in an increase in the wholesale price from an average of about seven cents during several years preceding the plan to 14 to 16 cents in 1912–13. The world's available supply of coffee was in this manner equalized and the price regulated The prosperity of the industry in Brazil was restored; violent fluctuations in price from years of good to those of poor crops were avoided, and the losses previously experienced from occasional overproduction and unremunerative prices were obviated.

In May, 1912, the United States Department of Justice began suit against Henry Sielcken and other agents of the scheme in that country, on the ground that 931,000 bags of valorization coffee stored in Brooklyn constituted a violation of the Sherman Antitrust Law. This case was protested by the Brazilian Ambassador on the ground that the United States could not interfere with the property of another nation. Negotiations between the governments followed with the result that the United States agreed to withdraw the suit if Brazil would secure the disposal of the coffee by April, 1913. In January, 1913, the International Valorization Committee meeting in London stated that all syndicate coffee held in the United States had been sold to 80 buyers in 20 different States. Thereafter the government suit was withdrawn. About the same time 300,000 bags were sold in Europe and it was announced that no more would be disposed of by the syndicate during 1913, though it held at that time more than 3,000,000 bags in storage in various European centres. Moreover there was nothing to prevent the syndicate from controlling the United States market by operating from some convenient Canadian centre.

VALPARAISO, väl'pȧ-rī'sō. A province of west Chile, bounded by Santiago on the south and east, Aconcagua on the north and east, and the Pacific Ocean on the west (Map: Chile, E 4). The small islands of Juan Fernández are included in the province. Area, 1953 square miles. The surface is largely mountainous and sterile in the southern part, but fertile in the north. The chief occupation, outside the capital, is agriculture. Pop., 1907, 281,872; 1912, 311,809. Capital, Valparaiso (q.v.).

VALPARAISO. The capital of the Province of Valparaiso, Chile, and the chief seaport of the Republic, situated on a bay of the Pacific, 68 miles (116 miles by rail) west-northwest of Santiago (Map. Chile, E 4) The older and business portion of the city extends along the shore of the bay, while on the slope of the surrounding hills are the finer residence suburbs. Viña del Mar, a few miles to the east, is a noted suburb and seaside resort. Valparaiso enjoys a mild and equable climate, the average temperature being 58° F., the average for January 63° F, and for July 53° F. The average annual rainfall is about 13.5 inches. The town has some well-constructed streets and a square with many monuments. The more important monuments include statues of Columbus, William Wheelwright, who built the first railway in South America, Thomas Cochrane (tenth Earl of Dundonald), who organized the Chilean navy, and a fine monument to the navy, surmounted by a statue of Admiral Prat. The port is strongly fortified and the government maintains here a large naval arsenal. The chief manufactures are cotton goods, machinery, and ironwork; other interests are the manufacture of tobacco, the bottling of mineral water, sugar refining, brewing, and distilling. The harbor is accessible and has a complete system of docks, warehouses, and shipyards. Valparaiso is the most important commercial city of Chile and is making rapid progress It exports grain, wool, leather, guano, saltpetre, and copper. Its chief imports are textiles, other manufactures, and mineral products. In 1912 nearly one-half the imports of Chile passed through Valparaiso, the same year the port ranked seventh in exports It is the seat of a United States consul. Pop., 1903, 143,769; 1912, 179,794. The city was founded by Juan de Saavedra in 1536. It was visited by a terrible earthquake in 1855. During the civil war of 1891 it was taken and partly sacked by the congressional troops. On Aug. 16, 1906, a tremendous earthquake caused the greater part of the city to crumble in ruins. The worst shock lasted five minutes.

VALPARAISO, väl'pȧ-rā'zō. A city and the county seat of Porter Co., Ind., 44 miles southeast of Chicago, Ill., on the Pittsburgh, Fort Wayne, and Chicago, the Grand Trunk, and the New York, Chicago, and St. Louis railroads (Map: Indiana, C 2). It is chiefly a residential city, and has the Valparaiso University, St. Paul's Academy, a Carnegie library, Christian Hospital, and a fine courthouse. The city is in a rich farming district, and manufactures mica products, paint, electrical specialties, cut glass, steel products, and educational specialties. Valparaiso was settled in 1836 and incorporated in 1856. Pop., 1900, 6280; 1910, 6987.

VAL'PY, Abraham John (1787–1854). An English printer and editor, second son of Richard Valpy, the head master of Reading School. From his father's instruction he passed to Pembroke College, Oxford, graduating in 1809. While a schoolboy at Reading he published a selection from Cicero's *Letters*, which went through several editions. With the intention of rivaling the great classical printers, he began business in London, first in Chancery Lane and subsequently (1822) in Red Lion Court, Fleet Street. Among the classics published by him are Brotier's *Tacitus* (5 vols., 1812); a reissue of Stephens's *Thesaurus Græcæ Linguæ* (12 vols., 1816–28); the *Delphin Classics*, with George Dyer as editor (141 vols., 1819–30); and *The Family Classical Library*, translations into English (52 vols., 1830–34). He also founded the *Classical Journal* (1810) and a periodical called

the *Museum* (1822) and brought out an illustrated edition of Shakespeare (15 vols., 1832–34). In or about 1837 he sold his business and became interested in an insurance company and other financial undertakings.

VALTELLINA, val'tĕl-lē'na. The upper valley of the Adda River, in the Province of Sondrio, Italy, extending from the Stilfser Joch (Stelvio Pass) to Lake Como. More particularly, however, it designates only the lower portion (some 55 miles long). This is a luxuriant, charming little district, opening towards the west between the Bergamese and the Bernina Alps. The valley is famed for its wines. Grain and fruit are also produced. Sondrio and Tirano are in this valley. In mediæval times the Valtellina was a part of Lombardy. It was wrested from the Duke of Milan by the people of Grisons in 1512. In 1620 the Roman Catholics sought through the murder of the adherents of the Reformed faith to free the district from the rule of the Swiss Confederation. The Confederates, however, were able ultimately to maintain possession of the valley with the help of Spain and Austria. In 1797 Napoleon united it to the Cisalpine Republic. In 1814 it passed to Austria and in 1859 to Italy.

VALUE (OF. *value*, value, fem. sing. of p.p. of *valoir*, from Lat. *valere*, to be strong, able). In political economy, a word that is most commonly used to designate the power of a commodity to command other commodities in exchange. The term is applied, however, to several other conceptions. The potential capacity of an object to meet human needs is sometimes called value—value in use, in the terminology of the classical economists. In modern scientific economics, the term "utility" has for the most part supplanted this use of the word "value." Another meaning which the term "value" conveys is the significance of an object to an individual as the indispensable condition of a certain satisfaction. Value in this sense of the term is frequently called subjective value, to distinguish it from objective or exchange value (the first conception noted above). Subjective value is of two kinds, subjective use value, where the importance of an object is gauged by the direct satisfaction to be obtained through its consumption, and subjective exchange value, where the importance of an object is gauged by the satisfaction it will yield indirectly, through exchange.

A distinction is usually made between market value and normal or natural value. Market value is the purchasing power of a commodity in the open market on a given day; normal or natural value is the value which would prevail if competitive forces worked without friction. Market values fluctuate widely from day to day; normal values change, if at all, only with changes in the fundamental conditions of production and consumption.

The word "price" is often used as synonymous with "exchange value." Economists define price as the power of a commodity to command money in exchange; value (exchange or objective) is the power of a commodity to command in exchange commodities in general.

In order to have value, an object must satisfy some human want, and it must exist in a quantity which is insufficient wholly to satisfy all desire for it. It must possess utility and scarcity. In the case of most commodities, limitation in supply is due to the necessity for effort or sacrifice in winning such commodities from nature. In explaining value, economists have been inclined to emphasize one or the other of these two essential conditions. On the one hand, we have the cost theories of value; on the other, the utility theories. As representative of the cost theories we may take that known as the classical theory, derived from Adam Smith, logically developed by Ricardo, and substantially completed by Senior, Carey, John Stuart Mill, and Cairnes. According to this theory, market value is determined by demand and supply, being fixed at the point where the former just equals the latter. Value increases directly with increase in demand, inversely with increase in supply (other conditions remaining the same). In the case of commodities that may be freely reproduced without increase in cost, cost of production determines normal value. If market value is not high enough to cover cost of production some producers will turn to other industries, with the result that value will rise through decrease in supply. If, on the other hand, market value exceeds cost of production, producers will secure a profit which will lure other producers into the field, whose competition will reduce prices to the cost level. In the case of commodities produced at varying costs (e.g., the products of agriculture) values will tend to equal cost to the producer in the least favorable situation whose product is nevertheless necessary to meet the demand. The classical economists recognized a third class of commodities, consisting of those which could not be reproduced (e.g., paintings by the old masters), and of those whose production is controlled by a monopoly. The value of such commodities, in their theory, is derived from their utility and scarcity. Such commodities were regarded as relatively unimportant; accordingly, the law that value is controlled in the long run by cost of production was held to be nearly universal.

During the second and third quarters of the nineteenth century the classical theory of value was almost universally held by economists; it serves as the basis of much of the economic thought of the present day.

A second theory of much historical importance is the labor theory of value. Adam Smith argues that in a primitive society the respective amounts of labor spent on commodities must have served as a basis for their exchange value; Ricardo in many passages speaks as though he regarded labor as the basis of exchange value, although a general examination of his work leaves no doubt that he admits the determining influence of other elements in value besides labor. The theory was adopted by Karl Marx and his followers as a theoretical basis for socialism. Whatever part of the value of a commodity falls to the landlord or the capitalist Karl Marx regarded as a deduction from the fruits of labor, since labor alone created value. The difficulty in accounting for the value of goods produced at a varying expense in labor, of goods which are not reproducible, and of those which are freely given by nature, but in quantities not adequate to the demand, deprives this theory of scientific value.

Utility theories of value were unsuccessful in explaining the facts of value, until the second half of the nineteenth century, when the concept marginal utility was discovered. By a well-known psychological principle, the pleasure de-

rived from the satisfaction of any given want declines with each successive unit of satisfaction experienced If an individual possesses a stock of goods for consumption, some units of this stock may be so used as to yield a high degree of satisfaction; other units will yield less, and the final or marginal unit may yield but little satisfaction, however great the satisfaction from the first unit may have been The absolute importance to the individual of any unit in his possession will be measured by the utility of the marginal unit, since the loss of any other unit would at once be made good by the substitution of the marginal unit In his private economy, an individual values his goods according to their marginal utilities. In exchange, both buyer and seller compare the marginal utility of the commodity to be bought and sold with the marginal utility of money. If the seller finds that the marginal utility of the money offered him exceeds the marginal utility of the commodity for sale, he is naturally willing to sell; if the buyer finds that the marginal utility of the commodity exceeds that of the money demanded, he purchases Naturally, many sellers would be willing to take a price less than that which they are offered, many buyers would pay more than they do rather than go without the commodity they desire. A certain number of buyers, however, possess limited means, and would not purchase if the price rose above a certain figure. A number of sellers would hold their property rather than take a lower price. It is these buyers who are least eager to buy and sellers least eager to sell who hold the power of determining ratios of exchange, all other purchases and sales, in an open market, conforming to the values set by these.

The marginal-utility theory does not deny that in the long run the values of commodities tend to correspond with their respective costs of production, but it gives a new interpretation to the fact. Costs consist themselves in values —value of labor, capital, use of land, etc., used up in the manufacture of a commodity. These things are not valued for their own sake, but for the sake of the products for final consumption into which they enter. Naturally, these commodities are valued marginally. If pig iron in one use creates a value equal to 40, in another use a value represented by 10, the latter use will determine the value of pig iron. But under free competition there would be a tendency to increase the production of commodities in which pig iron created a value of 40, withdrawing iron, if necessary, from the less productive use. The result would be that the value of iron in the more profitable use would decline, and with it the value of the commodity into which it entered. In this way it appears as if value were determined by costs. On the other hand, the increase in value of iron in the least profitable use, resulting from the withdrawal of iron from that use, shows quite clearly that in a broad view it is the commodity for final consumption that determines the value of the elements in cost, not cost that determines values.

This theory was originated by Gossen in the fifties, but gained no attention at the time. Two decades later it was rediscovered by Jevons, Menger, Walras, and J. B. Clark, working independently. Through the consistency with which it explains the diverse phenomena of value, it has received wide acceptance, although it has been unable to displace the classical theory completely. Marshall has endeavored to reconcile the two theories, holding that cost of production and marginal utility, taken together, explain value, but that neither theory alone explains it satisfactorily. In this view he is followed by probably the majority of American and English economists. See POLITICAL ECONOMY

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VALUE, STANDARD OF. See MONEY.

VALUES (Fr. *valeurs*). The relation of the different parts of a painting to each other, with reference to the light and shade they reflect. Value does not consider color as such, but its relative appearance in light and shade. Consult the works referred to under COLOR.

VALVA'TA. A small pulmonate mollusk of American fresh waters, remarkable for the squareness of its whorls. See Colored Plate of SNAILS

VALVE. A device or appliance for controlling the flow of liquids, gas, or loose material through a pipe, chute, or other form of passageway. With the general use of steam, water, gas, and other fluids, a great variety of valves have been invented and are in daily use. These valves bear various trade names based on their purpose, the shape or motion of the valve, and the method of operation. Thus we have safety valves, globe valves, slide valves, screw valves, reducing valves, regulating valves, etc. Valves generally, whatever their specific names may be, can be included in a general classification with reference to the manner in which their motion is obtained, or in a general classification with regard to the motion relative to the valve seat. In the first classification are: (1) valves opened and closed by hand; (2) valves operated by independent mechanism; (3) valves operated by mechanism connected with the machine whose operation they control; and (4) valves opened and closed by the motion of the fluid whose flow they control. Classified with regard to their motion relative to the valve seat there are: (1) valves which rotate in the opening, (2) valves which rise and fall from and to their seats, and (3) valves which open and close by sliding on and parallel to their seats. It is obvious that the characteristics of the first and second classifications may be combined in one valve; thus a slide valve may be operated by hand like the ordinary hand-screw gate valve, by separate mechanism, like the hydraulic gate valves for water works, or by mechanism connected with the medium operated, like the slide valve of a locomotive. A flap valve con-

sists of a disk hinged at one side. One form of butterfly valve consists of a disk hinged at diametrically opposite edges and slit through the centre parallel to the hinges. In another the hinges are placed on the diametrical slit. A disk valve consists of a circular disk seated on a guide and free to slide up and down for a limited distance on a rod or bolt passing through a hole in its centre. Lift or poppet valves consist of a disk with a flat or beveled edge seated on a circular disk, they operate by their own weight, like a disk valve, or by means of springs or rods. Slide valves are of various forms. The gate valve used on water mains consists of a metal disk sliding between two seats inclined towards each other so as to form a wedge-shaped slot. This disk is also wedge-shaped to correspond with the slot, and is raised and lowered by a stem attached to its upper edge and screwed up and down by a hand wheel. Cocks consist of a conical plug seated in a conical casing, both plug and casing have a hole through them in the line of the pipe, and by turning the plug so that the holes coincide the valve is opened. Valves are usually made of metal, but may be combined with rubber or leather, to secure tightness. Consult Dalby, *Valves and Valve Gear Mechanism* (London, 1906). See AIR COMPRESSOR; GAS; LOCOMOTIVE; PUMPS AND PUMPING MACHINERY; SAFETY VALVE; STEAM ENGINE; WATER WORKS.

Valves in Musical Instruments. These are mechanical devices, in brass instruments, for lengthening or shortening the column of air. By means of this mechanism the older natural horns and trumpets, which had only a diatonic scale, were changed to chromatic instruments capable of producing every chromatic interval within their range. The number of valves is generally three, though some instruments have four. Two systems of valves are now in general use—piston valves and rotary valves. The latter afford the player a lighter manipulation of his instrument, but are more likely to get out of order. For valves in the organ, see ORGAN.

VALVERDE, văl-vâr'dā. An old settlement on the east bank of the Rio Grande, Socorro Co., N. M. A sharp engagement took place here Feb 21, 1862. General Canby, stationed at Fort Craig with 3800 men, disputed the advance up the river of a force of about 3000 Confederates under General Sibley, but was compelled to withdraw within his works.

VÁMBÉRY, vām'bār-y', ARMINIUS (1832–1913). An Hungarian traveler and Orientalist, born at Szerdahely, near Pressburg. He was largely self-educated. In 1854 he went to Constantinople as a private tutor, where he later became private secretary to Fuad Pasha. With the assistance of the Hungarian Academy he traveled through Armenia and Persia from 1861 till 1864. He became professor of Oriental languages at the University of Budapest in 1865, retiring from active life in 1905. The literary activity of Vámbéry was confined, in the main, to the Ural-Altaic linguistic stocks, especially the Turkish. The most important of his works are: *Reise in Mittelasien* (1865; 2d ed., 1873); *Meine Wanderungen und Erlebnisse in Persien* (1867); *Etymologisches Wörterbuch der turko-tatarischen Sprachen* (1878); *Altosmanische Sprachstudien* (1901); editions of the *Kudatku-Bilik* (1870) and the *Schibaniade* (1885); *Geschichte Bocharas oder Transoxaniens* (2 vols., 1872); *Primitive Kultur des turko-tatarischen Volkes* (1879); *Das Turkenvolk* (1885); *The coming Struggle for India* (1885), *Hungary* (1887), *Travels and Adventures of the Turkish Admiral Sidi Ali Reis* (1899); *Western Culture in Eastern Lands* (1906). Consult his *Arminius Vambéry His Life and Adventures* (7th ed., London, 1889), and *The Story of My Struggles* (2 vols., New York, 1904).

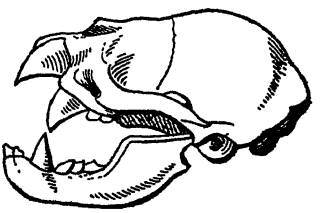
VAMPIRE (Serv., Bulg. *vampir*, Russ. *vampirŭ*, Little Russ *vampyr*, *uper*, White Russ. *upir*, vampire, probably from North Turk *uber*, witch). In Slavic folklore, a corpse that rises at night from his grave, and drinks the blood of the living, which he obtains by sucking, without arousing the sleeper. He may not only appear in human form, but can assume the shape of a dog, cat, toad, or any blood-sucking animal. The victim loses appetite, wastes away, and after a few days expires without any visible disease. The corpse of the destroyer, being thus supplied, remains pliable and lifelike. The veins are full, the cheeks ruddy and plump, and the mouth is gory—properties which enable an inquirer to ascertain the vampire quality. The most effective remedies against the vampire are cremation of the corpse, or nailing it by a thorn or aspen stake driven at one blow through the breast to the bottom of the grave to prevent the body from wandering. Yet another mode of destroying the vampire is to chop off the head of the corpse with a grave-digger's shovel.

Communities as well as individuals may be attacked by the vampire. In general, children are first destroyed. The demon may, however, be traced by sprinkling salt on the floor of the house which it haunts. Vampirism is seldom a matter of choice, but a necessity depending on criminal character, or some other reason which is likely to render a spirit uneasy in the grave. Thus witches, wizards, suicides, children of the devil, or illegitimate offspring of parents themselves illegitimate, are vampires, while the leap of a cat or the flight of a bird across a corpse may force even the innocent dead to become a vampire. Vampirism is, moreover, regarded as infectious, since, it is believed, a man who has been the object of attack may be turned into a vampire. The practice of burying murderers and other criminals with a stake through the body was evidently brought about by dread of their turning into vampires; as regards suicides, this custom was only abolished in England by a statute of George IV. A survival of the superstition has been cited in New England as late as the first half of the nineteenth century, while in 1870–71 there were several trials for vampirism in West Prussia, Pomerania, and Mecklenburg.

The belief in vampires is part of the widespread fear of malignant ghosts (see GHOSTS), especially the Lamiæ (q.v.), fostered by the mediæval belief of the Greek Catholic church that all who died under ecclesiastical ban were kept alive by the devil for the ruin of their surviving friends. The belief is an ancient one, treated by Philostratus and Phlegon of Tralles, by Goethe in his *Braut von Korinth*, and in operas by Palma (1812), Hart (1820), Marschner (1828), and Von Lindpainter (1828). Consult: Augustin Calmet, *Dissertations upon the Apparitions of Angels, Demons, and Ghosts and concerning . . . Vampires* (Eng. trans., London, 1759); Wilhelm Hertz, *Der Werwolf* (Stuttgart, 1862); W. R. S. Ralston, *Russian Folk-*

tales (London, 1873). Bram Stoker has embodied in his novel *Dracula* (New York, 1899) a mass of the vampire belief of eastern Europe.

VAMPIRE. A Neotropical blood-sucking bat of the section Desmodontes of the family Phyllostomidæ, and especially of the genera *Desmodus* and *Diphylla*, specifically, *Desmodus rufus*.



SKULL OF A TRUE VAMPIRE.
Showing extraordinary form of piercing incisors in the upper jaw of *Desmodus rufus*.

These bats are of small size, are tailless, and have nose leafs, an organization modified in accordance with their habits of subsisting by sucking blood from the bodies of the larger mammals, including man, usually while the victim is asleep. The single pair of upper incisors are prolonged and sharpened into caniniform teeth, which will pierce the skin like lancets and are rooted in bones of unusual size and solidity. The canines are large, the premolars small, and the molars absent. The gullet is so small that nothing but liquid food can pass, and the stomach is intestiform, while the intestinal canal is modified to suit a diet of blood. The blood of the victim is likely to continue to flow after the vampire departs. Repeated visits of the vampire may so weaken a horse, a cow, or a human being, that death may follow. In some places and times it becomes dangerous to sleep exposed to the bat's attack, but the total of injury done is far less than is popularly believed. *Desmodus* inhabits forested regions from Central America to Chile. Another still smaller blood-sucker is the closely related Brazilian *Diphylla ecaudata*, whose habit is to pare away the skin until the blood oozes through the shaved space.

The family (Phyllostomidæ) is very large, and distinguished from other bats by the presence of three bony joints in the middle finger of the hand (wing). They are greatly diverse in habits and fare. Some are exclusively insectivorous; the majority feed mainly or entirely on fruits; two species are exclusively blood drinkers; and one section, the javelin bats (Phyllostoma), while probably subsisting mainly on fruit, sometimes also attack animals and men. In the uncertainty of information as to this group, the word "vampire" has been widely and often mistakenly applied. It is commonly given, e.g., to the great South American false vampire (*Vampyrus spectrum*), which feeds wholly on fruit, and is quite harmless. It measures 28 inches across the expanded wings, and is common about villages. For illustrations and bibliography, see BAT.

VAN, vän. The capital of the Vilayet of Van, in Turkish Armenia (Map: Turkey in Asia, E 2). The town, surrounded by double walls and a moat, is poorly built, with narrow streets and flat-roofed mud houses. An interesting feature is the ancient castle, standing on a rock about 300 feet high. There are fragments of cuneiform inscriptions on the walls and a trilingual inscription of Xerxes on the south side of the castle rock. A number of Christian schools in the town are maintained by the American Mission. The population is estimated at 30,000.

Armenian historians give to Van the name of Shemiramagerd, or the City of Semiramis. The city is believed to have been the capital of the ancient Kingdom of Urartu. The region had a language of its own which is known as Vannic. In the middle of the fourth century A.D. Sapor II captured Van. At the beginning of the tenth century it became the capital of the Armenian Province of Vasburagan. It was captured at the end of the fourteenth century by Timur, after whose death it passed to Persia, and in the sixteenth century to the Osmanlis. The Russians occupied Van in 1915 with the help of Armenian regiments. See WAR IN EUROPE

VAN, LAKE. The largest lake in Asiatic Turkey. It lies near the Persian and Russian boundaries, between Armenia and Kurdistan, and between the sources of the Euphrates and Tigris, at an altitude of over 5000 feet (Map: Turkey in Asia, E 2). It is about 80 miles long and 10 to 50 miles wide, with an area of 1400 square miles. Its shores are very irregular, and the lake is surrounded by densely wooded mountains. It receives a few short streams, but has no outlet, its water being very salt. Near its east shore lies the town of Van.

VANADINITE. A vanadinate of lead with lead chloride crystallized in the hexagonal system. It has a resinous lustre, and is yellow, red, or brown. It usually occurs as prismatic crystals with smooth faces and sharp edges, also sometimes in rounded forms and globular incrustations, and is found in the Urals, Sweden, Argentina, South Africa, and Mexico, and in the United States with wulfenite and pyromorphite at localities in New York, Arizona, and New Mexico. This mineral is a source of vanadium salts, which are used as a pigment for porcelain, and in ink manufacture.

VANADIUM (Neo-Lat., from *Vanadis*, a Scandinavian goddess). A metallic element discovered by Del Rio in 1801, and later investigated by Sefström in 1830 and by Wöhler and Berzelius in 1831. It is never found native, but occurs in combination as vanadic acid in a number of minerals, including descoloizite, endlichite, motthamite, psittacinite, roscoelite, and vanadinite. The last-named mineral, from Spain, Chile, and Argentina, constitutes the principal commercial source of vanadium at the present time. In Colorado, vanadium and uranium are together extracted from the mineral carnotite with a hot solution of sodium carbonate; from this the uranium is next removed by means of caustic soda, and then the vanadium is precipitated in the form of calcium vanadate. Vanadium has also been found in the lava at Vesuvius and spectroscopically in the sun. It is a difficult metal to obtain pure, but was isolated by Roscoe by heating the anhydrous dichloride in pure dry hydrogen.

Vanadium (symbol, V; atomic weight, 51.0) is a white metal having a specific gravity of 6.03 and melting between 1700° and 1800° C. (3092° and 3240° F.). The metal combines with platinum to form an alloy, and with oxygen forms a suboxide, a monoxide, a dioxide, a trioxide, and a pentoxide, of which the last two act as acid-forming oxides, forming hypovanadic

and vanadic compounds Of the various vanadium salts, ammonium metavanadate, formed by dissolving the pentoxide in ammonium hydrate, is used as a black pigment, frequently with aniline as a dye, and also as the basis of a permanent black ink. But the most important use is found by metallic vanadium itself (prepared in the electric furnace), whose addition, in quantities of only one or two tenths per cent, to chromium steel and other steels imparts to them an extraordinary degree of elasticity and tensile strength, which are particularly valuable in automobile construction.

VAN AMRINGE, ăm'rĭnj, JOHN HOWARD (1835–1915). An American mathematician and educator, born in Philadelphia. In 1860 he graduated from Columbia, where thereafter he taught mathematics, holding a professorship from 1865 to 1910 when he retired. From 1894 to 1896 he was also dean of the School of Arts and thereafter dean of Columbia College. He was without a rival in popularity among Columbia men during his long service and afterward till his death. Besides making many addresses on subjects relating to the university, Van Amringe wrote much in the same field. He was the first president of the American Mathematical Society

VAN BEMMEL, văn bĕm'ĕl, EUGÈNE, BARON (1824–80). A Belgian author and educator, born at Ghent. He studied law, but turned to literature, and in 1846 attracted considerable attention by his *De la langue et de la poésie provençales* In 1849 he was called to the chair of French literature at the University of Brussels, where he lectured on modern political history, archæology, and comparative literature. He was secretary of the Society of Belgian Authors and first director of the *Revue Trimestrielle*, which he founded in 1854 and which in 1864 became the *Revue de Belgique*. In 1871 he was made rector of the university. Besides many contributions to periodicals, Van Bemmel published: *Voyage à travers champs: la province de Luxembourg* (1849); *L'harmonie des passions humaines* (1854); *La Belgique illustrée* (1855); *Etude sur les monuments druidiques* (1857); *Histoire de Saint Josse-ten-Noode* (1869); *L'Ourthe et l'Amblève pittoresques* (1873); *Patria Belgica* (1871–75); *Don Placide: mémoires du dernier moine de l'Abbaye de Villers* (1876), a novel; *Histoire de Belgique empruntée textuellement aux récits des écrivains contemporains* (1880). He died in Brussels.

VAN BENEDEN, PIERRE JOSEPH. See BENEDEN.

VANBRUGH, văn-brōō', IRENE (?–). An English actress. The daughter of a clergyman named Barnes, she was born at Heavitree, Exeter, was educated in London and Paris, and in 1901 was married to Dion Boucicault, an actor, son of Dion Boucicault (q.v.). She acted with Miss Sarah Thorne at Margate, and in 1889 joined J. L. Toole, touring with him in Australia and New Zealand. In 1892 she became a member of Beerbohm Tree's company, and in 1895 of Arthur Bourchier's company, with which she appeared in America in 1896. She had important rôles in the following plays: *The Chili Widow; The Admirable Crichton; Letty; His House in Order; The Great Conspiracy; Mid Channel; Grace; Passers By; Rosalind; Open Windows; The Land of Promise; Der Tag; The School for Scandal.*

Her sister, Violet Vanbrugh, also a well-known actress, became the wife of Arthur Bourchier (q.v.).

VANBRUGH, văn-brōō', SIR JOHN (1664–1726). An eminent English architect and dramatist. He was born in London, the grandson of a Protestant refugee from Flanders. John Vanbrugh at about 19 went to France, presumably to study architecture, but returned to England two years later and got a commission in the army, becoming a captain. In 1690 he was again in France, and was arrested as a spy, being made a prisoner in the Bastille. He was released late in 1692 and returned to England. His first play was *The Relapse, or Virtue in Danger*, a sequel to Colley Cibber's *Love's Last Shaft*, from which Sir Novelty Fashion reappears in Vanbrugh's piece as the inimitable Lord Foppington. It was produced at Drury Lane late in 1690, and established its author as one of the leading wits and dramatists of the day. In the following spring his comedy of *The Provok'd Wife*, brought out at Lincoln's Inn Fields Theatre, met with an even better reception. The year 1698 is notable in dramatic history for the publication of Jeremy Collier's famous *Short View of the Immorality and Profaneness of the English Stage*. Vanbrugh was among those attacked, and he published in the same year a pamphlet in reply, *A Short Vindication of The Relapse and The Provok'd Wife from Immorality and Profaneness*. Of his other works, several of them free adaptations from the French, the best is *The Confederacy*, a brilliant comedy, produced in 1705 at the new theatre that he built in the Haymarket for himself and Congreve.

Meanwhile, he had been making his way as an architect. In 1701 he began erecting for the Earl of Carlisle the palace of Castle Howard in Yorkshire. In 1702 he was appointed Comptroller of the Board of Works. In 1705 he was engaged to erect Blenheim Palace, which Parliament had voted to the Duke of Marlborough; but the Duchess, after her husband's death, refused to pay Vanbrugh and dismissed him. After much trouble he managed to get nearly all the money due. He was knighted in 1714, and died at Whitehall.

His comedies have not maintained their popularity, their licentious tone preventing their being read to the extent to which the keenness of their satire and the genuine character of their humor would otherwise entitle them.

At his death Vanbrugh left an unfinished comedy called *The Journey to London*, which Cibber completed and produced at Drury Lane in 1728 as *The Provok'd Husband*. Consult: W. C. Ward, in Introduction to his edition of the *Dramatic Works* (London, 1898); Max Dametz, *John Vanbrughs Leben und Werke* (Vienna, 1898); Leigh Hunt, *The Dramatic Works of Wycherley, Congreve, Vanbrugh, and Farquhar, with Biographical and Critical Notes* (new ed., London, 1855); William Hazlitt, *Lectures on the English Comic Writers*, ed. by W. C. Hazlitt (ib., 1903).

VAN BRUNT, HENRY (1832–1903). An American architect, born in Boston, Mass. He graduated at Harvard in 1854. Among the more important buildings of which he was the architect are Memorial Hall at Harvard, the library building of the University of Michigan, the First Church in Boston, and the Electricity Building at the World's Columbian Exposition. Among his writings are *Greek Lines and Other*

Architectural Essays (1893), and a translation of Viollet-le-Duc's *Discourses on Architecture.*

VAN BU'REN. A city and the county seat of Crawford Co., Ark., 5 miles northeast of Fort Smith, on the Arkansas River and on the St. Louis, Iron Mountain, and Southern, and the St. Louis and San Francisco railroads (Map: Arkansas, A 2). It ships large quantities of fruit; and has an extensive mining-car factory, cotton gins and compress, railroad repair shops, a zinc smelter, and foundries and machine shops. Pop., 1900, 2573; 1910, 3878

VAN BUREN. A town in Aroostook Co., Me., 242 miles by rail north of Bangor, on the Bangor and Aroostook Railroad (Map: Maine, E 1). It is the seat of St. Mary's College, and contains the Convent of the Good Shepherd. Van Buren has extensive lumber interests. Pop., 1900, 1878; 1910, 3065.

VAN BU'REN, MARTIN (1782–1862). Eighth President of the United States. He was born at Kinderhook, N. Y., Dec. 5, 1782, studied law with William P. Van Ness in New York City, and was admitted to the bar in 1803. He early developed a fondness for politics and held successively the offices of Surrogate of Columbia County (1808–13) and State Senator (1812–20), in the latter capacity being recognized as the leader of the Tompkins faction of the Republican party. In 1815 he became Attorney-General of the State, a position from which he was removed in 1819 on account of his rupture with the administration of Gov. De Witt Clinton. In February, 1821, he was elected to the United States Senate, and in the same year served as a delegate in the State Constitutional Convention. In the Senate, to which he was reëlected in 1827, he served for a number of years as chairman of the Judiciary Committee, supported the tariff bills of 1824 and 1828, opposed internal improvements by the Federal government, and became a strong advocate of States' rights (q.v.). He resigned from the Senate to accept the office of Governor of New York, to which he was elected in 1828. Van Buren was an enthusiastic supporter of General Jackson for the Presidency in 1828, and became Jackson's Secretary of State the following year, but resigned in 1831 to accept the post of Minister to England. The refusal of the Senate, from motives arising from pique, to confirm his nomination after he had sailed only brought increased popularity to Van Buren, and with the support of Jackson easily secured his nomination and election to the vice presidency in 1832. During all the vicissitudes of Jackson's administration Van Buren succeeded in retaining his confidence unimpaired, winning especial favor from the President because of his attitude in the Peggy O'Neill episode (see EATON, MARGARET O'NEILL), and soon came to be regarded as his logical successor. In 1835 he was nominated by the Democratic party, and in the following year was elected President, receiving 170 electoral votes, as against 73 given to his principal opponent, the Whig candidate, Gen. W. H. Harrison. Van Buren's term was made notable by a widespread financial panic resulting partly from certain measures of President Jackson's Administration, and partly from the spirit of reckless speculation which prevailed at the time. The chief measure of his administration was the establishment of the independent treasury system for the safekeeping and disbursement of the public moneys. This system, after a short interruption during the Whig supremacy, became a part of the permanent policy of the country. President Van Buren was renominated in 1840 for the presidency, but, chiefly on account of the financial distress of the time, for which he was to a considerable extent held responsible in the popular mind, he was overwhelmingly defeated by the Whig candidate, General Harrison. In 1844 he was again a candidate for the Democratic nomination, but on account of his opposition to the annexation of Texas he was opposed by the southern Democrats, and was defeated. In 1848 he was nominated for the presidency by the newly formed Free-Soil party (q.v.). His ticket diverted sufficient votes in New York from General Cass, the Democratic candidate for President, to insure the latter's defeat and the triumph of the Whigs. He supported Pierce in 1852 and Buchanan in 1856, and remained to the day of his death a Democrat except on the question of slavery extension.

Van Buren attained eminence at the bar, but never practiced after his election to the United States Senate in 1821. As a politician he was surpassed by few, if any, men of the time, and for many years was the controlling spirit of the Albany Regency (q.v.). He wrote a fragmentary work entitled *An Inquiry into the Origin and Cause of Political Parties in the United States*, published in 1867. The most valuable of his numerous biographies is that by E. M. Shepard in the "American Statesmen Series" (Boston, 1899). Consult D. S. Alexander, *Political History of the State of New York* (New York, 1906); William MacDonald, *Jacksonian Democracy* (ib., 1906); J. G. Wilson, ed., *The Presidents of the United States*, vol ii (ib., 1914). (See UNITED STATES.) One of his sons, John (1810–66), popularly known as Prince John, graduated at Yale in 1828, became an able and prominent lawyer, and was Attorney-General of New York in 1845–46.

VAN BUREN, WILLIAM HOLME (1819–83). An American surgeon, born in Philadelphia. He graduated from the medical department of the University of Pennsylvania in 1840; entered the army and served in Florida and on the Canadian frontier; was on the staff of Bellevue Hospital from 1849 till 1852; was professor of anatomy in the medical college of New York University from 1852 till 1866; and from 1866 till shortly before his death occupied the chair of surgery in Bellevue Hospital Medical College. He translated Bernard and Huette's *Operative Surgery and Medical Anatomy* (1855), and Morel's *Compendium of Human Histology* (1861). He also published: *Contributions to Practical Surgery* (1865); *Lectures on Diseases of the Rectum* (1874); and, with Dr. E. L. Keyes (q.v.), *A Practical Treatise on Surgical Diseases of the Genito-Urinary Organs* (1874).

VANCE, LOUIS JOSEPH (1879–). An American novelist. He was born in Washington, D. C., and was educated in the preparatory department of the Brooklyn Polytechnic Institute. Besides contributing short stories and verse to magazines after 1901, he wrote many popular novels, among them: *The Brass Bowl* (1907); *The Black Bag* (1908); *The Bronze Bell* (1909); *The Fortune Hunter* (1910); *The Bandbox* (1912); *Joan Thursday* (1913); *The Lone Wolf* (1914); *Sheep's Clothing* (1915).

VANCE, ZEBULON BAIRD (1830–94). An American soldier and politician, born in Bun-

combe Co., N. C. He attended Washington College, Tenn., and in 1851–52 studied law at the University of North Carolina. In 1852 he was admitted to the bar. He was a member of the State Legislature in 1854, and in 1858 was elected to Congress as a Whig to fill the unexpired term of Thomas L. Clingman (q.v.). He opposed secession as long as possible but raised a company which became a part of the Fourteenth North Carolina Regiment. Later he was elected colonel of the subsequently famous Twenty-sixth North Carolina Regiment, and served in eastern North Carolina and in the Seven Days' battles. In 1862, while in the field, he was elected Governor, and at once bent all his energies to the successful prosecution of the war. Upon the collapse of the Confederacy, he was imprisoned in Washington from May 20 to July 5, 1865, but was then released on parole. In 1870 he was elected to the United States Senate, but, as his disabilities had not been removed, was refused admission. He resigned in 1872, and resumed the practice of law in Charlotte. In 1876, after an exciting campaign, he was for the third time elected Governor. He was again elected to the United States Senate in 1879, and was reelected in 1885 and 1891. Consult Dowd, *Life of Zebulon B. Vance* (Charlotte, N. C., 1897).

VAN CEULEN, Cornelius Janssen. See Janssen, Cornelius.

VAN CORTLEAR, or **VAN CURLER,** Arendt (c.1600–67). A Dutch colonist in America, born in Holland. Emigrating to New Amsterdam (New York) in 1630, he made an expedition to the Iroquois country in the winter of 1634–35, of which he kept a journal. In 1642 he became superintendent of Rensselaerswyck, and as such was called upon to conduct frequent negotiations with the Indians, whom he treated with uniform consideration and justice and over whom, in consequence, he exercised a powerful influence, by which he preserved peace for many years between them and the whites. Throughout the Mohawk country, and to a certain extent among the eastern Indians generally, the name Corlear soon came into use to designate the English governors (especially of New York), and was so used for more than a century. In 1661 he bought the Great Flat of the Mohawk River from the Indians, and in 1662 founded Schenectady, the first agricultural settlement in the province in which farmers could hold land in fee simple, free from feudal annoyances. In 1667, while on his way to Quebec to visit the French governor, he was drowned off Split Rock, in Lake Champlain.

VAN CORTLANDT, Jacobus (1658–1739). An American merchant, brother of Stephanus Van Cortlandt (q.v.). Born in New York City, he became the founder of the Yonkers branch of the family, and his estate was finally purchased by New York City and made into Van Cortlandt Park. The manor house in the park has been restored and is now used as a historical museum. Van Cortlandt was one of the most notable men of the colony, and served as mayor of New York City in 1719.

VAN CORTLANDT, Philip (1749–1831). An American soldier and legislator, born in Westchester Co., N. Y. He became a land surveyor at 19, and in June, 1775, after the outbreak of the Revolutionary War, entered the Continental army as lieutenant colonel, serving in the campaign against Burgoyne (1777), in Sullivan's expedition against the Iroquois Indians (1779), and in the Virginia campaign, which closed with the capture of Yorktown (1781). He became a colonel in November, 1776, and a brevet brigadier general in September, 1783. Subsequently he was a member of the State Convention which ratified the Federal Constitution (1788), of the New York Assembly (1789–90), of the New York Senate (1791–94), and of Congress (1793–1809).

VAN CORTLANDT, Stephanus (1643–1700). An American Colonial administrator, born in New Amsterdam (New York City). He was a member of the Court of Assizes, a legislative-judicial body, under the first English Governor, Nicolls. He had various ranks from captain to colonel in the regiment of Colonial militia; and from 1677 almost continuously until his death was mayor of New York City, being the first native American to hold that position. Other positions under the British colonial government were those of Governor's Councilor, Judge of the Common Pleas, Justice and Chief Justice of the Provincial Supreme Court, Commissioner of Revenue, Deputy Auditor General, and Deputy Secretary of the Province. In 1697 William III, by patent, erected Van Cortlandt's large estates into the lordship and manor of Cortlandt. The manor house, built on the north shore of Croton Bay, was still standing in 1916. In it were entertained many of the noted men of the revolutionary period. See also Van Cortlandt, Jacobus.

VANCOUVER, văn-kōō'vẽr. The metropolis of western Canada and the fourth largest city in the Dominion, situated on a peninsula in Burrard Inlet (q.v.), an arm of the Strait of Georgia (Map: British Columbia, D 5). It has steamship connections with Japan, China, India, New Zealand, Sandwich Islands, Alaska, Seattle, Victoria (B. C.), and points along the American coast, and is the terminus of the Canadian Northern, the Canadian Pacific, and the Great Northern railways. Vancouver is the seat of the University of British Columbia opened in 1915 and among its noteworthy features are beautiful parks, particularly Stanley Park with its preserve of virgin forest, and numerous modern office buildings and institutions the most important of which are the Canadian Bank of Commerce, Bank of Montreal, Merchants Bank, Customs House, Hotel Vancouver, Vancouver General Hospital, public library, Orphanage, and the court house and provincial administrative offices. The city is an important centre of the timber industry, the value of its lumber exports in 1914 being $12,755,834. The salmon canning and fishing industries are also centred here and its many large industries include shipbuilding, sugar refining, fish packing, and the manufacture of jute, furniture, and machinery. The fine harbor allows for a large foreign trade and in 1915 the exports were valued at $15,172,233 and the imports at $25,705,360. The registered tonnage of 18,478 seagoing and coasting vessels entered and cleared was 10,347,563 for the year ending March 31, 1915. The bank clearings for the same period amounted to $369,995,095. The city, named for Capt. George Vancouver, R. N., who explored and named Burrard Inlet in 1792, has had a remarkable growth. Pop. (city proper), 1886, 600; 1891, 13,709; 1901, 27,010; 1911, 100,401.

VANCOUVER. A city and the county seat of Clarke Co., Wash., 3 miles north of Portland,

Oreg., on the Columbia River, the Great Northern, the Spokane, Portland, and Seattle, the Northern Pacific, and the Union Pacific railroads, and on several steamship lines (Map: Washington, C 4). It has St. James College (Roman Catholic), opened in 1856, the State School for the Blind, and the State School for the Deaf and Dumb Defective Youths. The headquarters of the military department of the Columbia are there, the Vancouver barracks (q.v.). Other features include the House of Providence, St. Joseph's Hospital, the Carnegie Library, courthouse, high-school and post-office buildings, and a United States Land Office. There is also a picturesque park, in the heart of the city. The industrial establishments include brick and tile works, bottling works, a box factory, creameries, flour and lumber mills. Vancouver was founded by the Hudson's Bay Company in 1828, and was first incorporated in 1858. Pop., 1900, 3126; 1910, 9300; 1915 (U. S. est.), 12,555, 1920, 12,637.

VANCOUVER, GEORGE (1758–98). An English naval officer and explorer, who served with Cook in his second and third voyages. In 1791 he was sent to Nootka Sound (q.v.) to receive the transfer of the disputed territory from the Spaniards. He went by way of the Cape of Good Hope, touched at Australia and New Zealand, where he surveyed and mapped a portion of the coast hitherto unknown, and then proceeded by way of Tahiti to Nootka. In the following year he passed through the Strait of San Juan de Fuca, discovered the Gulf of Georgia, and circumnavigated Vancouver Island. He then carefully examined for the first time the coast north of San Francisco, and returned to England in October, 1795. His account of his expedition was published in 1798, in London, under the title, *A Voyage of Discovery to the North Pacific Ocean and Round the World in the years 1790–95.* Consult C. F. Newcombe, *The First Circumnavigation of Vancouver Island* (Victoria, 1914).

VANCOUVER BARRACKS. A United States military post in the State of Washington, established in 1848. The reservation, which embraces 640 acres, is on the right bank of Columbia River, 120 miles from its mouth, and 8 miles from Portland, Oreg. The railway station, telegraph station, and post office are Vancouver, Wash. There are quarters for a regiment of infantry, which with a company of engineers formed the garrison in 1916.

VANCOUVER ISLAND. An island on the Pacific coast of North America, politically a part of British Columbia (Map: British Columbia, D 5). Area, nearly 20,000 square miles. The island is mountainous, belonging to the adjacent chain on the continent. Victoria Peak is the highest point, reaching an elevation of 7484 feet. The coast presents a fiordlike aspect, being roughly irregular. Nootka Sound is on the west. Lakes and rivers abound, but none of the streams are navigable. The climate is moist and mild. There are forests of coniferous and deciduous trees. There is plenty of big game, and the fisheries are rich in salmon, herring, and sturgeon. Gold is found in the rivers; iron and copper ores are abundant; and particularly noteworthy are the coal mines, which supply the whole Pacific coast. The island has railway communication extending from Victoria northwesterly to Alberni. Victoria, the capital of British Columbia, is situated at the southeastern end of the island. Pop., 1911, 31,660.

Vancouver was discovered in 1774, and in 1792 was circumnavigated by George Vancouver. The United States laid claim to it, but relinquished it under the Oregon Boundary Treaty in 1846. At the instance of Great Britain the Hudson's Bay Company agreed to vacate the island for 10 years, in order that settlers might enter. As a result it was made a colony at the end of that time, and in 1866 it was united with British Columbia.

VAN CURLER. See VAN CORLEAR.

VANDA (Neo-Lat., from Skt. *vandana*, parasitic plant). An Indo-Malaysian genus of plants of the family Orchidaceæ. The species, of which there are about 20, are generally epiphytic, are well supplied with foliage, and grow vigorously. *Vanda suavis*, one of the most remarkable species, has large fragrant white or yellow flowers with a violet lip. *Vanda cærulea* is highly prized for its panicles of azure flowers.

VANDAL, vän'dal', ALBERT (1853–1910). A French historian, born in Paris. His work shows much scholarly research and sober judgment. He was elected to the French Academy in 1897. He wrote: *En karriole à travers la suède et la Norvège* (1876); *Louis XV et Elizabeth de Russie* (1882); *Ambassade française en Orient sous Louis XV* (1887); *Napoléon et Alexandre Ier* (3 vols., 1894–97), awarded the Vaubert prize, *Les voyages du Marquis de Noutel* (1901), *L'avènement de Bonaparte* (1902). He succeeded Albert Sorel (q.v.) at the school of political science and wrote little during the latter part of his life.

VANDALIA. A city and the county seat of Fayette Co., Ill., 69 miles northeast of St. Louis, Mo., on the Kaskaskia River, and at the junction of the Vandalia and the Illinois Central railroads (Map: Illinois, F 8). The old State House is the most prominent feature of the city. Vandalia has a foundry, machine shops, a tarring plant, a paper mill, stave and wagon factories, a saw mill, and a brickyard. Pop., 1900, 2665; 1910, 2974.

VANDALS (Lat. *Vandali, Vinduli, Vindili*). An ancient Germanic or Teutonic people. Procopius (q.v.) states that they originally occupied the country about the Palus Mæotis (Sea of Azov). If this is so, they migrated later to the northwest, and settled south of the Baltic, between the rivers Vistula and Viadua (Oder). When they appear in history in the second century A.D. they inhabited the region to the northeast of the Riesengebirge, and figure as the associates of the Marcomanni and the Quadi (qq.v.) in the plundering expeditions into Pannonia and the wars with Marcus Aurelius (q.v.). In the latter half of the third century they are found in the Roman province of Dacia (q.v.), along with Goths (q.v.) and Gepidæ. According to Jordanes (q.v.) the Gothic King Geberic annihilated a large part of the nation on the banks of the Maros. The remainder were transplanted by Constantine to Pannonia (about 334 A.D.), where they lived in peace for 60 years. But at the beginning of the fifth century, urged, it is said, by Stilicho (q.v.), they abandoned their new homes, and in company with the Suevi, Alani, and Burgundians, led by their King, Godegisil, burst into Gaul, which they wasted for the space of three years. Thence they swept through the passes

of the Pyrenees into Spain, which experienced a similar fate, and finally, after much quarreling and fighting with their German associates, they settled in a part of Bætica, which received from them the name of Vandalitia (modern Andalusia, q.v.). In 429, at the call of Bonifacius (q.v.), Roman Governor of Africa, they crossed the Strait of Gibraltar, under their leader, Genseric (q.v.), in one resistless horde (numbering 50,000 to 80,000 in all), carrying devastation and ruin from the shores of the Atlantic to the frontiers of Cyrene (q.v.) They were joined by the Donatists (q.v.), a sect of African heretics, and, being themselves Arians, inflicted great cruelties upon the orthodox Christians. Meantime Bonifacius endeavored to undo his treachery. He marched against the Vandals, but was defeated with considerable loss, and driven into Hippo (now Bona), which he defended for more than 14 months. Reenforced by a Byzantine army under Aspar, he sallied out against the Vandals, but was again defeated. Thus decided the fate of Africa. In 439 Genseric broke the peace which he had concluded with Valentinian III in 435, and conquered Carthage (q.v.). A new peace was established which recognized the authority of the Vandals over north Africa from the Atlantic to Cyrene, over the Balearic Isles, Sardinia, Corsica, and part of Sicily. In 455 the Vandals invaded Italy and plundered Rome for 14 days. After the death of Genseric (477), his son, Hunneric, cruelly persecuted the Catholics. He warred against the Moorish races in north Africa, who were trying to recover their independence, and by his piracies kept the Mediterranean in a state of alarm. His successors, Guntamund (484–496) and Thrasamund (496–523), were comparatively mild and tolerant rulers. But the warm climate and the love of luxurious pleasure now began to enervate the spirit of the Vandals. Thrasamund was compelled to solicit aid from his brother-in-law, Theodoric (q.v.), who sent a Gothic contingent to him to help him against the Moors of Tripoli. After his death, Hilderic (523–530), a son of Hunneric, became ruler, but his subjects grew discontented, and he was overthrown by his uncle, Gelimer, in 530. This led the Greek Emperor Justinian (q.v.) to send an expedition, under Belisarius (q.v.), against Gelimer. When the latter heard of the arrival of the Byzantine general he caused Hilderic and his sons to be put to death, but was himself soon after forced to seek refuge in Numidia. In 534, after two defeats by Belisarius, he surrendered, was carried to Constantinople in triumph, and died in Asia Minor. Most of the Vandals were drafted into the Imperial army, and were lost in the Persian wars. The few who remained in Africa rapidly disappeared among the natives. Consult: Procopius, *De Bello Vandalico;* Wrede, *Die Sprache der Vandalen* (Strassburg, 1866); L. Schmidt, *Geschichte der Wandalen* (Leipzig, 1901); Pasquale Villari, *The Barbarian Invasions of Italy,* English translation by Linda Villari (New York, 1903); *Cambridge Medieval History,* vol. i (ib., 1911); E. Gibbon, *Decline and Fall of the Roman Empire,* chapters xxxiii and xli, ed. by J. B. Bury (London, 1912); and the article "Vandalen" in Fr. Lübker, *Reallexikon des klassischen Altertums* (8th ed., Leipzig, 1914).

VANDAMME, vän'dàm', Dominique René (1771–1830). A French general, born at Cassel (Nord). He enlisted at Martinique in 1788, and, returning to France at the beginning of the Revolution, gained distinction as the commander of a free corps which he organized in 1792, and became at the age of 22 a brigadier general in the army of the North. He fought in Belgium under Jourdan and on the Rhine, became general of division in 1799, and distinguished himself at Austerlitz (1805) In the following year he was placed in command of the Wurttemberg troops, and in this capacity occupied Silesia in 1806–07, and took part in the Austrian campaign of 1809 In 1812 he commanded the forces in Westphalia, but, owing to dissensions with King Jerome, was removed After the battle of Dresden (1813) he was intrusted by Napoleon with the pursuit of the allies, but at Kulm (August 29–30) was surrounded and compelled to capitulate with 10,000 men. During the Hundred Days he was created a peer by Napoleon (he had been made Count in 1808), and fought at Ligny and Wavre. He was banished after the second restoration and lived for some time in America.

VAN DEN BOSCH, van dĕn bŏs, Jan (1780–1844). A Dutch general, born at Herwynen. In 1797 he went to Java as a lieutenant and rapidly rose to be a colonel. In 1815 he became chief of the general staff and later major general. In 1830 he was appointed Governor-General of Batavia and was the founder of the Dutch system of civilizing the natives. In 1833 he became Minister of State for the Colonies and was raised to the nobility in 1839.

VAN'DERBILT, Cornelius (1794–1877). An American capitalist and financier, born near Stapleton, Staten Island, N. Y. He had practically no schooling At the age of 16 he established a ferry between Staten Island and New York for passengers and farm products. At 18 he owned or controlled three boats, and from that time on his interests in shipping rapidly increased. He rapidly acquired a considerable fleet of river and harbor boats, and in 1817 built and became captain of the first steamboat running between New York and New Brunswick, N. J. A company was organized of which he obtained in 1824 a controlling interest. In 1827 he leased the New York and Elizabeth Ferry and made it a paying investment. In 1829 he began the construction of a fleet of steamboats to compete with the existing Hudson River and Long Island Sound lines. Gradually he obtained control of the important competing lines, established new lines out of New York to Boston and other coast points, and started a new line on the Delaware River. Subsequently his fleet became the largest of the sort in the world, and led to their owner being popularly known as the Commodore. In 1851 he established a steamship and transfer line to California by way of Lake Nicaragua, which successfully competed with the existing Panama route. During the Crimean War he established a transatlantic line between New York and Havre. About the time of the outbreak of the Civil War, having accumulated a fortune of upward of $10,000,000 in the steamboat business, he gradually began to withdraw from that and transfer his capital to railroads, the great possibilities of whose development appealed to him. He had become president of the New York and Harlem Railroad as early as 1857, and in 1864 he obtained control also of the Hudson River Railroad, the stock of which had fallen

to a low figure, worked it in conjunction with the Harlem line, and soon placed it on a paying basis. In 1867 he obtained control of the New York Central Railroad, was elected its president, and in 1869 consolidated with it the Hudson River road. Eventually he completed his plan of a through trunk line from New York to Chicago by securing the Lake Shore, Canada Southern, and Michigan Central roads. At his death his fortune, estimated at about $100,000,000, was left largely to his son, William H. Vanderbilt. A bequest of $1,000,000 was made for founding Vanderbilt University at Nashville, Tenn

VANDERBILT, CORNELIUS (1843–99). An American financier and capitalist, son of William H. Vanderbilt and grandson of "Commodore" Cornelius Vanderbilt. He was born at New Dorp, Staten Island, and was privately educated. After serving as a banking clerk in New York he entered the brokerage house of Kissam Brothers. In 1865 he entered the service of the New York and Harlem Railroad, of which he was treasurer from 1867 to 1877. In the latter year, upon his father succeeding "Commodore" Vanderbilt as president of the New York Central Railroad he became its first vice president, in which position he had almost complete control of the finances of the road. In 1878 he became treasurer of the Michigan Central Railroad and vice president and treasurer of the Canadian Southern. Subsequently he was for several years president of both of the last mentioned roads, besides being president of the New York and Harlem, and after 1886 chairman of the board of directors of the New York Central Railroad At the same time. he was director in more than 34 different railway corporations. He gave largely to educational and religious institutions, among which were Vanderbilt University, Yale University, and the Cathedral of St. John the Divine in New York City. To the Metropolitan Museum, New York, he presented Rose Bonheur's "Horse Fair."

Of his sons, Cornelius, the eldest, devoted his attention primarily to his numerous financial interests. Alfred Gwynne and Reginald Claypoole Vanderbilt became especially known for their interest in show horses, the former, who was lost when the *Lusitania* was sunk in 1915, having been president of the National Horse Show Association of America. Their sister Gladys, who married Count Laszlo Széchényi, was a nurse in Austrian hospitals during the European War and received from Emperor Francis Joseph the Order of the Red Cross. For another sister, see WHITNEY, GERTRUDE VANDERBILT.

VANDERBILT, GEORGE WASHINGTON (1862–1914). An American capitalist, son of William Henry Vanderbilt (q.v.). He was born at New Dorp, Staten Island, N. Y., and was educated partly abroad, where he did much traveling. He did much for the New York Free Circulating Library, gave to Teachers College its site on Morningside Heights, and to the American Fine Arts Society (New York) presented the exhibition room known as the Vanderbilt Gallery. He is known especially for his estate, Biltmore, near Asheville, N. C., consisting of 100,000 acres which he laid out as a great park. Here, in 1892, Gifford Pinchot (q.v.) began the first systematic forestry work in the United States, and here also notable experiments in agriculture were carried on. On the great estate at Biltmore Vanderbilt erected one of the finest of American country houses

VANDERBILT, WILLIAM HENRY (1821–85). An American capitalist and financier, the son of "Commodore" Cornelius Vanderbilt (q.v.), born in New Brunswick, N. J. He was educated at the Columbia College Grammar School, and at the age of 18 became a banking clerk in New York City. A few years later failing health compelled him to retire to a farm on Staten Island. He was appointed receiver of the Staten Island Railroad, which had fallen into difficulties, and in two years cleared it from debt, connected it with New York by a new ferry line, and as a result was chosen its president. Thenceforth his father made him a partner in all his large railroad and financial transactions, and manager of the various railroad interests he acquired The son became vice president of the New York and Harlem Railroad in 1864, and in the next year vice president of the New York Central and Hudson River lines. At his father's death in 1877 he succeeded him as president of the latter road, and under his able and skillful management the control was completed of the Michigan Central, Lake Shore and Michigan Southern, Canada Southern, and Chicago and Northwestern systems. Subsequently the Nickel Plate and West Shore roads were acquired. He gave largely during his lifetime to Vanderbilt University, the College of Physicians and Surgeons (Columbia University), and other educational and philanthropic institutions.

His sons, William Kissam, Frederick William, and George Washington Vanderbilt (q.v.), succeeded to their father's large railroad and other financial interests. The brothers built the Vanderbilt Clinic in New York. William K. Vanderbilt was a founder and president of the New Theatre. His first wife after her divorce married O. H. P. Belmont and gained prominence as a leader in woman suffrage, and his second wife became known for her many charities and her personal interest in social-welfare movements. In 1915 she was awarded the French Foreign Office gold medal for work on behalf of the American Ambulance Corps in the European War.

VANDERBILT UNIVERSITY. A coeducational institution for higher learning at Nashville, Tennessee. It was founded in 1875 through donations received from Cornelius Vanderbilt (1794–1877) (q.v.) amounting to $1,000,000, and other members of the Vanderbilt family also gave largely to it later. The organization includes a College of Arts and Sciences, schools of law, religion, medicine, dentistry, pharmacy, and engineering. The annual enrollment is about 1000 students. In 1913 Andrew Carnegie gave to the School of Medicine $1,000,000 for endowment and equipment. The total resources in 1916 amounted to more than $4,000,000. The annual income is about $200,000. The governing board of the university is a self-perpetuating board of trustees composed of 33 members with an active executive committee of seven members. The library contains about 60,000 volumes. The faculty in 1916 numbered 169, headed by president J. H. Kirkland, LL.D., D.C.L.

VANDERGRIFT. A borough in Westmoreland Co., Pa., 40 miles by rail east of Pittsburgh, on the Pennsylvania Railroad. It has the largest sheet steel plant in the world. In July, 1915, the borough of Vandergrift Heights, whose population in 1910 was 3438, was consolidated with Vandergrift. Pop., 1900, 2076; 1910, 3876.

VANDERGRIFT, MARGARET Pen name of Margaret Thomson Janvier See JANVIER, THOMAS ALLIBONE

VAN'DERKEMP, FRANCIS ADRIAN (1752–1839). An American scholar and writer, born at Kempen, Holland, and educated in the University of Groningen. In 1777 he became a minister in Leyden where he remained for several years. In politics and in religion he was a liberal, and incurred the displeasure of the Dutch government. He joined the armed forces of the Patriot party, which sought political reform in opposition to the Orange party, and was taken prisoner He was released in December, 1787, and came to New York the following year with letters of introduction from John Adams and Lafayette. For six years his home was Esopus on the Hudson, after which he removed to the neighborhood of Lake Oneida, where he was engaged in agriculture during the remainder of his life. He was chosen a member of learned societies and admitted to the honorary degree of LL.D. by Harvard College (1820). In addition to many printed papers he left an autobiography, which has furnished the material for a memoir written in 1903 by Mrs. Helen Lincklaen Fairchild Many of his manuscripts are preserved by the Pennsylvania and Buffalo Historical Societies and by Columbia University.

VAN'DERLIP, FRANK ARTHUR (1864–). An American financier and writer, born in Kane Co., Ill. After a boyhood spent on a farm and a country school education, he was apprentice in a machine shop at Aurora, Ill., and studied stenography at night by writing with chalk on his lathes. Then he was employed on a local newspaper, and next became a student at the University of Illinois and at Chicago University. He studied finance under Joseph French Johnson (q.v.). From 1890 to 1894 he was financial editor of the Chicago *Tribune*, in 1894–97 associate editor of the Chicago *Economist*. Appointed by President McKinley Assistant Secretary of the Treasury in 1897, he resigned in 1901 and became vice president of the National City Bank of New York, of which, from 1909, he was president. In 1915 he became chairman of the great new American International Corporation, formed to promote American commercial and industrial interests in foreign countries. Vanderlip studied financial and industrial conditions abroad in 1901, conferring with Ministers of Finance in all the European countries. After his return he published (1902) *The American Commercial Invasion of Europe* and took an active part in formulating important financial legislation. Besides the book named and many addresses on financial subjects, he published: *Business and Education* (1907); *Modern Banking* (1911); *A Plea for Intellectual Freedom in Currency Legislation* (1913); *Business and Politics* (1915). See VOLUME XXIV.

VAN'DERLYN, JOHN (1776–1852). An American portrait and historical painter, born near Kingston, N. Y. He was a protégé of Aaron Burr, who supported him as a pupil of Gilbert Stuart, in Philadelphia, and sent him to Paris, where he studied for five years. On his return to America in 1801 he lived in the house of Aaron Burr, then Vice President, where he painted the well-known profile likenesses of Burr and his daughter. In 1803 he returned to Paris, also visiting England in 1805, and then went to Rome, where he remained three years. Here he painted his "Marius Among the Ruins of Carthage" (1807), which received a gold medal at Paris in 1808 In 1812 he finished his second chief work, "Ariadne of Naxos" (Pennsylvania Academy of Fine Arts, Philadelphia). He painted a number of portraits of public men in Paris, and in America after he settled in New York in 1815. For 12 years his panoramas of Paris, Athens, Mexico, and Versailles and other paintings were exhibited in the New York Rotunda, a building erected for that purpose in City Hall Park. The financial returns were small and he was more or less in need of money during the remainder of his life. He died in destitution at Kingston. In 1842 he received the commission for his "Landing of Columbus," one of the large panels in the rotunda of the capitol in Washington, well known from its use upon the United States five-dollar note. Only the design, however, is by Vanderlyn, the execution having been intrusted by him to a French painter.

Vanderlyn's paintings show superior draftsmanship and skill in composition, and his portraits are carefully modeled and good in characterization. The best known are those of Washington in the capitol at Washington, President Taylor (Corcoran Gallery, ib); Aaron Burr and R. R. Livingston (New York Historical Society). In the Metropolitan Art Museum are portraits of John A Sidell, Frank Waddell, and the artist.

VAN DER STAPPEN, CHARLES. See STAPPEN, C. P. VAN DER.

VAN DER STUCKEN, stu'ken, FRANK (1858–). An American composer and musical conductor, born in Fredericksburg, Tex. When but six years old he was taken by his parents to Antwerp, and was thus enabled to study with Benoit. In 1876 he went to Leipzig, where he spent two years in study with Reinecke, Grieg, and Langer, after which he traveled through Europe for two years. In 1881 and 1882 he served at the Breslau City Theatre as kapellmeister. He succeeded Leopold Damrosch in 1884 as director of the Arion Club of New York, was conductor of the Symphony Concerts at Cincinnati, Ohio, in 1895–1907, dean of the College of Music there in 1897–1901 and honorary dean thereafter. From 1906 to 1912 he was conductor of the biennial May Festival at Cincinnati He composed the opera *Vlasda* (1883); the symphonic prologues *William Ratcliff* and *Pax triumphans; Festival March* for orchestra; *Festival Hymn; Inauguration March;* incidental music to Shakespeare's *The Tempest;* an orchestral episode, *Pagina d'amore;* mixed and male choruses *a capella;* numerous songs.

VANDER VEER, ALBERT (1841–). An American surgeon, born at Root, N. Y. He studied medicine at Albany and Washington, D C., graduating from the National Medical College in 1862. He took part in the Civil War as surgeon of the Sixty-sixth New York Volunteer Regiment. In 1865 he settled in Albany and in 1869 became a professor in the Albany Medical College, of which he was also dean from 1896 to 1905, and where he held the chair of surgery after 1902. He served as president of the American Surgical Association in 1905 and of other important societies. His writings treat especially of uterine surgery and surgery of the abdomen.

VANDERVELDE, vän'dĕr-vĕl'de, EMILE (1866–). A Belgian statesman, born at Ixelles. He studied law at the University of

Brussels, and became doctor of laws in 1885 and doctor of social science in 1888. In the latter year he organized the Circle of Student Socialists at Brussels, and in 1898 founded the Socialist Antialcoholic League. Eventually he became a member of the International Socialist Bureau. Elected a deputy for Charleroi in 1894, he quickly distinguished himself in the Chamber by his eloquence. Reëlected for Brussels in 1900, he became chief of the parliamentary Socialist group, being again successful at the polls in 1906. When the European War broke out in 1914, he became premier of the Belgian War Ministry, and he was a member of the Belgian Commission that protested to President Wilson against German treatment. His wife visited the United States, where she raised $300,000 for Belgian relief. Vandervelde's writings include: *Les associations professionelles d'artisans et d'ouvriers en Belgique* (1892); *L'Evolution industrielle et le collectivisme* (1896; Eng. trans., *Collectivism and Industrial Evolution*, 1901); *La question agraire en Belgique* (1897); *Le Socialisme en Belgique* (1898), with Destrée; *L'Alcoolisme et les conditions du travail en Belgique* (1899); *La propriété foncière en Belgique* (1900); *L'Exode rural et le retour aux champs* (1903); *Le Socialisme et l'agriculture* (1906); *La Belgique et le Congo* (1911).

VAN DER VLUGT, WILLEM. See VLUGT.

VAN DER WAALS, JOHANNES DIDERIK. See WAALS.

VAN DER WEYDEN. See WEYDEN, VAN DER.

VAN DEVAN'TER, WILLIS (1859–). An American jurist, born at Marion, Ind. He graduated from Asbury College (later De Pauw University) in 1878 and from the Cincinnati Law School in 1881. After practicing at Marion, in 1884, he settled at Cheyenne, Wyo. In 1886 he was commissioned to revise the territorial statutes. While city attorney of Cheyenne, member of the territorial legislature (1887–88), and Chief Justice of the Wyoming Supreme Court (1889–90), he came to be recognized as a leader in the Republican party. From 1897 to 1903 he was Assistant Attorney-General of the United States, assigned to the Department of the Interior. During the same period he was professor of law at George Washington (then Columbian) University. In 1903 he was appointed a justice of the Federal Circuit Court and in 1910 President Taft appointed him an associate justice of the United States Supreme Court. He delivered numerous opinions on complicated corporation and railroad cases. In United States *v.* Patten (226 U. S., 525), he declared that a conspiracy to corner a staple commodity in order to enhance its price came under the provisions of the Sherman antitrust law. See PATTEN, JAMES A.

VAN DE VELDE, vän dā vĕl'dĕ. A family of Dutch artists. See VELDE, VAN DE.

VAN DIE'MEN'S LAND. See TASMANIA.

VAN DORN, EARL (1820–63). An American soldier, born near Port Gibson, Miss. He graduated at West Point in 1842. He took part in the military occupation of Texas and in the Mexican War, and was brevetted major. After the war he was engaged in suppressing the outbreak of the Seminole Indians in 1849–50, and later in the operations against the Comanches in the Indian Territory. After the secession of his native State he became a Confederate soldier, was appointed brigadier general, later succeeded Jefferson Davis as major general of the Mississippi forces, and in March, 1861, received an appointment as colonel in the Confederate army. He was promoted brigadier general in 1861, major general in September of that year, and in January, 1862, became commander in chief of the Trans-Mississippi Department. He was defeated at Pea Ridge in March, 1862, and was superseded by General Holmes and given command of a division in the army of the Mississippi. Again promoted, he commanded his own and Sterling Price's troops in the unsuccessful attack on Rosecrans at Corinth, Oct. 3 and 4, 1862. After his defeat at this point charges were brought against him for neglect of duty, but he was completely exonerated by a court of inquiry. Superseded by Pemberton, he commanded a division under the latter, and while in command of the Confederate cavalry during the first advance movements of the Federals on Vicksburg, won an engagement at Holly Springs, Miss., and conducted other operations with great success and brilliancy. He continued in the field until May, 1863, when he was shot and killed as a result of a private quarrel.

VANDU'ARA. The Roman name of a town in Scotland, now called Paisley (q.v.).

VAN DU'ZER, LEWIS SAYRE (1861–). An American naval officer, born at Elmira, N. Y. Graduating from the United States Naval Academy in 1880, he was promoted through the various ranks of the service to captain in 1911. During the Spanish-American War he participated as an officer of the U.S.S. *Iowa* in the battle of Santiago and the destruction of Cervera's fleet (1898) and also in the attack on San Juan, P. R. During the Philippine Insurrection he served on the *Charleston* and *Petrel* (1898–1900), and at the outbreak of the Boxer Rebellion in 1900 he went to China. In 1900–02 he was an instructor in ordnance at the United States Naval Academy, and in 1908–09 commanded the *Cleveland*. After serving as commandant of the Navy Yard at Olongapo, P. I. (1909–10), and as captain of the yard at the Brooklyn Navy Yard (1910–13), he was in command of the U.S.S. *Utah*, until 1914, when he retired. He received several medals. Besides editing the *Army and Navy Year Book* in 1895 and 1896, and contributing to technical journals and various reference works, he served as nautical and naval editor of the NEW INTERNATIONAL ENCYCLOPÆDIA.

VAN DYCK, dĭk, ANTHONIS, called in England SIR ANTHONY VANDYKE (1599–1641). The most important portrait painter, next to Rubens, of the Flemish school; also a figure painter and an etcher. He was born at Antwerp, March 22, 1599, the son of Frans van Dyck, a wealthy silk mercer, and his second wife Maria Cuypers, who was known for her skill in embroidery. He was placed, at 10, with the painter Hendrik van Balen; in 1615 he was independently established at Antwerp with Jan Brueghel the younger. His heads of Christ and of the Twelve Apostles attracted the attention of Rubens, who made the young artist his assistant and friend. He lived in the great master's house, and fell completely under his influence, often painting the same subjects in a manner which makes it extremely difficult to distinguish them, as, e.g., in several works at Berlin and a "St. Jerome" at Dresden. In 1618 he was admitted to the Painters' Guild. In November, 1620, on invitation of the Earl of Arundel, he went to

England, and was granted a pension by James I. By this time he had formed a more independent style, still based upon Rubens's but less robust in character and bright in color, and more refined. In February he was granted eight months' leave and presumably traveled in Italy. In 1622 he was again in Antwerp to attend his father's deathbed, and shortly afterward we find him in Venice.

He next went to Genoa, where he was warmly welcomed by the resident Flemish painters, like the brothers De Wael, whom he commemorated in the portrait of the Capitoline Museum (Rome) and in that of Jacobus de Wael and his wife at Munich. He was much influenced by the great Venetian masters and gradually changed his style and method of painting. His Italian sketchbook, now in possession of the Duke of Devonshire, gives interesting record of his studies, many of which are after Titian. Some of his finest productions belong to this period. Wonderfully characteristic is the series of portraits of the Genoese nobility, in their rich, costly robes and glittering jewels, which are still to be seen in local palaces. One of these, "Portrait of a Lady and Child," is now in the Morgan collection, Metropolitan Museum, New York. At Rome (1623) he portrayed Cardinal Bentivoglio (Pitti Palace), and in 1624, while on a visit to Palermo, he painted Philip of Savoy (Viceroy of Sicily) (Turin), besides painting the celebrated Madonna del Rosario (see MADONNA). Afterward he painted portraits of other members of the house of Savoy at Turin, now in the Pinacoteca. He probably returned to Antwerp about 1627 and the following five years contain his best work. In friendly rivalry with Rubens, he established an influential school. Sometimes he painted after Rubens's sketches, achieving works difficult to distinguish from his master's, as in "St. Martin Dividing His Cloak" (National Gallery, London, and Saventhem, Belgium), and the "Raising of the Brazen Serpent" (Madrid and Richmond). This is the period of his chief religious works. At his father's dying wish he presented to the Dominican Sisters at Antwerp a picture of "Christ on the Cross" (1629, Antwerp Museum). This was a favorite subject; others were the "Pietà" and "Bewailing Christ," of which there are splendid examples at Antwerp, Vienna, and Munich. Of his Madonnas well-known examples are at Munich, Paris, Berlin, and Palermo. His mythological subjects are less frequent; among the best known are "Danaë" (Munich) and "Diana and Endymion" (Prado).

His many portraits of this period, including the nobility and his fellow artists, show increased dignity and nobility of character, but are less brilliant and of a softer, more golden color scheme than his Italian portraits. His celebrity is attested by the appointment as court painter to the Spanish regents of the Netherlands, Albert and Isabella; his portrait of the latter is in Madrid. Other sitters were Maria de' Medici, the exiled Queen mother of France, her son Gaston, Duke of Orléans (Earl of Radnor), and the Marquis Spinola. Most of Van Dyck's best portraits in European galleries belong to this period; among them are those of Frans Snyders and his wife (St. Petersburg and Cassel), the Count Palatine of Neuburg, the full length Duke and Duchess of Croy, the so-called Burgomaster of Antwerp and wife, and the Organist Liberti—all at Munich, the beautiful Princess Luisa de Tassis (Liechtenstein collection, Vienna); Anna Wake (The Hague), President Ricardo and his son (Louvre); and Cornelis van der Geest (National Gallery, London), besides many others in English private collections.

Van Dyck also designed for the school of engravers which Rubens had founded, his plates being executed by Paulus Pontius, Lucas Vorster, and others. He himself etched about 22 plates with fine technique; but he generally preferred to etch only the heads, leaving the detail to engravers. During his stay in Italy he began to collect materials for an iconographic work portraying the chief celebrities of the day. The studies in *grisaille* are dispersed over Europe, but the complete work was published at Antwerp in 1641. It is usually known as Van Dyck's *Centum Icones* or *Iconographiæ*.

For some time Van Dyck had been receiving overtures from the English King, instigated by the Earl of Arundel and his friend Kenelm Digby. He had been persuaded in 1631, but, differences arising, he went instead to Holland. There he portrayed Prince Henry of Orange and his wife and the Princes Charles Louis and Rupert, sons of the exiled King of Bohemia (Vienna Gallery). At this time, probably, occurred his visit to Frans Hals at Haarlem, which romancers have elaborated upon. Upon his arrival in England (1632) the King assigned him a house in Blackfriars (London) and apartments in the royal palace of Eltham for the summer; he was knighted and named painter in ordinary to their Majesties, and the year following was granted a yearly pension of £200. The many portraits of the royal family which he now began are perhaps his best known works. Among these are Charles I, the Queen, and their children, and Charles I on horseback, at Windsor, an equestrian portrait of the King in the National Gallery; the portraits of the King and Queen at St. Petersburg, and at Dresden, and "Charles I Hunting," in the Louvre. From 1634 to 1636 Van Dyck was again in Antwerp, where he portrayed the new Regent, Don Ferdinand of Austria (Madrid), and the family of Count John of Nassau (Panshanger), and many others, besides painting his remarkable portrait group of the "Magistracy of Brussels in Session" (destroyed by fire, 1695). From 1636 to 1640 he resided in England, and painted the host of ancestral portraits scattered throughout the seats of the English nobility. Only the sketch and the finishing touches of most of these paintings are by the master himself, the rest being left to assistants. Among the most charming are the two celebrated groups of the King's children, the three with the spaniel (1635, Dresden), and five with the great Dane (1637, Windsor). Van Dyck is well represented in the public collections of the United States, particularly in works of the Genoese period. The Metropolitan Museum, New York, contains nine examples, including the Marchese Durazzo and "Lucas van Uden" in his Genoese manner, and the Earl of Warwick and James, Duke of Lennox (a marvelous example), of the English period. He is represented in the Boston Museum, the Art Institute, Chicago, in the Gardner collection, Boston, and by four examples each in the Frick collection, New York, and the Widener collection, Philadelphia.

On the death of Rubens in 1640 Van Dyck was



SIR ANTHONY VAN DYCK

"QUEEN HENRIETTA" OF ENGLAND, FROM THE PAINTING IN THE DRESDEN GALLERY

invited to Antwerp to complete his pictures for the King of Spain, but declined In the same year he went to Paris, but was disappointed in his hopes of a commission to decorate the Louvre. In failing health he returned to London, where he died Dec. 9, 1641. He was a man of refined character and aristocratic bearing, remaining all his life the *pittore cavalleresco* of his colleagues in Italy. These traits are very perceptible in the many portraits of himself which he painted, in the beautiful youthful example of Munich as in the maturer work in the Uffizi. From his youth he was a favorite of the fair sex, and many were his adventures; but in 1640, at the King's wish, he married Mary Ruthven, a court lady of noble descent.

Van Dyck's character made him par excellence the portraitist of the aristocracy; his portraits are aristocratic and refined, usually with a touch of melancholy, sometimes, indeed, being almost posed and sentimental. Much modern sympathy for the cause of the roistering Cavaliers of England is based upon his noble portraits of Charles I and his followers. In him Flemish realism was tempered by the refining influence of Italy, manifesting itself in more subdued coloring and increased nobility of form. What Rubens sought to express by dramatic action he showed by intensity of expression. Van Dyck trained many assistants, but did not form a school. He exercised a great influence upon the later English portraitists.

Bibliography. The principal monographs on Van Dyck are by Max Rooses (Eng. trans., London, 1900), the chief authority; Lionel Cust (ib, 1911); and Fierens-Gevaert (Paris, 1912), also *Masters in Art*, vol. i (Boston, 1900), containing a bibliography. Among other biographies are those of A. Michiels (Paris, 1881), J. Guiffrey (ib., 1882), E. Knackfuss (Bielefeld, 1902), and Stokes (New York, 1905). For illustrations of all his paintings see Emil Schaeffer (Stuttgart, 1909); for his etchings, F. Newbolt (New York, 1906), and A. M. Hind (Boston, 1915); for engravings, W. Heinemann (London, 1911).

VAN DYCK, CORNELIUS VAN ALLEN (1818–95). An American missionary. He was born at Kinderhook, N. Y., and graduated M.D. at Jefferson Medical College, Philadelphia, 1839. The next year he went as medical missionary to Syria. He was stationed at Beirut, Abeih, and Mount Tabor; was principal in a seminary (1848–52); in the Sidon field (1852–57), and later at Beirut. In 1846 he was ordained to the ministry. He made himself master of the spoken and written Arabic, and undertook the work left unfinished by the death of Eli Smith of translating the Bible into Arabic. Ultimately he entirely rewrote the translation in the style of the Koran. He was the manager of the Mission Press at Beirut from 1857 to 1880; physician to St. John's Hospital and professor of pathology in the Syrian Protestant College there from 1857 to 1882, when he became physician at St. George's Hospital. He superintended the printing of his Bible translation by the American Bible Society, and taught Hebrew in Union Theological Seminary in New York (1866–67). Van Dyck made many translations of religious, scientific, and medical works into Arabic.

VAN DYCK, ERNEST (1861–1923). A Belgian tenor singer, born at Antwerp. He studied in Paris under Saint-Yves. In 1886 he was engaged to sing the rôle of Parsifal, in which his success was instantaneous, and through which he obtained a world-wide reputation He made his début as Lohengrin in 1887. In 1888 he was engaged for the Vienna court opera, and subsequently made many tours of Europe and America, appearing at the Metropolitan Opera House in the season of 1898–99. He was prominently identified with the first productions of Wagner's music dramas at the Grand Opéra of Paris.

VAN DYKE, HENRY (1852–). An American Presbyterian clergyman, author and scholar, born in Germantown, Pa. He graduated at the College of New Jersey (Princeton) in 1873 and at Princeton Theological Seminary (1877), and studied for two years at Berlin University. From 1879 to 1882 he was pastor of the United Congregational Church of Newport, R. I., and then of the Brick Presbyterian Church, New York City, till 1900, when he became professor of English literature at Princeton. In 1902–03 he served as moderator of the General Assembly of his denomination In 1908–09 Dr. Van Dyke was American lecturer at the University of Paris. He was elected to the American Academy of Arts and Letters and received numerous other honors. By appointment of President Wilson he became Minister to the Netherlands and Luxemburg in 1913. His writings, of which those devoted to nature became especially popular, include: *The Reality of Religion* (1884); *The Poetry of Tennyson* (1889, 1895); *The Christ-Child in Art* (1894); *The Other Wise Man* (1896); *The Builders, and Other Poems* (1897); *The Gospel for a World of Sin* (1899); *The Toiling of Felix, and Other Poems* (1900); *The Ruling Passion* (1901); *The Blue Flower* (1902); *Essays in Application* (1905); *Days Off* (1907); *Out-of-doors in the Holy Land* (1908); *Le Génie de l'Amérique* (1909; in Eng., *The Spirit of America*, 1910); *Collected Poems* (1911); *The Unknown Quantity* (1912); *Grand Canyon and Other Poems* (1914).

VAN DYKE, JOHN CHARLES (1856–). An American art historian and critic. He was born at New Brunswick, N. J., and studied at Columbia University, and for many years in Europe. He was admitted to the New York bar in 1877 but never practiced law. In 1878 he was appointed librarian of Sage Library, New Brunswick, and in 1899 professor of art history in Rutgers College. He was elected to the National Institute of Arts and Letters. His many publications on art subjects include: *How to Judge a Picture* (1888); *Art for Art's Sake* (1893); *A History of Painting* (1894; new ed., 1915); *Nature for its Own Sake* (1898; 4th ed., 1906); *Opal Sea: Continued Studies in Impressions and Appearances* (1906); *Studies in Pictures* (1907); *The Desert* (1906); *The Mountain* (1916); *New Guides to Old Masters*, a series of critical guide books. He also edited *Modern French Masters* (1896); *Old Dutch and Flemish Masters* (1901); *Old English Masters* (1902); and a series of histories covering the history of art in America. His work is distinguished by lucid style and sound criticism, particularly from a technical viewpoint.

VAN DYKE, PAUL (1859–). An American historian, brother of Henry Van Dyke (q.v.). Born in Brooklyn, N. Y., he graduated from Princeton in 1881 and from Princeton Theological Seminary in 1884, and studied at Berlin in 1884–85. He was a Presbyterian minister at Geneva, N. Y., in 1887–89, taught

church history at Princeton Seminary in 1889–92, and was pastor of the Edwards Congregational Church at Northampton, Mass., in 1892–98. Thereafter he held the chair of modern European history at Princeton University. His writings include *The Age of the Renascence* (1897) and *Renascence Portraits* (1905).

VANE, CHARLES WILLIAM STEWART. See LONDONDERRY, third MARQUIS OF.

VANE, SIR HENRY (HARRY) (1613–62). An English statesman. He was the son of Sir Henry Vane, a statesman of the reign of Charles I. He studied at Magdalen Hall, Oxford, but never matriculated, because he refused to take the oath of allegiance and supremacy. At an early age he became a Puritan, and embraced independent principles in religion and republican principles in politics. In 1635 he sailed for New England. He was soon after elected Governor of Massachusetts, but, having quarreled with the leaders of the Colony, returned to England in 1637. Through his father's interest he was appointed joint treasurer of the navy, and entered Parliament in 1640. He immediately joined Pym and the other Parliamentary leaders in their opposition to Charles I, and was one of the originators of the Root and Branch Bill for the total abolition of Episcopacy. After the death of Pym in 1643 Vane became the leader of the House of Commons, which power he retained until 1646. He was a member of the Westminster Assembly; was the chief instrument in carrying the Self-Denying Ordinance (1644); carried to the House of Lords the articles of impeachment against Archbishop Laud, and was one of the commissioners at the treaties of Uxbridge (1644–45) and the Isle of Wight (1648). But he was too strict a parliamentarian to view with satisfaction the increasing power of Cromwell and the army. He labored for an accommodation with the King, and after Pride's Purge refused to sit in Parliament, taking no part in the execution of the King. On the establishment of a Commonwealth, however, in February, 1649, he was appointed one of the Council of State and was one of its most active and efficient members. After the expulsion of the Rump in 1653 he broke definitely with Cromwell and withdrew from public affairs. Vane wrote *The Retired Man's Meditations; or, The Mysterie and Power of Godliness* (1655) and *A Healing Question Propounded and Resolved* (1656). The latter was so hostile to Cromwell's Protectorate that the author was imprisoned in Carisbrooke Castle, Isle of Wight. He was released after a detention of four months, and attempts were made by Cromwell to win him over, but Vane was inflexible, and during the rule of the great Protector and his son Richard he maintained an attitude of sullen discontent. When the Restoration took place, Vane was one of the 20 persons excluded from the general pardon; and in July, 1660, he was committed to the Tower. On June 2, 1662, he was arraigned and indicted for high treason before the Middlesex grand jury, found guilty, and on the 14th was beheaded on Tower Hill. There are *Lives* of Vane by J. K. Hosmer (Boston, 1888) and by John Willcock (London, 1913).

VÄNER, or **VENER,** vā'nēr, LAKE. The largest lake in the Scandinavian Peninsula, and the third largest in Europe (Map: Sweden, E 7). It is of oval shape, but contracted near the middle by two outjutting peninsulas, and most of the islands of the lake lie between these points, tending to divide the body. Its greatest length from northeast to southwest is 90 miles, its greatest breadth 45 miles, and its area 2309 square miles. Its greatest depth is 295 feet. The coasts are irregular, in the north high, steep, and rocky, or forest-covered. Lake Vaner is fed by several streams of considerable size, the largest being the Klar Elf. Its outlet to the southwest is the lower Gota Elf (q.v.), discharging into the Cattegat. The lake is an important avenue of commerce. It is connected by the Gota Canal with Lake Vetter, and thence with the Baltic Sea on the east, while access through the Gota Elf is afforded by a canal around the Trollhatta Rapids. Another canal connects the lake with Frederikshald in Norway.

VAN ESS, KARL and JOHANN. See ESS.

VANES'SA. See MOURNING CLOAK.

VANESSA. The disguised name given by Swift to Esther Vanhomrigh, formed from the first syllables of her whole name. See SWIFT, JONATHAN.

VANE-TEMPEST-STEWART, CHARLES STEWART. See LONDONDERRY, sixth MARQUIS OF.

VAN EYCK, īk. The name of two celebrated Flemish painters. See EYCK, VAN.

VAN GEHUCHTEN, vän ge-huk'ten, ARTHUR (1861–1914). A Belgian anatomist, born at Antwerp. For many years he was professor in the faculty of medicine at the University of Louvain. In 1914, after the partial destruction of the university by the Germans, Van Gehuchten went to Cambridge, England, where he taught biology at the university till his death. The results of his remarkable researches in anatomical science were set forth in his *L'Anatomie du système nerveux de l'homme* (1893, 4th ed., 1906). Van Gehuchten is especially known for his contributions to the theory of neurons. (See NERVOUS SYSTEM AND BRAIN.) Besides the work mentioned and many monographs and contributions to reviews, he published: *Cours d'anatomie humaine systématique* (3 vols., 1906–09); *Les centres nerveux cérébro-spinaux* (1908); *La radicotomie postérieure dans les affections nerveuses spasmodiques* (1911).

VAN GOGH, VINCENT. See GOGH.

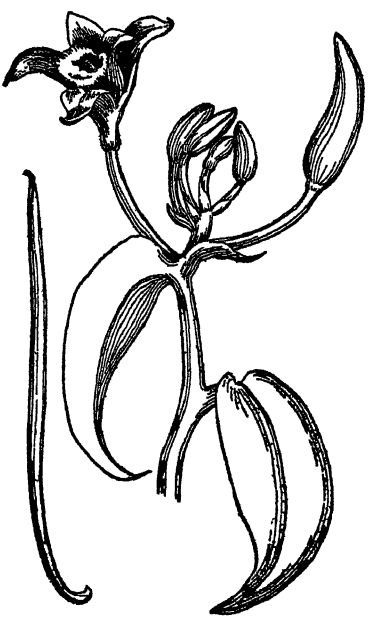
VAN HASSELT, ANDRÉ. See HASSELT.

VAN HISE, vän hīs', CHARLES RICHARD (1857–1918). An American geologist and educator, born at Fulton, Wis. He graduated in 1879 at the University of Wisconsin, where he afterward taught, holding successively chairs of metallurgy, mineralogy, and geology. In 1903 he was elected president of the university. Associated with the United States Geological Survey from 1883, in 1900 he was appointed geologist in charge of the division of Pre-Cambrian and metamorphic geology. From 1897 to 1903 he was consulting geologist for the Wisconsin Geological and Natural History Survey, and in the latter year became president of the board of commissioners of the same. Van Hise became a member of the National Academy of Sciences and in 1907 served as president of the Geological Society of America. In 1892, upon the foundation of the *Journal of Geology*, he was made one of its editors. An authority on American Pre-Cambrian geology, and particularly on the iron-bearing series of the Lake Superior region, on the deposition of ores, and on the principles of structural and dynamic geology as applied to crystalline rocks, he pub-

lished: *Correlation Papers . . . Archæan and Algonkian* (1892); *Principles of North American Pre-Cambrian Geology* (1896); *Some Principles Controlling the Deposition of Ores* (1901); *The Iron Ores of the Lake Superior Region* (1901); *An Attempt to Reduce the Phenomena of Rock Alterations to Order under the Laws of Energy* (1903); *The Conservation of Natural Resources in the United States* (1910); *Concentration and Control* (1912, new ed., 1915).

VAN HORNE, SIR WILLIAM CORNELIUS (1843–1915). A Canadian railway president. He was born near Joliet, Ill., and was educated at the local schools. Beginning railway service as a telegraph operator in 1857 he rapidly advanced through various positions to the presidency of the Southern Minnesota Railway (1877–79) and in 1880–82 was general superintendent of the Chicago, Milwaukee, and St. Paul. As general manager of the Canadian Pacific (1882–84) he had a prominent part in the measures which successfully completed that railway in 1885, and he was afterward successively vice president (1884–88), president (1888–99), and chairman of the board of directors (1899–1910). He was also president of or director in a large number of financial and industrial corporations. Van Horne strongly opposed the Taft-Fielding reciprocity agreement in 1911. In 1894 he was knighted (K.C.M.G.).

VANIL'LA (Neo-Lat, from Sp *vanilla, vayniilla,* vanilla, vanilla bean, little pod, dim. of *vaina,* pod, from Lat. *vagina,* sheath). A genus of epiphytic orchids, natives of tropical America and of Asia. The seedlings germinate in the ground, and climb with twining stems to a height of 20 to 30 feet on trees, upon



VANILLA PLANIFOLIA.

which they live, clinging by fibrous roots produced from the nodes. The stem is four-cornered and juicy; the leaves long and fleshy; the very large fleshy, generally fragrant, flowers in spikes; the fruit, a podlike fleshy capsule, opening along the side. The vanilla of commerce is chiefly the fruit of *Vanilla planifolia,* a species indigenous from Mexico to Peru, and cultivated in the West Indies, Mauritius, and Ceylon and elsewhere. The plant is propagated by cuttings and is allowed to climb trees that will afford it a partial shade. It furnishes a crop in three years and lives for 30 or 40 years. Since it is not self-fertile, artificial fertilization of the flowers is resorted to in successful plantations. The fruit is cylindrical, 7 to 8 inches long, and less than ½ inch thick. It is gathered before fully ripe, dried in the shade, and sweated, to develop and fix the aroma. This manipulation, which is a kind of fermentation, requires great care, and upon it the value of the product depends. The fruit contains within its tough pericarp a soft black pulp, in which many minute black seeds are embedded. It has a peculiar, agreeable odor, and a sweetish taste, most pronounced in the interior pulp. It is much used by perfumers and also for flavoring chocolate, sweetmeats, ices, etc. The aromatic principle of vanilla is vanillin ($C_8H_8O_3$), produced artificially by several methods. Owing to the high price of the best vanilla beans, sometimes amounting to $10 to $15 per pound, the artificial product is used to a great extent, especially in adulterating cheaper grades. It has not the delicate odor of the natural product and has a tendency to break up, forming undesirable compounds. The extract of Tonka bean (q.v.) has also been used as a cheap substitute for vanilla.

VANILLA GRASS. See HOLY GRASS.

VAN INGEN, WILLIAM BRANTLEY (1858–). An American mural painter. He was born in Philadelphia, studied there at the Pennsylvania Academy of Fine Arts under Schuessele and Eakins, with John La Farge in New York, and in Paris under Bonnat. At first an assistant of La Farge, he afterward executed independently many mural decorations in public and private buildings, including six panels in the Congressional Library, Washington, eight in the United States Court House, Chicago, 14 in the Pennsylvania State Capitol at Harrisburg, 16 in the United States Mint Building, Philadelphia, and five in the Administration Building, Panama Canal (1914–15). His work displays careful draftsmanship and skillful use of warm, glowing color.

VANINI, vä-nē'nē, LUCILIO (1585–1619). An Italian freethinker, born at Taurisano. He taught successively at Geneva, Paris, and Lyons, at the last of which cities he published in 1615 the *Amphitheatrum Æternæ Providentiæ.* On account of his pantheistic teachings he was forced to flee to England. When his dialogues *De Admirandis Naturæ Regimæ Deæque Mortalium Arcanis* came out in Paris the following year they were burned by the Sorbonne. Vanini then went to Toulouse, where he began to teach. Here he was again accused of atheism and witchcraft, and was burned at the stake on the day of his condemnation. His dramatic death gave him a reputation not justified by the achievements of his life.

VANITY FAIR. In Bunyan's *Pilgrim's Progress,* a fair held in the town of Vanity, at which all comers are supposed to give themselves up to thoughtless frivolity—synonymous with the world of gay pleasure.

VANITY FAIR. A celebrated novel by Thackeray, published in monthly parts (January, 1847–July, 1848) and in book form with illustrations by the author, in 1848. The name

was derived from *Pilgrim's Progress*. Becky Sharp (q.v.) is a character

VAN LAER, vän lär', ALEXANDER THEOBALD (1857–1920). An American landscape painter He was born at Auburn, N. Y., studied at the National Academy of Design and at the Art Students' League, New York, and in Holland under George Poggenbeek Good examples of his landscapes, which are nearly always taken from the neighborhood of his home in Litchfield, Conn., and are charming, intimate interpretations of nature in her gentler moods, include "February Snow" (Brooklyn Museum), "Connecticut Hillside" (National Gallery, Washington), and "On the Brandywine" (Herron Art Institute, Indianapolis) Van Laer was elected a member of the National Academy in 1909, and became well known as a lecturer on art subjects.

VAN LEN'NEP, HENRY JOHN (1815–89). An American Congregational missionary and scholar He was born in Smyrna, Asia Minor, and was sent to the United States for education at the age of 15 He graduated at Amherst College (1837), studied theology at Andover, and sailed as a missionary of the American Board to Turkey (1849). He was stationed in Smyrna, Constantinople, and Tokat in connection with educational institutions, and traveled in Greece, Palestine, and Egypt. He was a notable linguist and teacher. He returned to the United States, because of failure of health, in 1869, and became professor in Ingham University, Le Roy, N. Y (1876), and principal of Sedgwick Institute, Great Barrington, Mass. (1879). He was author of *Travels in Asia Minor* (1870), *Ten Days Among the Greek Brigands* (1874), and *Bible Lands* (1879).

VAN LENNEP, vän lĕn'nĕp, JACOB. See LENNEP, JACOB VAN

VANLOO, vän'lō'. A family of French painters. The eldest, JACQUES (1614–70), and his son ABRAHAM LOUIS (1641–1713), were born in Holland, but settled in Paris under Louis XIV. Of the latter's two celebrated sons, the elder, JEAN BAPTISTE VANLOO (1684–1745), was born at Aix (Provence), and studied with his father and with Benedetto Luti at Rome. In 1720 he restored the frescoes of Il Rosso and Primaticcio at Fontainebleau, and in 1731 became a member of the Academy. From 1736 to 1742 he was in England under the patronage of Robert Walpole and the Prince and Princess of Wales. His forceful and striking portraits were in great demand, but enfeebled health caused his retirement to his native town, where he died. His historical paintings, which show sound technique, include "Diana and Endymion" (1731) and "Institution of the Order of the Holy Ghost in 1578," both in the Louvre.

His brother, CHARLES ANDRÉ (1705–65), a genre, historical, and portrait painter and a sculptor, usually called Carle Vanloo, was born at Nice, studied with Jean Baptiste, and under Benedetto Luti and the sculptor LeGros at Rome, where on a subsequent visit he was employed by the Pope and the King of Sardinia. He became a member of the Academy in 1735, was made professor in 1737, and director in 1763. His large decorative, mythological, and religious paintings, such as the "Marriage of the Virgin" in the Louvre, are inferior to those of contemporary masters; but his minutely executed, charmingly colored genre scenes, of which the best are "A Rest during the Hunt" (Louvre), "Spanish Conversation," and "The Concert" (Wallace collection), show accurate and keen observation of contemporary life. The three sons of Jean Baptiste were also painters of some reputation.

VAN MARCKE, märk, EMILE (1827–90). A French cattle painter. He was born at Sèvres and studied under Troyon at Barbizon. His work is less bright in color and more heavily realistic than his master's, unlike whom he usually represents animals in a state of repose He received the cross of the Legion of Honor in 1872 and a gold medal at the Paris exhibition. He is represented in the Louvre and the provincial museums of France, and in the Metropolitan Museum, New York, and other public and private collections in the United States, where his works are very popular.

VANNER. See ORE DRESSING.

VANNES, van The capital of the Department of Morbihan, France, at the mouth of the Vannes, 84 miles northwest of Nantes (Map: France, N., C 5). It is a quaint, decadent town, and contains the venerable cathedral of St. Pierre, the eighteenth-century church of St. Paterne, a Hôtel de Ville (1884), St. Simon College (1886), with its seventeenth-century chapel, a museum of natural history and one of Celtic and Gallo-Roman antiquities. Part of the old walls remain, notably the Tour du Connétable. Vannes has linen and cotton mills, tanneries, breweries, and ironworks. Shipbuilding is extensively carried on. Vannes was the capital of the Veneti. It became the Roman Dariorigum Venetorum. Pop., 1901, 23,375; (town) 1911, 17,842.

VANNUCCI, vän-nōōt'chē, PIETRO. See PERUGINO, PIETRO.

VANNUTELLI, vän'nōō-tĕl'lē, SERAFINO, CARDINAL (1834–1915). An Italian Roman Catholic churchman. He was born at Genazzano, studied there, and graduated in philosophy and theology in the Capranica College, Rome. After teaching theology in the Pontifical Seminary, he was secretary to the Papal Nuncio in Bavaria, auditor to the court of Maximilian in Mexico, and apostolic delegate to Ecuador, Peru, Colombia, and Central America. He was made Papal Nuncio to Brussels in 1875, and to Vienna in 1880. In 1887 he was created Cardinal, and later became Vice-Chancellor of the church. It was understood in 1903, when Cardinal Sarto became Pope as Pius X, that Vannutelli was the candidate of the Triple Alliance. In that year he was made dean of the Sacred College. His brother, VINCENZO VANNUTELLI, was made Cardinal in 1889.

VAN NUYSSEN, ABRAHAM JANSSENS. See JANSSENS, ABRAHAM.

VAN RENSSELAER, vän rĕn'se-lär, KILLIAN (1595–1644). A Dutch merchant, active in the founding of the Dutch colony of New Netherland. He came of a wealthy family of Amsterdam, where he received a good education and became a leading diamond and pearl merchant. He was one of the promoters and organizers of the Dutch West India Company, to which he advanced large sums of money, and loaned several vessels. After the successful settlement of the New Amsterdam colony he purchased, through an agent, a large tract of land on the Hudson, south of Albany, where he established a settlement of mechanics and farmers, called Rensselaerswick. The estate covered almost all of three counties—Albany, Rensselaer, and Colum-

bia—and was the first and the largest of the patroonships in New York. (See PATROON.) Van Rensselaer himself did not come to America, but managed his estate through an agent.

VAN RENSSELAER, văn rĕn'se-lēr, MARIANA GRISWOLD (1851–1914), usually known as MRS. SCHUYLER VAN RENSSELAER. An American author. She was born in New York City, and was married in 1873, her husband being a well-known journalist. She was at one time president of the Public Education Association of New York. Mrs. Van Rensselaer was elected an honorary member of the American Institute of Architects and in 1910 received the degree of Litt.D. from Columbia University, a signal honor. Her writings include: *Henry Hobson Richardson and his Works* (1888); *English Cathedrals* (1892; 4th ed., 1902), *Art out of Doors* (1893); *Should We Ask for the Suffrage?* (1894); *One Man Who was Content* (1896), *Niagara, a Description* (1901); *History of the City of New York in the Seventeenth Century* (1909); *Poems* (1910).

VAN RENSSELAER, STEPHEN (1764–1839). An American political leader known as the Patroon. He graduated at Harvard in 1782. Engaging early in politics, he was elected to the Assembly in 1789; was a member of the State Senate from 1790 to 1795; was Lieutenant-Governor of New York from 1795 to 1801; presided over the State Constitutional Convention of 1801; and was again in the Assembly in 1808–10. He took a great interest in military affairs, becoming major general of the State militia, and in 1812 directed the unsuccessful assault upon Queenstown. He took an active interest in the construction of the Erie Canal and was one of its strongest promoters. In 1810–11 he was one of a commission appointed to explore the proposed route, and from 1816 until his death was a member of the Canal Commission, being its president from 1824 to 1839. In 1819 he became a regent of the University of the State of New York, and was subsequently its chancellor. In 1824 he established at Troy a scientific school which, two years later, was incorporated as the Rensselaer Polytechnic Institute. From 1823 to 1829 he was a member of Congress. He published *A Geological and Agricultural Survey of the District Adjoining the Erie Canal* (1824). Consult Barnard, *A Discourse on the Life, Services, and Character of Stephen Van Rensselaer* (1839).

VAN REYPEN, WILLIAM KNICKERBOCKER (1840–). An American surgeon. He was born in Bergen, N. J.; was educated in the University of New York (M.D., 1862); entered the naval service of the United States as assistant surgeon, in December, 1861, and during the Civil War was stationed for a time at the Naval Hospital in New York City, and then served on the *Saint Lawrence* in the East Gulf Blockading Squadron. He was promoted to be a surgeon in 1868, a medical inspector in 1887, and a medical director in 1895. During the Spanish-American War he supervised the fitting out of the hospital ship *Solace*—the first practical hospital ship ever used in any navy. From 1897 to 1902 he was surgeon-general and medical director of the United States Navy, retiring with the rank of senior rear admiral. In 1905 President Roosevelt appointed him chairman of the central committee of the American National Red Cross Association.

VAN ROOY, văn rō'ê, ANTON (1870–). A Dutch dramatic bass singer, born in Rotterdam. Most of his vocal training was received under Stockhausen of Frankfort. For a time he devoted himself entirely to the concert platform, and won fame as a lieder singer and in oratorio. The strong dramatic quality of his voice led Frau Wagner to offer him the rôle of Wotan at Bayreuth (1897), after which he was engaged in similar parts in England and America. He first appeared in London in 1898, and he went to New York in 1899, becoming a favorite in German opera in both cities.

VANS. A people who, according to their inscriptions, occupied what is now Armenia before the Armenians. Their language, preserved on old Vannic monuments, is considered non-Aryan, with possibly Caucasic affinities. See VAN.

VAN SANT'VOORD, GEORGE (1819–63). An American lawyer and author. He was born at Belleville, N. J., graduated at Union College in 1841, was admitted to the bar in 1844, practiced at Kinderhook, N. Y., in 1846–51, and then removed to Troy. He was a member of the State Assembly in 1852 and 1856, and district attorney for Rensselaer County in 1860–63. His publications include: *Principles of Pleading in Civil Actions Under the New York Code of Procedure* (1852), *A Treatise on Practice in the Supreme Court of the State of New York in Equity Actions* (1860), *Life of Algernon Sydney* (2d ed., 1853), and *Lives of the Chief Justices of the Supreme Court of the United States.*

VAN SCHAACK, shăk, PETER (1747–1832). An American lawyer and author. He was born at Kinderhook, N. Y., and graduated at Columbia College in 1768. In 1773 he was appointed to revise the Colonial statutes, in 1777 was summoned before the committee on conspiracies for opposing the Revolution, and, refusing to swear allegiance to the State of New York, was sent to Boston, where he remained until the following year. He was then banished and went to England, returning to New York in 1785 after a statute had been passed restoring his rights as a citizen. He was readmitted to the bar and gained a wide reputation as a practitioner and instructor. In later life he became blind. He published *Laws of the Colony of New York* (1773) and *Conductor Generalis, or the Duty and Authority of Justices, Sheriffs, Coroners, etc.* (1788). Consult H. C. Van Schaack (ed.), *Life, Journal, Diary, and Letters of Peter Van Schaack* (New York, 1842).

VAN s'GRAVESANDE. See GRAVESANDE.

VAN SWIETEN, GERARD. See SWIETEN.

VAN 'T HOFF, vănt hŏf', JACOBUS HENRIK (1852–1908). A Dutch chemist. He was born in Rotterdam, and was educated at the Polytechnic School in Delft, and in the University of Leyden, also studying chemistry under Kekule in Bonn and Wurtz in Paris. In 1874 he published a full though brief account of the stereochemical theory (see STEREOCHEMISTRY), with which his name as its founder will always be associated. In 1878 he became professor of chemistry, mineralogy, and geology in the University of Amsterdam. He declined a call to the University of Leipzig in 1887, but in 1896 he was made honorary professor in the University of Berlin, while the Berlin Academy of Sciences enabled him to establish a research laboratory, where he applied successfully physicochemical theories to the study of geological phenomena, and especially the study of the conditions of formation of the Stassfurt salt deposits. Van 't Hoff's views on stereochemistry as presented in his first paper

(translated into French, German, and English, *Chemistry in Space*, 1891), although opposed by many chemists at first, soon received universal acceptance, and have formed the starting point for a whole series of brilliant investigations which have thrown much light on molecular structure. In the second branch of his work Van t Hoff applied mathematical and thermodynamical principles to chemical reactions and equilibria (see THERMOCHEMISTRY), summing up a part of his work in his *Etudes de dynamique chimique* (1884). He was also the first to point out clearly the analogy between the gaseous state and that of dilute solutions, and developed the laws governing the relations of the latter, laying the basis for the great development which physical chemistry has had in recent years. Becoming interested in heterogeneous equilibria he turned his attention to double salts, and especially to minerals, such as those of the Stassfurt deposits. For 10 years he and his students carried out these studies, contributing 51 papers to the proceedings of the Academy of Sciences of Berlin, and, as a result, the problem as to the origin of these salts, at least from the chemical point of view, is to be regarded as having been completely solved. In 1901 his achievements led to his being made the recipient of the first Nobel prize in chemistry. Many other honors came to him, including honorary memberships in various foreign societies

VAN TIEGEHEM, vän tē'gän', PHILIPPE EDOUARD LEON (1839–1914). A French botanist, born at Bailleul (Nord), and educated at the Ecole Normale Supérieure, where he became maître de conférences in 1864. He was elected to the Academy of Sciences in 1877, and in 1879 became professor of botany in the Museum of Natural History. He held also a like position in the Institut National Agronomique after 1898. In 1908 he was elected life secretary of the Académie des Sciences. He translated Sachs's great manual under the title *Traité de botanique* (2 vols., 1873–74), and wrote *Recherches sur la structure du pistil et sur l'anatomie comparée de la fleur* (1871); *Traité de botanique* (1884; 2d ed., 1890); *Eléments de botanique* (2 vols., 1883–88; 3d ed., 1898); *Recherches sur les phanérogames sans graines* (1897). His most important contribution to botany was the stelar theory, which had an important influence upon the subsequent development of vascular anatomy.

VAN TWILLER, WOUTER or WALTER (c.1580–c.1650). A governor of New Netherland, born at Nieukirk, Holland. Until his appointment as Governor, which he owed to the influence of his wife's uncle, Killian van Rensselaer (q.v.), he was a clerk for the Dutch West India Company at Amsterdam. He arrived at New Amsterdam, as Governor, in 1633. Owing to inexperience he was soon involved in troubles, not only with the neighboring English and Indians, but with his own people. In spite of his protests and a military demonstration, colonists from New England took possession of the Connecticut valley, but he was more fortunate on the Delaware, where his soldiers captured a shipload of intending settlers from Virginia. Though his management of affairs showed little ability, his shrewdness and the growing prosperity of the Colony enabled him to accumulate a private fortune. He returned to Holland in 1637.

VAN TYNE, CLAUDE HALSTEAD (1869–). An American historian, born at Tecumseh, Mich. He graduated from the University of Michigan in 1896, studied at Heidelberg, Leipzig, and Paris in 1897–98, and took his Ph.D. at the University of Pennsylvania in 1900. In 1903 he returned to the University of Michigan as a teacher, becoming professor of American history in 1906 and head of the department of history in 1911. In 1913–14 he lectured in the French provincial universities on the Harvard Foundation. Besides editing various works, he contributed to the NEW INTERNATIONAL ENCYCLOPÆDIA, and wrote: *The Loyalists in the American Revolution* (1902); *The American Revolution* (1905); *History of the United States for Schools* (1915), with A. C. McLaughlin.

VANUXEM, LARDNER (1792–1848). An American geologist, born in Philadelphia, Pa. He graduated in 1819 at the Ecole des Mines, Paris, and was professor of chemistry and mineralogy at South Carolina College in 1819–26. In 1827–28 he studied the geology of Ohio, New York, Tennessee, Kentucky, and Virginia, for the State of New York, to whose Legislature he submitted a report. He was a geologist of the New York Geological Survey in 1836–42. The Association of American Geologists was formed in 1840 through his suggestion, and he was also one of the founders of the American Association for the Advancement of Science. He assisted in arranging the New York State geological collection, the basis of the subsequent State museum. He published numerous papers.

VANVES, vänv. A town of the Department of Seine, France, one mile southwest of the fortifications of Paris (Map: Paris and vicinity). Pop., 1911, 15,545.

VANVITELLI, vän'vē-tĕl'lē, LUIGI (1700–73). An Italian architect of Dutch parentage (Van Witel), born in Rome. At the age of twenty-six he became supervising architect of St. Peter's. He designed a palace and two churches (San Francesco and San Domenico) at Urbino, and remodeled Michelangelo's church of S.M. degli Angeli at Rome. His masterpiece was the vast palace erected at Caserta in 1752 for Charles III of Naples, with its remarkable garden and cascades. The palace, nearly 800 by 600 feet, is distinguished by many impressive features, especially its stairs, halls, and vistas, chapel and theatre, and is one of the finest works of late Italian architecture.

VAN VLECK, EDWARD BURR (1863–). An American mathematician, born at Middletown, Conn. He graduated from Wesleyan University, Conn., in 1884, attended Johns Hopkins in 1885–87, and studied at Gottingen (Ph.D., 1893). He was assistant professor and professor (1895–1906) at Wesleyan, and professor after 1906 at the University of Wisconsin. In 1913 he became president of the American Mathematical Society, of whose *Transactions* he was associate editor (1902–05) and editor (1905–10). Besides monographs in mathematical journals he published *Theory of Divergent Series and Algebraic Continued Functions* (1903).

VAN WERT. A city and the county seat of Van Wert Co., Ohio, 78 miles southwest of Toledo, on the Pennsylvania, the Ohio Electric, and the Cincinnati Northern railroads (Map: Ohio, A 4). It has the Brumback Library, the county hospital, a Y. M. C. A., a Y. W. C. A., and several fine public parks. Among its industrial establishments are railway machine shops, a tobacco stemmery, a canning factory, and manufactories of novelties, lumber products, etc. Pop., 1900, 6422; 1910, 7157; 1916 (est.), 8000.

VAPEREAU, vap'rō', LOUIS GUSTAVE (1819–1906). A French encyclopædist, born in Orléans, and educated at the Ecole Normale in Paris He taught philosophy in Tours (1843–1852) and, returning to Paris, studied law and was admitted to the bar in 1854, but forthwith gave himself entirely to literary pursuits In 1858 he published the first edition of his *Dictionnaire des contemporains*, a standard work of reference in constant process of revision (6th ed., 1891–93). Vapereau edited also a *Dictionnaire universel des littératures* (1876); *L'Année littéraire et dramatique* (1859–69), and other similar works. He was from 1877 to 1888 Inspector General of Primary Schools. During the Prussian invasion (1870–71) he was prefect of Cantal, and later of Tarn-et-Garonne

VAPOR. A term employed to designate the gaseous state of substances that are ordinarily liquid or solid, such as water, benzene, iodine, etc. It has been proposed that the term "vapor" be applied to gaseous substances below their critical points (see CRITICAL POINT), i.e., at all temperatures at which they may be liquefied by sufficient pressure, while the term "gas" should be restricted to the state of substances above their critical points, i.e, when their existence in the liquid or solid state is impossible. Such a usage of the terms might, however, be somewhat misleading, as it might convey the idea of a difference in the general behavior of gaseous substances below and above their critical points. No such difference is really known to exist, the laws of the gaseous state being equally well obeyed below and above the critical point The most important property of vapors is their density, which leads immediately to a knowledge of the relative weights of molecules. The density of a vapor is usually expressed in terms of that or hydrogen taken as unit, and then the molecular weight of the given substance is twice its vapor density. The best methods of determining the vapor density of substances together with the apparatus used are described under MOLECULES—MOLECULAR WEIGHTS (q.v.). The vapors given off by mixtures are themselves mixed; e.g., a mixture of water and alcohol emits a mixture of water vapor and alcohol vapor. At any given temperature the vapor given off by a solid or a liquid, whether single or mixed, exerts a certain definite pressure which is generally referred to as the vapor pressure (or vapor tension) of the liquid. The vapor pressure of a mixture is the sum of the partial pressures of its components—quantities of the greatest importance in the theory of mixtures and solutions as well as in the theory of distillation (q.v.). See also EVAPORATION; GASES, GENERAL PROPERTIES OF; CRITICAL POINT; BOILING POINT.

VAPOR BATH. See BATH.

VAPORIZATION. See EVAPORATION.

VAR, vär. A department of southeast France, situated in the former Province of Provence (Map: France, S., L 5). Area 2333 square miles. The department is covered by the lower spurs and foothills of the Maritime Alps. The chief river is the Argens. Viticulture is the principal industry, producing nearly 30,000,000 gallons of wine annually. Silk culture is also carried on to some extent, and there are manufactures of pottery, paper, silk, and soap. Pop., 1901, 326,384; 1911, 330,755. The capital of the department is Draguignan, and the largest city is Toulon.

VARĀHAMIHIRA, vä-rä'hä-mi'hi-rä (?–587 A.D.). A celebrated Hindu astronomer who was born near Ujjain and began his calculations about 505 A.D. Tradition makes him one of the Nine Gems at the court of King Vikrama (q.v.). He was the author of four astronomical works, including the *Pañcasiddhāntikā*, edited by Thibaut and Dvivedi (Benares, 1889), the *Bṛhatsaṁhitā*, an encyclopædic treatise in one hundred and six chapters (ed. by Dvivedi, ib., 1895–97), the *Bṛihaj-jātaka* or *Horā-śāstra* (translated by C. Jyer, Madras, 1885); and the *Laghu-jātaka* (partly translated by Jacobi, 1872). Consult Thibaut, "Astronomie, Astrologie und Mathematik," in Buhler and Kielhorn, *Grundriss der indo-arischen Philologie* (Strassburg, 1899).

VARAN'GIANS. The name by which the Old Norse invaders of Russia (q.v.) were known to the Slavs The word signifies in the Old Norse men who have pledged themselves to a leader. The celebrated Varangian Guard of the Byzantine emperors, which existed from the tenth century, was composed mainly of Northmen and Goths from Sweden and Norway, though later other Teutonic warriors, notably English, were among their numbers. See NORMANS

VARAN'IDÆ (Neo-Lat. nom pl., from *Varanus*, from Ar. *waran*, *warsal*, lizard). A family of aquatic lizards, called warans, varans, safeguards, etc See MONITOR.

VAR'DAMAN, JAMES KIMBLE (1861–). An American lawyer, journalist, and legislator, born in Jackson Co, Texas. His family moving to Mississippi, he read law in an office at Carrollton and was admitted to the bar in 1881. He edited successively the Winona *Advance*, the Greenwood *Enterprise* and *Commonwealth*, and from 1908 the weekly *Issue*, published at Jackson. At the same time he was prominent in Democratic politics. From 1890 to 1896 he was a member of the State House of Representatives, of which he was Speaker in 1894. He saw service in Cuba during the Spanish-American War and rose to be major. Defeated for Governor in 1895 and 1899, he was elected to that office in 1903. Though strongly opposed to participation of the negro in politics or even in the suffrage, he denounced lynching, and in 1904 called out the militia to protect a negro until he had had a trial by law. Although defeated by John Sharp Williams for the United States Senate in 1907 and in 1910 by LeRoy Percy, in 1911 he was selected in a primary election of unusual bitterness by an overwhelming majority.

VARDÖ, värd'ë. A town on the northeast coast of Norway. It is the most eastern town of Norway, and mentioned in 1307. The old Fort Vardöhus, dating from before 1307, is the northernmost fort in the world. Fishing, fish-oil refineries, shipping, and commerce are the principal industries. In 1910, 8177 people, with 1747 boats, took part in the cod fisheries at Vardö. In the same year were produced 26,219,230 kgs. codfish and 5089 hls. cod-liver oil. Pop., 1910, 3111.

VAR'DON, HARRY (1871–). A British golf champion. In 1914, for the sixth time, he won the English open championship. In 1913 he played in the United States and was defeated for the American open championship at Brookline, Mass., by Francis Ouimet, an American amateur, whose success made a sensation be-

cause of his youth. Edward Ray (q.v.) was third in this match, which had been featured by a triple tie in the final round the preceding day (September 19). For many years Vardon and Ray were leading figures in British golf. Vardon published *The Complete Golfer* (1907) and *How to Play Golf* (1912).

VAREC (Fr., from Icel. *rāgrek*, wave wrack, stuff thrown ashore by the waves). A crude sodium carbonate obtained in Brittany and Normandy, France.

VARESE, va-rā'zā. A town in the province of Como, Italy, 37 miles northwest of Milan and 4 miles east of Lago Maggiore (Map: Italy, B 2). The picturesque scenery gives the town considerable prominence as a place of resort. The most interesting edifice is the church of San Vittore, dating from the sixteenth century. Varese has a museum with a valuable collection of historic relics. There are manufactures of wine, silk goods, paper, furniture, organs, carriages, etc. Pop. (commune), 1901, 17,715; 1911, 21,605 (town, 7721).

VARGAS, vär'gas, JOSÉ MARÍA (1786–1854). A Venezuelan politician and surgeon, born in La Guayra. He studied medicine at Carácas and Edinburgh, and became professor in the University of Carácas. He took part in the revolutionary movements, was a member of the constituent congress of 1830, and in 1834 was named vice president. The following year he was elected to the presidency, but resigned in 1836 on account of the difficulties of his administration. He was Senator (1838–46) and Councilor of State (1847–49). In 1853 he went to New York City, where he died.

VARGAS, LUÍS DE (1502–68). A Spanish religious painter, born at Seville. He is reputed to have been a pupil of Perino del Vaga at Rome, where he spent 28 years. He was influenced by Sebastiano del Piombo and the Flemish painter Kempeneer, and is more robust and personal than his Castilian contemporaries. Though inferior as a colorist, he was an excellent draftsman, and particularly excelled in portraiture. Of his frescoes, which were considered his best works, none survive. His principal oil paintings are in the cathedral of Seville: a "Nativity" (c.1541), and his masterpiece, the "Temporal Generation of Christ" (1561), popularly known as the "Gamba."

VARIABLE STARS. In the majority of instances the stars show no appreciable fluctuations of brightness. There are, however, about 5000, known as variable stars, which exhibit very distinct changes of luminosity, changes which in some cases are irregular, in others periodic. The first periodic variable discovered was Mira in the constellation Cetus (q.v.), but, although it was first observed by Fabricius in 1596, it was not until 1667 that its period was definitely established by Boulliaud. Another famous variable star is Algol (q.v.). The application of photography to the study of the heavens has resulted in a rapid increase in the number of stars recognized as variable. See STAR.

VARIANCE (from Lat. *variantia*, difference, diversity, from *variare*, to change, vary, from *varius*, different, various). In the law of pleading, an inconsistency or difference between the original process by which an action is begun and the pleadings; or a difference between the facts alleged in the pleadings and those proved by the evidence introduced at the trial. A variance between the process and pleadings must be objected to before a trial is had on the merits, as it is generally held to be cured by verdict. The practice under modern codes is characterized by considerable liberality with the end of meting out substantial justice as between the parties, and hence in case of a slight variance between the pleadings and the proof it is customary to permit an amendment at the trial to conform with the proof. Where the variance is substantial, however, and is concerning matter which the other party is not prepared to meet, no proof of facts not alleged in the pleadings will be permitted. Moreover, in case the proof adduced shows an entirely different cause of action from that set forth in the pleadings, the variance is fatal. Consult the works of Stephen and Chitty on *Pleading*.

VARIATION (Lat. *variatio*, from *variare*, to change, vary). Structural or functional deviations from the parent form or type. Naturalists are working towards the discovery and classification of facts, and of causes producing variation. Species are unequally variable; there are plastic as well as rigid ones. Nature prevents overvariation by competition; otherwise crowding of species would result. The greatest range of variation occurs in cultivated plants and domestic animals; yet the turkey does not vary whether living in America or Europe, nor does the guinea fowl in America depart from the African type; and the cat varies much less than the dog. Wide-ranging, much diffused, and common species vary most, and those of large genera more frequently vary than those of genera containing but one or only a few species. Persistent or ancient and cosmopolitan forms have not varied through long periods of their history. See HEREDITY; LAMARCKISM.

It was claimed by Darwin that variation is by chance, though he adds that this is "a wholly incorrect expression," for in nature there is no such thing as chance, the expression serving "to acknowledge plainly our ignorance of the cause of each particular variation"; and he states that "the direct action of changed conditions leads to definite or indefinite results." But it is more probable that, though variations may in some cases seem to be fortuitous, in general throughout geological time variation has been regulated by changes in physical and biological conditions of environment along certain determinate lines, the variations becoming permanent when they prove useful. That the direction of variation is dependent on the surroundings is shown by the gradual atrophy of eyes in animals living in darkness. The reduction in the number of limbs and toes is conditioned by the mode of life. The variation in the colors of animals is in direct relation with the varying amount of light and shade to which they are exposed. See PROTECTIVE COLORATION AND RESEMBLANCE.

Primarily variation is due to the changes of the environment, i.e., to the differences in atmospheric pressure, electricity, gravity, light, to changes of temperature (heat and cold), and of the mechanical and chemical state of the water or air, as well as the kind and amount of food. The causes are mainly external, but some are apparently internal, such as reproduction. These physical agents have been called the primary factors of organic evolution (q.v.) operating on the most primitive and plastic one-celled forms of life, which in the beginning led to the origin of the different types of life or lines of development.

Nomenclature. A variant is one of the dissimilar conditions of form in which an organ appears; thus the variants of the number of rays of a scallop shell are 13, 14, 15, etc. A variant must be sharply distinguished from a variety, which is a group term for individuals that breed true to one another, and resemble one another in color, size, and other characteristics less broad and general than specific ones. A variate is one of the varying units of study; each scallop shell is, in respect to the number of its rays, a variate, and in 1000 scallops there may be, e.g., 200 variates (ray numbers) falling in the variant class of 16 rays. Each different variant thus usually includes a number of variates. Variates are of two sorts: counted and measured (integral and graduated). For example, the number of rays on a scallop shell (15, 16, 17, etc.) is an integral variate; the diameter of the shell is a graduated variate. The data of variation may be classified in various ways, but two main types are (1) slight variations and (2) sport variations. Slight variations are such trivial differences as distinguish one adult male of a homogeneous community from another male of this community, the number of grains on one head of rice from the number on a second head of rice. It is the noticed and yet unnoted form of variation. Sport variations are the relatively rare occurrence of great differences cropping out in a community. These are sometimes incompatible with life, and are then known as monsters; but when sports persist, and are bred from, they may impress themselves with peculiar strength; e.g., Ancon sheep, and the downless peaches called nectarines. Variable characters may also be classified as integral and graduated. They play a nearly equal part in evolution, for some species have differentiated chiefly along the line of multiplication or reduction of the number of parts, while other species have varied in size, color, and other qualities of parts. Again, variates may be either individual or organal. Individual variates belong to different individual animals or plants, whereas organal variates are found in the multiple organs of one and the same individual, eg, the length of a fish is an individual variate; the diameter of one of its scales as compared with that of the others is an organal variate. According to Huxley's definition, a race is a propagated variety. These terms—variant, variety, race, species—are by no means fixed, since in many instances gradations may be found which more or less completely link them.

Variation with age is a matter of daily observation. First of all, the absolute size of the body and its organs tends to increase with age up to a limit. Secondly, the proportions change. Some organs are developed precociously, i.e., the child's head; others are retarded, e.g., the length of the child's legs. Careful measurements of the shell of a crab have shown that the shell grows larger in proportion to its breadth as it grows older. Especially at the time of sexual maturity in most animals special features develop greatly that are earlier latent. Not only the size, but also the variability of organs, changes with age. Thus the standard deviation of the stature of the five-year-old child is 3 inches; of the seven-year-old child, 2.85 inches. Variation with sex is likewise a widespread phenomenon. Not all organs vary in the two sexes, however, but only the so-called secondary sexual ones, such as the mane of mammals; the comb, wattles, and tail feathers of fowl; the plumage of most birds, and the antenna of moths. The old idea that the male was uniformly more variable is not markedly true. In the wings of some insects the female is the more variable.

The fact of selection is best measured by variability, any species after selection being presumably less variable than before; the mean also may be changed by selection if this acts especially on the large or on the small. By selection we may, moreover, divide a binomial species into two pure groups, each centring about one of the modes. Darwin and others have thought that by selection of minute variations a species might be changed to any extent, but this view is combated by some, especially De Vries, who maintains that selection of slight variations can improve qualities already present, but cannot originate new ones, for which we must wait upon haphazard appearances (sports).

Correlated variation is the term applied to the common case of two organs so interdependent that when the one varies the other varies likewise. Multiple parts, such as the segments of an earthworm, vary just as different individuals do and follow the same laws, and where one of these repeated parts varies, they all vary in the same direction. Thus, if a peculiar spot appears in one segment of a leech, it is apt to appear in the whole series of segments; also, a variety of a species characterized by one peculiarity is apt to be characterized by a series of peculiarities. The variability of the various elements of a series or multiple repeated organ differs in the different cases. For example, the spots on the thoracic shield of a potato beetle are sometimes constant in size and occurrence; in others, the reverse. In the case of linear series, like the series of teeth on the jaw, it is often true that the terminal members of the series are the most variable. In general, the rule holds that specific characters are more variable than generic ones. But the relation between species and varying characters is even closer, as examination of extreme types will show. There is thus such a relation between the species of a genus that each, while maintaining its peculiar modes, varies especially in the direction of the others. A species remains constant only in a constant environment. This is illustrated in every estuary, where mollusks found near the fresher water are smaller than those in the open sea. Insects are darker along the seacoast. A passage from one part of the country to another shows that animals gradually become dissimilar, and even the individuals of the same species undergo a change which may be apparently quite independent of environment. This is shown in the Galapagos Islands, whose climatic conditions are practically the same, yet on each island the lizards are peculiar, and only one kind of lizard occurs on an island. See EVOLUTION; HYBRIDITY.

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port, *Statistical Methods, with Special Reference to Biological Variation* (3d ed., New York, 1913).

VARIATION. In music, a transformation of a melody by melodic, harmonic, contrapuntal, and rhythmic changes. The subject chosen is called the theme; it is first simply harmonized with or without an introduction, and then repeated in a variety of forms. The oldest variations are the doubles, in which the fundamental theme was not altered. But since the time of Haydn and Mozart the form of the variation has become more artistic. The theme appears with new harmonies, the mode is changed from major to minor or vice versa; there is variety of key and rhythm, and the melodic intervals themselves are often altered. Frequently a new melody is added as a counter subject to the original theme. The only principle to be observed is that the original theme shall always be recognizable by some feature.

VARIATION OF LATITUDE. See LATITUDE, VARIATION OF.

VARIATION OF MAGNETIC ELEMENTS. See COMPASS, TERRESTRIAL MAGNETISM.

VARICELLA (Lat., dim. of *variola*, from *varius*, spotted). The medical term for chickenpox (q.v.).

VARICOCELE (from Lat *varix*, dilated vein, from *varus*, bent, stretched, knock-kneed, awry + Gk. κήλη, *kēlē*, tumor). In surgery, a varicose state of the veins of the spermatic cord. It is caused by the same conditions which give rise to varicose veins (q.v.) elsewhere. There exists under these conditions a sense of fullness, or even heavy, dragging pain in the scrotum, in which the varicocele can be felt as a soft knotted, irregular mass. The treatment consists of wearing a proper support, bathing with cold water, exercise, and care of the bowels. In some instances ligation of the veins is called for.

VARICOSE VEIN (Lat. *varicosus*, full of dilated veins, from *varix*, dilated vein), or VARIX. A dilated and tortuous vein. Varices are of common occurrence in the submucous veins of the rectum (constituting hemorrhoids or piles), in the spermatic veins, giving rise to varicocele (q.v.), and in the veins of the lower extremities. They are very rarely found in other veins, such as those of the scalp, neck, and groin. Cooks, washerwomen, soldiers, and others whose occupation involves much standing, are specially prone to varicose veins. Varices may occur at almost any period of life, but are chiefly developed during middle age. Their formation is aided by any condition of the system which impedes the circulation, as certain diseases of the heart, lungs, and liver, and by continued overeating and the use of alcoholic stimulants, which are liable to induce hemorrhoids. Senile degeneration, gout, pregnancy, and the excessive exercise of the athlete may act as causes in certain cases. In varicose veins the coats of the dilated vessels may become thickened or may become thin; they may be lengthened so that the veins become tortuous; the dilation may be unequal, giving rise to the formation of pouches; and, in consequence of the enlarged calibre of the vessels, the veins act imperfectly, and their walls gradually undergo degeneration. Varices occurring in the leg commonly give rise to deeply seated aching pain in the limb, with a sense of weight, fullness, and numbness, before there is any external appearance of the affection. In a more advanced stage the ankles swell in the evening and the feet are cold. After a time a small tumor of a bluish tint appears, which disappears on pressure, but returns on the removal of the pressure, and is caused by a dilated vein. This dilation extends and forms knotty, irregular tumors, soft to touch, diminishing on pressure or on the patient assuming a horizontal posture. These tumors commonly occur in the middle of the leg, along the track of the saphenous veins, but they often extend along the whole of the leg and thigh. The deep as well as the superficial veins may be involved and the varices may be as large in diameter as a lead pencil.

The treatment of varicose veins is palliative or radical. All obstructions to the return circulation should be removed, and the wearing of garters absolutely forbidden. The use of an elastic bandage or elastic stocking upon the limb, the evenly distributed pressure of which supports the veins, is palliative. Such treatment, combined with proper dietetic and hygienic measures, is usually sufficient to meet the requirements of ordinary cases. It is not, however, curative. The radical or curative method of treatment consists in ligation or thorough excision of the sections of the enlarged veins at intervals of about 2 inches.

VARIED THRUSH. A thrush commonly known as the OREGON ROBIN (q.v.).

VARIETY (in biology). See VARIATION.

VARIETY (theatre). See VAUDEVILLE.

VARI'NUS. See GUARINO DA VERONA.

VARI'OLA. See SMALLPOX; VACCINATION.

VA'RIOLITE. See ORTHOCLASE.

VA'RIX. See VARICOSE VEIN.

VARLEY, JOHN (1778–1842). An English water-color painter. He was born at Hackney, London, and worked at first with a silversmith, afterward becoming assistant and pupil to Joseph Charles Barrow. His first exhibited picture, "View of Peterborough Cathedral," appeared at the Royal Academy in 1798. Some of his paintings, which are notable for broad, free treatment and fresh, pure color, are: "Beddgelert Bridge" (1800); "River Scene" (1840); "Bolton Abbey" (1842); and "Burial of Saul" (all in South Kensington Museum). He wrote several treatises on landscape painting, was one of the original members of the Society of Water Color Painters (1804), and numbered among his pupils David Cox, John Linnell, Mulready, and William Hunt.

VARLEY, JOHN PHILIP. See MITCHELL, L. E.

VARNA, vär'nä. The chief seaport of Bulgaria and the principal port of the Black Sea between Kustendje and the Bosporus, situated on the Bay of Varna, 325 miles by rail east-northeast of Sofia (Map: Balkan Peninsula, G 3). It is an old, irregularly built town with an unprotected harbor. The industrial establishments include tanneries and an extensive cotton spinnery. Varna carries on an extensive trade in animals, dairy products, grain, skins, and cloth. In the vicinity of Varna is the summer residence of the King. Pop., 1900, 33,443; 1910, 41,317—chiefly Bulgarians, Greeks, and Turks. Varna is identified with the ancient Milesian colony of Odessus. It is memorable as the scene of the defeat of the Hungarians under King Ladislas and John Hunyady by the Turks under Amurath II in 1444. It withstood an attack by the Russians in 1773, but was taken by them in 1828. In 1854, in the Crimean War, it was used as a base of operations by the allies. It was

bombarded by the Russian fleet in 1915 See WAR IN EUROPE

VARNHAGEN, vär'nä-zhĕn', FRANCISCO ADOLFO DE (1816–78) A Brazilian diplomat and scholar, born in São João do Ypanema He studied in Portugal, devoting himself especially to the history of Brazil In 1859 he returned to South America, was appointed Minister to Paraguay, but soon resigned because of his disapproval of López's government In 1865 he became Minister to Chile and Peru, whence, in 1868, he was transferred to Vienna, where he died. He wrote· *Florilegio de poesia brasileira* (1850–53); *Trovas e Cantares* (1853); *Examen de quelques points de l'histoire géographique du Brésil* (1858); *Amerigo Vespucci* (1865), *Nouvelles recherches sur les derniers voyages du navigateur florentin* (1869); *Ainda A. Vespucci* (1874); and the *Historia do Brasil* (1854–57).

VARNHAGEN VON ENSE, färn'ha-gen fŏn ĕn'ze, KARL AUGUST (1785–1858). A German author, born in Dusseldorf. After studying medicine at Berlin and philosophy at Halle, Berlin, and Tubingen, and helping (1803) to edit Chamisso's *Musenalmanach*, he entered the Austrian army (1809), and was wounded at Wagram. He joined the Russian army in 1813, entered the Prussian diplomatic service (1814), accompanied Chancellor Hardenberg to the Congress of Vienna, and (1815) became Minister at Karlsruhe. Having lost his official position in 1819, Varnhagen devoted himself chiefly to literature, although he continued to take a keen interest in political affairs, and was from time to time active in diplomatic matters His first work was an account of experiences in the war of 1813, *Geschichte der Hamburger Ereignisse*, followed by the *Geschichte der Kriegszüge Tettenborns* (1814). In the same year he married Rahel Levin (see VARNHAGEN VON ENSE, RAHEL), a Jewess of great intellect, who exercised a remarkable influence upon his subsequent career. At Berlin the Varnhagens became a rallying point for men distinguished in science, art, and letters, and theirs was the most important German salon Varnhagen wrote stories (1815), poems (1816), a remarkable character sketch of Goethe (*Goethe in den Zeugnissen der Mitlebenden*, 1824), and, between 1824 and 1830, five volumes of similar *Biographische Denkmale* In 1833 Rahel died, and in 1834 Varnhagen published a memorial of her in three volumes, followed (1836) by two volumes of a *Galerie von Bildnissen aus Rahels Umgang* and (1843–46) by seven volumes of *Denkwürdigkeiten*. Varnhagen's style, modeled on that of Goethe, is remarkable for elegance and precision. His reminiscences are of permanent historical value. He died in Berlin Oct. 10, 1858, and left 14 volumes of Tagebücher (1861–70), two volumes of *Denkwürdigkeiten* (1859), a volume of studies in Prussian history, *Blatter aus der preussischen Geschichte* (1868), and a volume of *Biographische Porträte* (1871). *Letters* to him from A. von Humboldt were published (Leipzig, 1860). There is an edition of selected *Works* (19 vols., Leipzig, 1871–77). Consult article by R. Haym in *Preussische Jahrbücher* (Berlin, 1863).

VARNHAGEN VON ENSE, RAHEL, *née* LEVIN (1771–1833). A German literary woman, born in Berlin. She became a familiar figure in literary and artistic circles at Hamburg, Paris, Prague, and Frankfort-on-Main, and in 1814 was married to Karl August Varnhagen von Ense (q.v.), over whose career she exercised a remarkable influence. Her husband published a memorial of her, *Rahel, ein Buch des Andenkens für ihre Freunde* (3 vols., 1834, new ed., 1903), and also *Galerie von Bildnissen aus Rahels Umgang* (2 vols., 1836) After her husband's death were published *Briefwechsel zwischen Rahel und David Veit* (2 parts, 1861) and *Briefwechsel zwischen Varnhagen von Ense und Rahel* (6 vols., 1874–75). Consult Ludmilla Assing, *Aus Rahels Herzensleben* (Leipzig, 1877), Emma Graf, *Rahel Varnhagen und die Romantik* (Berlin, 1903); Ellen Key, *Rahel, eine biographische Skizze* (ib., 1907).

VARNISH (OF, Fr. *vernis*, varnish, p.p. of OF *vernir*, to varnish, probably from ML *vitrinus*, glassy, from Lat. *vitrum*, glass). Varnishes are solutions of resins or drying oils which form transparent liquids capable of hardening on exposure to air, either by evaporation of the solvent or oxidation or both.

There are three classes, as follows· *Spirit*, where the solvent consists of some volatile liquid, such as alcohol, acetone, etc. A familiar example of this type is shellac varnish. *Turpentine*, or solutions of resins in oil of turpentine. *Oil*, drying oils, such as linseed, poppyseed, and Chinese wood oils, either alone or mixed with resins and thinned with turpentine. This last type has superior lasting quality, but is very expensive and difficult to prepare.

Turpentine and oil varnishes may also contain rosin, which is usually considered as an adulterant, and seriously detracts from the resisting quality to moisture and sunlight. The resins commonly used are shellac, mastic, sandarac, and dammar for spirit varnishes; and amber, copal, anime, kauri, and dammar for other types.

In the manufacture of spirit varnishes the resin is dissolved in the warmed solvent, cooled, and clarified. When necessary, alcohol soluble coloring matter, such as dragon's blood, cochineal, etc., may be added. For oil varnishes it is necessary to heat the resin for some time above its boiling point in order to drive off volatile oils and render the residuum soluble in hot boiled oil, which is now added. After thorough incorporation by means of stirring and heating the mass is cooled to 130°–140° C. (266°–284° F.) and thinned with turpentine. Several months of storage are necessary for clarification. In order to overcome the large losses sustained in heating the gums, they may be dissolved in naphthalene under pressure at 250°–290° C. (450°–522° F.), the resulting solution mixed with the drying oil, and the naphthalene distilled off. Lacquers or natural varnishes (see GUMS) are milky juices of certain trees found in the East. On heating, the sap loses water and furnishes a brown oily liquid which may be colored or mixed with pigment and thinner and acts as a varnish. Japans are dark-colored boiled oils sometimes mixed with asphaltum. They are largely used in coating sheet metal and are usually baked on. Consult: W. T. Brannt, *Varnishes, Lacquers, Printing Inks, and Sealing Waxes* (Philadelphia, 1893); A. H. Sabin, *The Industrial and Artistic Technology of Paint and Varnish* (New York, 1904); M. Bottler, *German Varnish Making* (ib., 1912); C. D. Holley, *Analysis of Paint and Varnish Products* (ib., 1912); G. H. Hurst, *Painters' Colors, Oils, and Varnishes* (5th ed., Philadelphia, 1913); Sir T. E. Thorpe, *Dictionary of Applied Chemistry* (New York, 1913); F. H. Thorp, *Outlines of Industrial Chemistry* (rev. and enl. ed., ib., 1914).

VARNISH TREE. A name given to several trees of the family Anacardiaceæ because the resinous juice is used for varnishing or for lacquering. The black varnish tree (*Melanorrhœa usitata*) is described in the article on MELANORRHŒA, and the Japan varnish tree (*Rhus vernicifera*) in the article on SUMACH. Other trees valuable for the varnish they yield are *Gluta benghas* and *Melanorrhœa wallichii*, natives of Java, Sumatra, Borneo, Celebes, and other East India islands. The juice is extremely acrid, and soon hardens into a black resin. To obtain it pieces of bamboo are inserted into the bark and allowed to remain all night, as the juice flows more freely by night than by day. It is prepared for use by boiling with equal parts of oil obtained from the fruit of *Mimusops elengi*.

VARNUM, JAMES MITCHELL (1748–89). An American soldier, born at Dracut, Mass. He graduated at Brown (then Rhode Island) University in 1769, was admitted to the bar in 1771, and practiced at East Greenwich, R. I. In 1774 he became commander of the celebrated Kentish Guards, and in May, 1775, was made colonel in the First Rhode Island Infantry. For efficient services at the siege of Boston, at Harlem Heights, and at White Plains he was appointed brigadier general of Rhode Island troops in December, 1776, soon afterward, in February, 1777, taking the same rank in the Continental army. After participating in the battle of Monmouth and in Sullivan's Rhode Island campaign, he resigned on March 5, 1779, and resumed the practice of law. He was major general of the State militia from 1779 to 1788, was a member of the Continental Congress in 1780–82 and again in 1786–87, and in 1787 was appointed one of the Supreme Court judges of the Northwest Territory, removing to Marietta, Ohio, in June, 1788.

VAROLIO, vä-rō'lyō, COSTANZO (c.1543–75). An Italian surgeon and anatomist, born at Bologna. He was a student and professor at the University of Bologna, and afterward went to Rome as physician to Pope Gregory XIII. His studies of the human brain are still remembered by the anatomical designation of *Pons Varolii*. He is the author of *De Nervis Opticis* (1573).

VAROTARI, vä'rō-tä'rē, ALESSANDRO (1590–1650). A Venetian painter, born at Padua, and usually called Il Padovanino. He imitated the style of Veronese and Titian, whose works he studied in Venice. The frescoes in the church of St Andrea at Bergamo are known to be his work, and there are two of his pictures in the National Gallery, London. His best works are "The Marriage at Cana" (1622), in the Academy at Venice, and "St. Liberatus," in the Carmine, Venice. He passed the greater part of his life in Venice and Padua, and his paintings are preserved chiefly in those cities. Consult Ridolfi, *Le Maraviglie dell' Arte* (Venice, 1648).

VARRO, MARCUS TERENTIUS (116–27 B.C.). A Latin author, known as the most learned of the Romans. He was born at Reate, in the Sabine territory. He studied first under L. Ælius Stilo Præconinus and then under Antiochus, a philosopher of the Academy. Varro served with distinction in the wars against the Cilician pirates and Mithridates; afterward, as legatus of Pompey in Spain, he was compelled to surrender his forces to Cæsar. He shared the fortunes of the Pompeian party till its defeat at Pharsalus, after which he obtained his pardon from Cæsar, by whom he was employed to collect and arrange the great library designed for the public. For a time he lived in retirement, chiefly at his villas near Cumæ and Tusculum, busily writing. When the second triumvirate was formed his name was on the list of the proscribed; but he escaped, and, after some time spent in concealment, he was received under the protection of Octavianus. The rest of his life was spent in his studies. Varro was the most learned and the most prolific of Roman authors. He declared that he had composed 490 books (book here, it should be noted, includes subdivision of works). Only two of his works have survived, and one of these is in a fragmentary state. The most considerable of his writings, whether lost or extant, are as follows: (1) *De Re Rustica Libri III*, still extant, the most important treatise on ancient agriculture known. (2) *De Lingua Latina* (grammatical), which originally extended to 25 books, only six of which, however, have come down to us, and even these are in an imperfect form. (3) *Antiquitatum Libri*, comprising two sections, the *Antiquitates Rerum Humanarum*, in 25 books, and the *Antiquitates Rerum Divinarum*, in 16 books. This, his greatest work, the one on which his reputation for learning was mainly founded, has unfortunately perished, except a few fragments. (4) *Saturæ*, composed in various metres, and occasionally also in prose. These pieces, copied to some extent from the productions of Menippus the Gadarene, were apparently a series of comments on a variety of subjects, generally in the form of dialogue, and aiming at the enforcement of moral lessons or serious truths in a familiar style. Of these we have only fragments. The best edition of the *De Re Rustica* is that of Keil (Leipzig, 1884); of the *De Lingua Latina*, that of Spengel (Berlin, 1885), and that of G. Goetz and F. Schoell (Leipzig, 1910). The *Saturæ Menippeæ* are published in Bücheler's edition of Petronius (5th ed, Berlin, 1912). Consult: Gaston Boissier, *Etudes sur Varron* (Paris, 1861); Martin Schanz, *Geschichte der römischen Litteratur*, vol. i, part ii (3d ed., Munich, 1909); J. W. Duff, *A Literary History of Rome* (London, 1909); the article "Terentius, 21," in Friedrich Lubker, *Reallexikon des klassischen Altertums*, vol. ii (8th ed., Leipzig, 1914); M. S. Dimsdale, *A History of Latin Literature* (New York, 1915).

VARSOVIENNE, vär'sō'vyĕn' (Fr., Warsaw dance). A modern dance in three-quarter time and moderate tempo, beginning on the up beat and having a strong accent on the first beat of the even measures. It originated in France about 1850, and is a modification of the Polish mazurka or redowa (qq.v.).

VAR'TABED. See ARMENIAN CHURCH.

VARUNA, vä'rōō-nä (from Skt. *var*, surround, encompass, probably connected with Gk. *οὐρανός, ouranos*, heaven). In Vedic mythology, the representative of the all-encompassing heaven. Only a dozen hymns in the Rig Veda are addressed exclusively to his praise, but they show him to be the noblest of the Vedic divinities. He is generally invoked in company with Mitra (q.v.). The sun is their common eye; the heaven is their golden abode. As creator and regent of the world, Varuna rules the universe with unswerving laws. A thousand spies, the stars or rays of light, seek out offenders against his rule; there is no escape from his omniscience, even by flight unto the farthest heaven; his bonds and fetters are ever ready for the guilty;

and inevitable punishment awaits those who have aroused his wrath At the same time it is his all-wise providence that protects the good In his divine keeping are a thousand remedies that relieve the miseries incurred by sin and hold death afar. The reward of immortality is Varuna's abode hereafter As sovereign of the vaulted sky Varuna is the lord of the waters. The sea is his domain, the rivers flow at his bidding, and the rains descend in accordance with his ordinances. Through his sovereignty over the waters he inflicts dropsy upon those who sin against his law. As an Aditya he is sometimes coupled with other gods than Mitra, while his great rival for supremacy in the hearts of the people is Indra (q.v.).

In post-Vedic mythology Varuna sank into insignificance beside Prajapati (q v) as a supreme being, and in the later Indian religion his dominion is confined simply to the sea and to the supremacy over the West Consult: Karl Bohnenberger, *Der altindische Gott Varuna* (Tubingen, 1893); W. J. Wilkins, *Hindu Mythology* (2d ed., London, 1900), Alfred Hillebrandt, *Vedische Mythologie*, vol. iii (Breslau, 1902); A. A. Macdonell, *Vedic Mythology* (Strassburg, 1897); L. D. Barnett, *Antiquities of India* (London, 1913).

VA'RUS, PUBLIUS QUINTILIUS. A Roman general. He belonged to a noble family. He was consul in 13 B.C. About 20 years later he was appointed Governor of Syria, and on his return was sent by Augustus to command the armies of Germany. The Germans, under the leadership of a chief of the Cherusci, named Arminius (q.v.), attacked Varus, who, with three legions, the usual number of auxiliaries, and a strong body of cavalry, had proceeded as far as the Weser. By false intelligence the proconsul was induced to quit his intrenched camp and to leave the highway for a shorter route. The Romans marched in a long straggling line, encumbered with baggage, with their wives and children. Suddenly they were assailed by the Germans in the depths of the Teutoberg Forest, and it was with difficulty they forced their way to a clear space to encamp for the night. For the next two days the Romans struggled on, marching and fighting with decreasing forces and exhausted strength, intending to reach, if possible, the fortress of Aliso on the Lippe. Finally they were met by the main force of the Germans and completely broken. Varus killed himself in despair. This victory of the Germans, gained 9 A.D., rolled back the tide of Roman conquest. The Rhine, instead of the Weser, again became the boundary of the Empire.

VASA, vä'sȧ. A government of western Finland, Russia, extending along the Gulf of Bothnia, and covering an area of 16,105 square miles (Map: Russia, B 2). The coastland is low and indented, but the surface rises in the interior into a rocky plateau interspersed with lakes and marshes. The climate is severe and only the coast region and the river valleys are suitable for agriculture. Rye, oats, barley, and potatoes are the principal farm products. The manufactures are of considerable extent and variety, including lumber, paper, metal wares, rubber goods, articles of apparel, food products, etc. There is a lively commerce with the Baltic ports. Pop., 1897, 446,772; 1912, 515,500, about one-third Swedes and the rest Finns.

VASA, or **NIKOLAISTAD,** nē'kō-lī-städ'. The capital of the Government of Vasa, Finland, a short distance from the Gulf of Bothnia (Map: Russia, B 2). The town is the seat of the Governor of the lan. Commercially it is the chief town of Osterbotten (in East Bothnia). Its industrial establishments include shipyards, woolen mills, and sawmills. Sawn timber is its chief article of export. Pop, 1897, 13,493; 1912, 22,000. The town was named Nikolaistad in honor of Nicholas I of Russia, when rebuilt after the fire of 1852.

VASA, HOUSE OF A Swedish royal family, which mounted the throne in the person of Gustavus I in 1523 and ruled till 1654. The most distinguished member of the house was Gustavus II Adolphus (1611–32). His daughter Christina, who was unmarried, resigned the throne in 1654 in favor of her cousin Charles X Gustavus, Count Palatine of Zweibrucken, who inaugurated a collateral female branch. Christina died in 1689. The house of Vasa furnished three kings to Poland, from 1587 to 1668. This branch of the family became extinct with John Casimir, who abdicated in 1668 and died in 1672.

VASA ORDER. A Swedish order of merit, founded in 1772 by Gustavus III. The decoration is a white enameled cross with eight points, surmounted by a crown and worn on a green ribbon.

VÁSÁRHELY, vä'shär-hĕl-y' The name of two towns in Hungary. See HÓDMEZŐ-VÁSÁRHELY and MAROS-VÁSÁRHELY.

VASARI, vä-zä'rē, GIORGIO (1511–74). An Italian painter and architect, chiefly known as a biographer of artists. He was born at Arezzo, and on the advice of his kinsman, Luca Signorelli, he first studied painting under Guglielmo di Marsiglia. Pollastra, the poet, taught him Latin, and the lad's ability to recite whole books of the *Æneid* won for him the patronage of the Cardinal of Cortona, who, in 1523, took him to Florence. There he was a pupil of Michelangelo and Andrea del Sarto and studied the humanities with the two Medicean princes, whose guardian the Cardinal was. During the exile of the Medici Vasari's fortunes suffered, but he went in the train of Cardinal Ippolito to Rome, and studied for many months with such assiduity that he was brought back to Arezzo on a litter. Upon his recovery Duke Alessandro de' Medici of Florence made him his court painter. In this capacity Vasari painted family portraits, frescoed the Medici Palace, and designed the decorations of Florence upon the visit of Charles V. After Alessandro's assassination he spent three years painting for the monks of Camaldoli, visited northern Italy and Venice, and resided at Rome (1529), and in other parts of Italy. In 1555 he was summoned to Florence by Duke Cosimo, in whose service he remained until his death. From the duke Vasari received a large pension and many gifts and honors, including the appointment to the office of gonfaloniere (chief magistrate) of Arezzo for life. He transformed the interior of the grand Palazzo Vecchio into apartments suitable for a duke's residence, and frescoed the Great Hall which the Republic had intended for Michelangelo and Leonardo. He also designed a number of buildings for the duke, including the Uffizi in Florence. Later he served alternately Pope Julius III and the duke. In 1573 he finished the decorations of the Sala Regia in the Vatican, but his intended masterpiece, the frescoes of the cupola of Florence, was unfinished at his death, June 27, 1574. He possessed a lovable and upright character, and was diligent, but he lacked genius.

Vasari was one of the most versatile artists of the later Renaissance. Modern criticism finds his painting mannered and without originality, but judges more favorably of his architecture. His masterpiece, the Uffizi, is a fine, harmonious building, admirably adapted for its various purposes. Other chief works are the Vigna di Papa Giulio near Rome, the church of the Badia, and his own house (now Casa Montauti at Arezzo), the cupola of Madonna dell' Umiltà at Pistoja, and the new sacristy of San Lorenzo, Florence.

But Vasari's greatest service by far to art is his world-renowned *Lives*, to which we owe our chief knowledge of the artists of the Italian Renaissance. This monumental work was undertaken at the suggestion of Cardinal Farnese (afterward Pope Julius III) in 1542; the first edition appeared under the title *Vite de' più eccellenti, pittori, scultori, ed architetti*. A second edition, enlarged and improved, appeared in 1568. The work is excellent in style, full of local color, and really remarkable in the acuteness and catholicity of its appreciation. He was, however, far too dependent on hearsay and gossip, inexact in facts and dates, and even guilty of wholesale plagiarism without acknowledgment. Nevertheless, his work remains, for its day, a monument of erudition and criticism, and not without justice has he been termed the father of modern art history and criticism. Monumental modern editions of the *Vite*, with complete notes, and biographies of the author, are those of Le Monnier (15 vols., Florence, 1846); Milanesi (9 vols., ib., 1878–85); Karl Frey (Munich, 1911); English translations are by Mrs. Foster (London, 1850), and by Gaston C. de Vere (10 vols., New York, 1912–16), the most accurate. Editions of selected biographies with admirable notes are by Blashfield and Hopkins (4 vols., New York, 1896), and, less scholarly, by E. L. Seeley (ib., 1906).

VASCO DA GAMA, väs'kō dä gä'mä. See GAMA, VASCO DA.

VASCONCELLOS, väs'kŏn-sĕl'lōs, JOAQUIM ANTONIO DA FONSECA E (1849–). A Portuguese critic, born at Oporto, and educated in Hamburg and Coimbra. He became professor of German at Oporto in 1883, and in 1889 was put in charge of the local Museum of Trade and Industry. His publications in the periodical *A Actualidade*, conducted by himself, and in separate volumes, concern the fine arts in general and music and German literature in particular. They include: *O Faust de Goethe e a tradução de Castilho* (1872); *Luiza Todi* (1873); *Reforma do ensino de bellas artes* (3 vols., 1877–79); *Albrecht Dürer e a sua influencia na peninsula* (1879); *O consummado germanista* (1879); *Goesiana* (4 vols., 1879–81).

VASCONCELLOS, KAROLINE MICHAËLIS (1851–). A Spanish philologist, born in Berlin. In 1876 she was married to Joaquim Vasconcellos (q.v.). Early devoting herself to the languages of the Spanish peninsula, she published: *Erlauterungen zu Herders Cid* (1868); *Romancero del Cid* (1870); *Studien zur romanischen Wortschöpfung* (1876); *Poesias de Francisco de Sâ de Miranda* (1885); *Studien zur hispanischen Wortdeutung* (1886); "Geschichte der portugiesischen Litteratur," in Gröber's *Grundriss der romanischen Sprachen* (1894); and *Randglossen zum altportugiesichen Liederbuch* (1896–1902); *O Cancionero da Ajuda* (2 vols., 1904); *Estudos sobre o romanceiro peninsular: romances velhos em Portugal* (1907–09).

VASCO'NIA. See GASCONY.

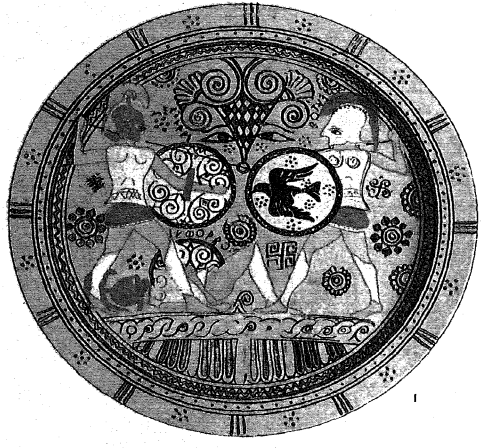
VAS'CULAR TISSUE (from Lat. *vasculum*, little vessel, diminutive of *vas*, vase, vessel). A tissue characteristic of the higher plants, comprising two regions that differ in the character and function of the vessels. The vessels of the xylem are tracheæ or tracheids, whose function is water conduction, those of the phloem are sieve vessels, whose function is associated with the transfer of food. Vascular tissue is also the chief tissue for mechanical support. See HISTOLOGY, MORPHOLOGY.

VASE. A vessel, more or less circular in form, used for practical or ornamental purposes. The material is generally pottery, though stone, glass, metal, etc., are frequently used, especially for ornament. The use of vases is common to all peoples, both ancient and modern; but it was in Hellenic lands that vase making attained highest perfection, alike in form and in artistic decoration, to the Greek vase, therefore, this article is mainly devoted.

Earthenware vessels were in almost universal use among primitive peoples, and in their clay forms and decorations furnish valuable information to the anthropologist, the archæologist (See ARCHÆOLOGY; ARCHÆOLOGY, AMERICAN; POTTERY), the student of the life of a given people (see end of this article), and, through the inscriptions on them, to the student of language. It is not, however, till a more advanced state of artistic development has been reached that the vases attract attention for their intrinsic merit. If, moreover, the rich prefer vessels of stone or metal, and the use of clay is confined to the poor, the potter is apt to produce cheap, rude, or carelessly made wares, even when the other crafts show the possession of high artistic skill. Thus, in Egypt, though good clay abounds, the vases are in general of little interest. The material for the study of early Oriental ceramics is neither so plentiful nor so minutely classified as is that from other lands. Moreover, the conservatism of the East is displayed in the persistence of a limited number of forms and old linear decorations, in marked contrast to the variety of the Greek types.

The Greek lands and Italy have yielded a vast mass of material, falling into well-defined groups, whose general succession is clear, and whose chronology is in most cases well established. Very early forms are those found in the lower strata at Troy, the island graves, and some of the pottery of Cyprus (q.v., at end). The clay is coarse and the vases are shaped without the aid of the potter's wheel. The decoration, when present, consists of incised lines in geometrical patterns. The color is black or red, according to the firing, and an apparent glaze is due to the polishing of the surface, as no coloring matter seems to have been employed. Towards the end of this period appear vases with decoration in colors, wheel-made, and showing much taste and skill. In addition to geometric designs there now appear plants and animals. Special classes of these vases are those from Thera and the Kamares ware of Crete (q.v.), whose relation to the Mycenæan pottery is still a subject of discussion. The earlier group of Mycenæan vases is decorated in dull colors on a highly polished clay. Later a more lustrous paint is used and the clay is very fine. A favorite form is the false-necked jar or amphora. (See Fig. 4 on Colored Plate.) Favorite subjects are representations of sea plants, the cuttlefish,

GREEK VASES - I.



1



2



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4

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1 PLATE FROM RHODES - COMBAT OF HECTOR AND MENELAUS
2 CYLIX - APHRODITE ON THE SWAN
3 MOURNING SCENE FROM ATHENIAN LECYTHUS
4 MYCENÆAN VASE .. FALSE-NECKED AMPHORA

nautilus, and murex, all of which are rendered very successfully, though with a tendency to become conventional. For the Minoan-Mycenæan pottery found in Crete, see ARCHÆOLOGY, II, *Minoan or Ægean Period*, towards the end.

With the fall of the Mycenæan civilization near the end of the second millennium, B C., there is a return to a prevailingly geometric style, in which the straight line replaces curves and spirals. The vases, of pale clay, are covered with mæanders, zigzags, concentric circles, and triangles, to which are later added rows of water birds, and, occasionally, animals. Some show scenes from human life. As the first great discovery of these vases was made outside the Dipylon Gate (q.v) at Athens, they are sometimes called Dipylon vases, though this name should not be given to Bœotian, Argive, or other non-Attic varieties. During the eighth and seventh centuries the increased intercourse with the East is reflected in the vases On the islands and among the Ionians of Asia Minor was developed a great variety of local schools, all showing great fondness for elaborate decorations covering the entire surface of the vase. Rows of animals often surround the body of the vase, while the field is filled with rosettes, stars, crosses, and similar ornaments An interesting example is a plate from Rhodes (Colored Plate, Fig. 1), representing the conflict of Hector and Menelaus over the body of Euphorbus; it is the earliest example of an Homeric scene in art. While it is certain that Ionian influence was prominent in this development, it is not yet possible to determine the exact history of the local schools. On the Greek mainland the Oriental influence may be seen in the delicate little vases commonly called Proto-Corinthian (probably of

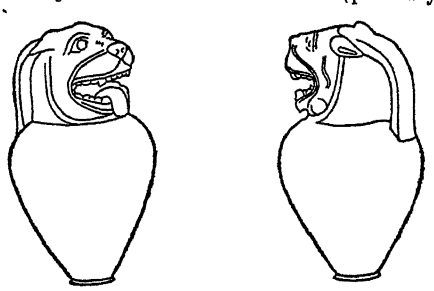


FIG. 1. PROTO-CORINTHIAN LECYTHUS.
From the *Journal of Hellenic Studies.*

Argive manufacture), and especially in the earlier Corinthian ware. Owing to the commercial importance of Corinth, her vases are found in Sicily and Italy and their manufacture seems to have continued even after the established supremacy of the Attic ware. They are of light clay, rather heavy in form and decorated with figures in black glaze with some use of red and violet. A white slip is also employed to indicate the flesh of women. At Naucratis and Cyrene the body of the vase was covered with this slip, on which were painted decorations in dark color.

Early in the sixth century the Athenian potters began to enter the field; they soon won complete mastery. They heightened the red of the clay by artificial means, and invented a black glaze of exceeding brilliancy. The earlier series is the black figured, in which the design is in black on the natural color of the clay. The details are indicated by incised lines, and a somewhat scanty use of red and white, though this last is always employed for the flesh of women. Near the end of the sixth century this technique was largely supplanted by the red figured, in which the body of the vase is covered with black glaze, while the figures appear in the natural color of the clay. The details are indicated by fine lines of black. While the earlier vases in this technique show the characteristics of archaic art, soon after the Persian wars there is greater correctness of drawing and more restraint and dignity of treatment. (See Colored Plate, Figs. 5 and 8) Later there appears a tendency to substitute prettiness and delicacy for dignity, and, while there is astonishing fineness of line, there is a distinct loss of power. In the fourth century the use of gilding and bright colors marks the decline. At this time also the practice, known in the early fifth century, of combining a vase and a figurine (Colored Plate, Fig 7) grew more common. Here we may perhaps trace the influence of works in metal, and it is certain that this was a large factor in the disappearance of wheel-made pottery and the substitution of vases formed in a mold and decorated with figures in relief, the so-called Megarian ware. Another series of Attic vases is distinguished by decorations in various colors on a white slip (Colored Plate, Fig. 2). The chief examples are seen in the *lecythus*, or jar used to contain oil and perfumes in the service of the dead. These vases are among the most beautiful products of Greek ceramic art; they were not made for export and are rarely found outside of Attica and Eretria See Colored Plate, Fig. 3.

In Lower Italy the Greek colonies seem to have developed local styles as early as the fourth century. All show a departure from the purer Attic taste in a love of florid and excessive ornamentation and the use of bright colors This leads to scenes introducing many figures, often arranged in rows, with ornamental borders of flowers and tendrils. Some of the vases of the earlier period are, however, fine examples of the potter's art. Colored Plate, Fig. 6.

In northern and central Italy the history of ceramics is chiefly concerned with the earlier and ruder types, valuable for ethnology, but with little artistic interest. The cemeteries on the Alban Mount, the Esquiline, and elsewhere yield rude vases of coarse clay, usually of a sooty black or dull gray. In Etruria there developed a distinct type, the bucchero nero of Italian writers. These vases are of coarse black clay. They are not painted, but polished and decorated with reliefs impressed in the soft clay by a stamp. The forms and reliefs show plainly the influence of metal vases, as well as of the Oriental and Greek importations. Though this ware seems to have been manufactured as late as the fourth century, the Etruscans were also great admirers of the Greek painted vases, which they imported in large numbers, and imitated, though with but small success.

About the end of the first century B.C. there appears in Italy, and later in Gaul, Germany, and Britain, the Arretine ware, of red clay, highly glazed, and decorated in relief. It commonly bears a potter's stamp, and is hence often called terra sigillata ware. The term Samian is almost certainly a misnomer. The best vases are of fine light clay with decorations evidently derived from the rich gold and silver plate in use among the wealthy. The Loeb collection of

Arretine pottery, now in the Fogg Museum in Harvard University, has been catalogued by G. H. Chase (New York, 1908). Another important collection of this ware is in the Boston Museum of Fine Arts.

In the preparation of the clay and the vase on the wheel Greek processes do not differ essentially from those described under POTTERY. Essential in the spirit of Greek ceramics is the absence of the merely mechanical and the presence of the free personality of the potter. Bands around the vase were drawn by the aid of the wheel, but all the other decoration was free-hand. In the black-figured ware the figures were first drawn in outline and then filled with solid color. After firing the details were engraved and the other colors added. A final firing made the vase ready for the market. In the red-figured ware the potter first drew his design on the soft clay with a dry point, thus allowing ample opportunity for alteration in details. The outlines were then marked by a border of lustrous black, and the body of the vase was covered with the same color. The details were then added under conditions that made correction impossible, while the full effect could not be seen till the firing brought the color to the surface. That the potter was proud of his art is shown by the frequency of signed vases during the sixth and earlier fifth centuries. Common also during this period was the practice of placing on the vase the name of some youth noted for his beauty or popularity, accompanied by the word καλός, *kalos*, beautiful. Consult the three monographs of Klein, named below in the bibliography.

The forms of the Greek vases are manifold, and a comparison of any collection with the tables given in catalogues will show the wonderful subtlety of the Greek artist in devising variations on well-established types.

Of the most important varieties, the *pithos* (Latin *dolium*) was a large jar of coarse clay used for storing grain or liquids, much as a modern hogshead is used. The *amphora* was a smaller vessel, primarily for storing oil or wine, but later a decorative vase. The body was somewhat large, the neck and mouth narrow. The Roman amphora was longer and narrower; the bottom was often pointed, for convenience in setting the amphora in the ground. Among the Romans the amphora was so often used for transporting liquids and solids, both by land and by sea, that the carrying capacity of vessels was reckoned by amphoræ. The *hydria*, or water pitcher, is in form much like the amphora, but distinguished by three handles, two on the shoulders for lifting, and one at the neck for use in pouring. An important vessel was the *crater*, or mixing bowl, in which wine and water were mixed and from which guests were served. In early times this is a round-bottomed bowl (*deinos*) on a stand, but later it was provided with a low foot, and developed into a number of graceful shapes.

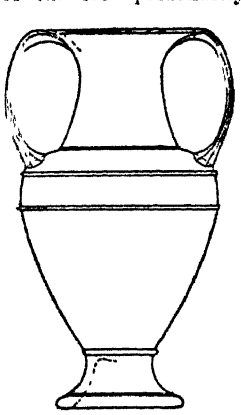


FIG 2

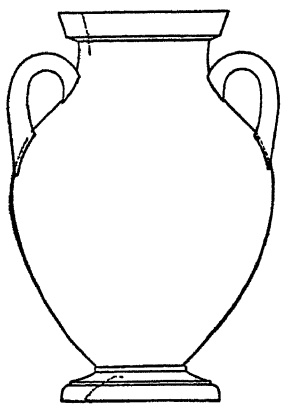


FIG. 3.

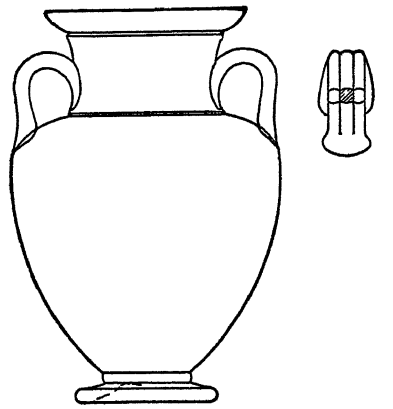


FIG. 4.

GREEK AMPHORÆ

2, early type showing imitation of metal forms, 3, early type, 4, later type.

(See Colored Plate, Fig. 5.) For oil and perfumes the *lecythus* was used, a tall, slender vase, with small neck and bell-shaped mouth. Gradual changes fashioned this into the graceful white funeral lecythus, already described. The *aryballus* was a small, round jug with very small neck and broad, flat lip—a favorite form with the Corinthian potters. Prominent among the cups are the *cantharos*, a large cup on a foot with high handles rising above the rim, and the *scyphos*, whose form is well shown in Colored Plate, Fig. 8. The favorite of the Attic potters was the *cylix*, a rather shallow saucer-like vase mounted on a foot. The decoration was applied on the outside, where two fields were

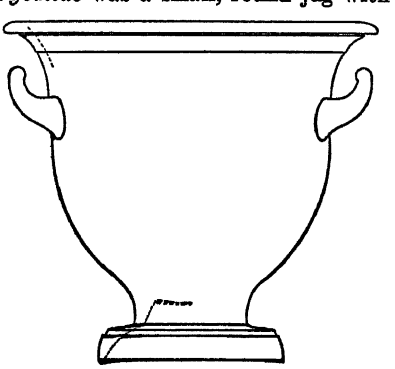


FIG. 5. CRATER.

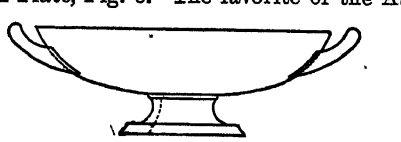


FIG. 6. CYLIX.



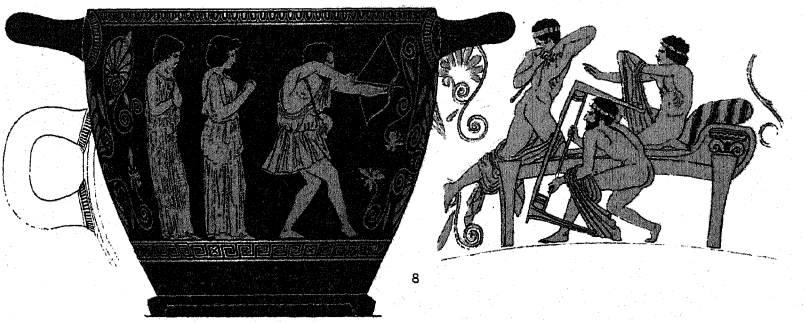
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5 CRATER - RETURN OF HEPHÆSTUS TO OLYMPUS
6 ALCMENE ON THE FUNERAL PYRE - PAINTING BY PYTHON ON A VASE FROM SOUTHERN ITALY
7 VASE IN THE FORM OF A SPHINX
8 SCYPHUS OR CUP - THE SLAUGHTER OF THE SUITORS BY ODYSSEUS

marked by the handles, and also in a small circular field in the centre of the inside. Consult Hartwig's *Griechische Meisterschalen der Blutezeit* (Berlin, 1893). Other common vases are the *rhyton*, or drinking horn, the *œinochoe*, or small pitcher, and the *pyxis*, or ladies' toilet box, commonly decorated with scenes from the life of women.



FIG. 7. RHYTON

There are few fields of Greek study which are not illumined by the light shed by these earthen vessels. For the history of the language and of the alphabet, the inscriptions on the vases are of the utmost value. Consult P. Kretschmer, *Die griechischen Vaseninschriften ihrer Sprache nach untersucht* (Gutersloh, 1894). In the personal life of the Greeks the importance of the vases becomes manifest. The scenes represented cover the entire range of life: children at play, young men at their gymnastic sports, the soldiers arriving for battle, and the girls and women within the house, spinning, weaving, etc. The marriage procession, the sacrifice, and the various ceremonies connected with the burial of the dead are all vividly shown on the vases. The artists drew a large part of their inspiration from mythological literature, and freely reproduced the versions then most popular. Hence these works are often valuable authorities.

Bibliography. See the "Bibliography by Authors," in Salomon Reinach, *Répertoire des vases peints grecs et étrusques*, vol. ii (Paris, 1900), and the "Bibliography by Subjects," in J. H. Huddilston, *Lessons from Greek Pottery* (New York, 1902). The history of Greek vases is not treated fully from the most modern standpoint in any single work. Still valuable are: Rayet and Collignon, *Histoire de la céramique grecque* (Paris, 1888); Dumont and Chaplain, *Les céramiques de la Grèce propre* (ib., 1881–90); Von Rohden, "Vasenkunde," in Baumeister, *Denkmaler des klassischen Altertums* (Munich, 1885–88); the article "Vas," in William Smith, *A Dictionary of Greek and Roman Antiquities*, vol ii (3d ed., London, 1891); E. Robinson, *Catalogue of Greek, Etruscan, and Roman Vases in the Boston Museum of Fine Arts* (Boston, 1893); Edmond Pottier, *Catalogue des vases antiques de terrecuite du Louvre* (Paris, 1896, 1899, 2 vols. of photographic plates with a text), of great value for the general characteristics of Greek vase painting, a history of the study, and the early styles. Excellent works are: W. Klein, *Euphronios: eine Studie zur Geschichte der griechischen Malerei* (2d ed., Vienna, 1886); id., *Die griechischen Vasen mit Meistersignaturen* (2d ed., ib., 1887); id., *Die griechischen Vasen mit Lieblingsinschriften* (ib., 2d ed., 1898); F. W. E. Gerhard, *Auserlesene griechische Vasenbilder* (Berlin, 1840–58); Lenormant and De Witte, *Elite des monuments céramographiques* (Paris, 1844–61); Otto Benndorf, *Griechische und sicilische Vasenbilder* (Berlin, 1869–83); G. T. Lau and others, *Die griechischen Vasen: ihr Formen und Decorationsystem* (Leipzig, 1877); Furtwängler and Löschke, *Mykenische Thongefasse* (Berlin, 1879); Genick and Furtwängler, *Griechische Keramik* (ib., 1883); Furtwangler and Loschke, *Mykenische Vasen* (ib., 1886); Harrison and McColl, *Greek Vase Paintings* (London, 1894); Hermann Thiersch, *Tyrrhenische Amphoren* (Leipzig, 1899), Furtwangler and Reichhold, *Die griechische Vasenmalerei, auswahl hervorragender Vasenbilder* (Munich, 1900 et seq.), still unfinished, but probably the most accurate publication of Greek vases yet attempted. H. B Walters, *History of Ancient Pottery* (2 vols., London, 1905); Edmond Pottier, *Douris and the Painters of Greek Vases*, English translation (London, 1909); Arthur Fairbanks, *White Lekythoi with Outline Drawing in Glaze Varnish* (New York, 1907); J. R. Wheeler, "Vases," in H. N Fowler and others, *Handbook of Greek Archæology* (ib., 1909); W. Riezler, *Weissgrundige Attische Lekythen* (Munich, 1914); Arthur Fairbanks, *Athenian Lekythoi with Outline Drawing in Matt Color on a White Ground* (New York, 1914); "Vasen," in Friedrich Lubker, *Reallexikon des Klassischen Altertums*, vol ii (8th ed., Leipzig, 1914). The vases scattered in expensive publications and periodicals are collected in small outline drawings in Reinach's *Répertoire*, cited above. Important also are the catalogues of the collections at Athens by Couve and Collignon (Paris, 1902); Berlin, by Furtwängler (2 vols., Berlin, 1885); the British Museum, by Smith and Walters, vols ii–iv (London, 1893–96); of the Louvre, by Edmond Pottier (3 vols., 1896–1906), of the vases in the Bibliothèque Nationale, by A. de Ridder (1901–02); of Vienna, by Masner (Vienna, 1892); of the Ashmolean Museum of Oxford, by P. Gardner (1893); and of Munich, by Jahn (Munich, 1855), with an introduction which laid the foundation for the scientific study of Greek vases.

VASELINE. Trade mark used on products of the Cheseborough Manufacturing Co. consisting largely of petroleum jelly (q.v.).

VA'SEY, GEORGE (1822–93). An American botanist, born near Scarborough, Yorkshire, England, and educated at the Berkshire Medical College, Pittsfield, Mass., where he graduated in 1848. He practiced medicine for 20 years in Illinois and in 1872 became botanist of the Agricultural Department at Washington. His works, which were published by the government, are: *A Descriptive Catalogue of the Native Forest Trees of the United States* (1876); *The Agricultural Grasses of the United States* (1884); *A Descriptive Catalogue of the Grasses of the United States* (1885); and *Grasses of the South* (1887).

VASILI, vä'zē'lē', COMTE PAUL. The nom de plume of Juliette Adam (q.v.).

VASILKOV, vä-sēl-y'-kôf'. A district town in the Government of Kiev, South Russia, 25 miles southwest of Kiev (Map: Russia, D 4). It manufactures small articles of gold and silver, leather, brick, soap, and candles. Pop., 1910, 16,816.

VASISHTHA, vä-sĭsh'tä. One of the most celebrated Vedic Rishis, the spiritual adviser of King Sudas in ancient northern India, and the traditional author of several hymns of the Rig-Veda, particularly in the seventh book. To him is also attributed a law book known as the *Vasiṣṭha Dharma Śāstra* (ed. by Stenzler, London, 1876, and by Führer, Bombay, 1883), another proof of the priestly tradition in the family of the Vasishthas. For legends concerning Vasishtha, see Muir, *Original Sanskrit Texts*, vol. i (2d ed., London, 1872); and consult:

Kaegi-Arrowsmith, *The Rigveda* (Boston, 1886); Dowson, *Hindu Mythology* (London, 1879); Wilkins, *Hindu Mythology* (2d ed., London, 1900). See VIŚVĀMITRA.

VÁSQUEZ DE CORONADO, vas'kath dā kō'rō-nä'dō, FRANCISCO. See CORONADO, FRANCISCO VÁSQUEZ.

VASSAL. Under the feudal system, one who was invested with a fief and who was bound to render feudal services and homage to a superior lord. The great lords of the realm who held directly of the King were known as crown vassals, but the term "vassal" was also applied to their feudal retainers. The services to be performed by a vassal depended upon his rank and station; if he was a great lord his chief duties were to serve the King in time of war and also furnish men and arms for military purposes: if he was only an insignificant tenant of a noble, his chief obligation might be to assist personally in the cultivation of his superior's lands. See FEUDALISM and authorities there referred to; also FEUDAL TENURE.

VAS'SAR, JOHN ELLISON (1813–78). An American lay preacher and missionary, a cousin of Matthew Vassar, founder of Vassar College, born at Poughkeepsie, N. Y. He worked in the Vassar brewery at Poughkeepsie, but from religious convictions withdrew from the company and devoted his time and money to missionary work. In 1850 he became an agent and colporteur of the American Tract Society, and traveled as its representative throughout the West. During the Civil War he was at the front with the Union armies, and after its close devoted himself to religious work in the South. He was popularly known as Uncle John Vassar. Consult T. E. Vassar, *Uncle John Vassar* (New York, 1879).

VASSAR, MATTHEW (1792–1868). An American philanthropist, founder of Vassar College. He was born at East Dereham, Tuddenham Parish, England, and in 1796 was brought to the United States by his father, James Vassar, a wool grower, who in 1797 settled on a farm near Poughkeepsie, N. Y., and four years later established himself as a brewer there. In 1806 Matthew left home, and for four years worked in a country store near Newburgh, N. Y. Returning to Poughkeepsie, he entered his father's business as a bookkeeper. In 1811 the brewery was destroyed by fire, and the family reduced to comparative poverty. Matthew then began business as a brewer on his own account, and accumulated a large fortune. He contributed liberally to numerous charities, but is chiefly remembered as the founder of Vassar College (q.v.). He died suddenly on June 24, 1868, while reading his annual report to the board of trustees of the college. Consult B. J. Lossing, *Vassar College and its Founder* (New York, 1867), and E. H. Haight, ed., *The Autobiography and Letters of Matthew Vassar* (ib., 1916).

VASSAR, MATTHEW, JR. (1809–81). An American philanthropist, nephew of Matthew Vassar, the founder of Vassar College. He was born in Poughkeepsie, N. Y., and at an early age entered the brewery established by his uncle and father, and of which he later became the successful manager, accumulating a considerable fortune. He strongly favored his uncle's project for establishing Vassar College, and was named by him a member of its first board of trustees, which position he held, together with that of college treasurer, until his death. He gave the college $100,000 to endow professorships, $50,000 for other purposes, and with his brother constructed the Vassar Brothers Laboratory. He gave also to public institutions in the city of Poughkeepsie, his gifts in all amounting to about $500,000. His brother, JOHN GUY VASSAR (1811–88), began business as a member of the brewery firm, but was compelled by ill health to travel. He journeyed for 30 years and published some of his experiences under the title of *Twenty Years around the World* (1861). He was one of the original trustees of Vassar College, and gave jointly with his brother a considerable amount of money to the institution.

VASSAR COLLEGE. An undenominational institution for the higher education of women, incorporated in 1861 as Vassar Female College. It was established through the gifts of Matthew Vassar, who gave 200 acres of land, and $788,000 for that purpose. The college is situated near Poughkeepsie, N. Y., on a level plateau, 3 miles east of the Hudson River. The present corporate name was adopted in 1867. The original endowment given by Matthew Vassar has been increased by other members of the Vassar family, and by gifts of friends of the college in various parts of the United States. The total endowment on Jan. 1, 1916, including fellowships and scholarships, amounted to $1,775,365, and the acreage in campus and farms amounted to 800. The student enrollment in the college is limited by a resolution of the board of trustees to 1000, but the pressure for admission and the difficulty of gauging withdrawals make it impossible to maintain this limit to exactness. The enrollment for 1915–16 was 1125. Students are admitted on passing the examinations set by the college entrance examination board, or by an examination covering three years of preparation in four selected subjects. The course of study, which is partly elective, covers four years, and leads to the baccalaureate degree. The degree of master of arts is also conferred in course. The physical equipment of the college includes 25 buildings, seven of which are dormitories and resident halls; a farm of 675 acres, maintaining a model dairy, operated for the benefit of the college dining rooms, an open-air theatre, athletic grounds, flower gardens and conservatories, lakes and woodlands. The library contains about 86,000 books and pamphlets. The faculty in 1916 numbered 138, headed by President Henry Noble MacCracken, L.H.D. Consult Taylor and Haight, *Vassar* (New York, 1915), and M. H. Norris, *The Golden Age of Vassar* (Poughkeepsie, 1915).

VASSILENKO, vȧs'sē-lôn'kō, SERGEI NIKIFOROVITCH (1872–). A Russian composer, born at Moscow. In 1895 he entered the Moscow Conservatory. Profiting by such masters of composition as Taneiev and Ippolitov-Ivanov (qq.v.), he composed, in 1901, as his graduation exercise, the prize-winning cantata, *The Legend of the City of Kietzh*, an original and effective work, which in 1893 was produced as an opera. Vassilenko's later works are neither so original nor so interesting as his earlier ones, the composer having come under the influence of French impressionism and other ultramodern musical tendencies. From 1907 he was director of the Moscow historical symphony concerts. Besides the cantata mentioned, his compositions include a symphony in G minor; the vocal works with orchestra *The Widow* and *The Whirlpool;* an

Epic Poem for orchestra, a symphonic poem, *The Garden of Death*.

VASTO, vas'tō. A town in the Province of Chieti, Italy, situated on rising ground, 1½ miles from the Adriatic, and 70 miles northwest of Foggia (Map: Italy, E 3). It has a Gothic cathedral, a town hall with a museum, and interesting remains of the period of Roman occupation. The industries are olive culture, fishing, stock raising, and the manufacture of wine, wax candles, and brick. Vasto, the ancient *Histonium*, was an important town under the Romans Pop. (commune), 1901, 15,538; 1911, 14,827 (town, 10,090).

VĀTA. See VĀYU.

VATATZES, JOHN III. See JOHN III VATATZES.

VATHEK, vă'thĕk' An Oriental romance, written by William Beckford in 1782, originally in French. It has been considered the best Oriental story ever written by an Englishman, and presents a remarkable alliance of the sublime and the fantastic. Consult Garnett, *Essays of an Ex-Librarian* (London, 1901).

VATICAN, COUNCIL OF THE. A council held in Rome in 1869–70 and considered by Roman Catholics as the Twentieth Ecumenical Council. (See COUNCIL.) In 1867, 300 years after the Council of Trent, Pope Pius IX announced his purpose of holding another council. The period between this announcement and the publication of the Pope's encyclical (June 29, 1868), definitely summoning the council, was replete with controversy regarding it. Many of the prelates and of the general body of the clergy, especially of France, Belgium, Germany, and Holland, as well as many Catholic statesmen, considered it inexpedient, largely for political reasons. Austria united in discountenancing the projected meeting, and, although Napoleon III was not indisposed to it within certain limits, his ministry generally regarded it with distrust. The government of Italy opposed it openly. On the festival of the Immaculate Conception (Dec. 8, 1869) the council held its first session in the basilica of the Vatican. There were present 719 prelates, 49 of whom were cardinals, 9 patriarchs, 4 primates, 121 archbishops, 479 bishops, and 57 abbots and generals of monastic orders. This number gradually rose to 764. Although the doctrine of infallibility had not been formally announced as a portion of the programme of the council till its actual convention, yet it may be said that the council had but two real objects: the solemn ratification of this dogma, and the utterance of a protest against infidelity in all its aspects, whether of rationalism, pantheism, materialism, or atheism. Although the decrees setting forth the doctrines of the Church regarding God, the creation, the relation of faith to reason, etc., were unanimously adopted in the third public session (April 24, 1870), the decision in regard to infallibility was not arrived at so harmoniously, and not till a much later period.

It had been arranged that the committee on faith should consider all other matters lying within its sphere, relating to the Church, before treating of its head and his prerogatives, but, on April 22, 1870, those prelates in favor of it addressed a collective note to the council urging that all questions should give way to that of papal infallibility. The Pope approved of this change, and ordered an inversion of the order of business accordingly. The first vote was not arrived at till July 13, when, out of 601 members, 88 voted *non placet*, or adversely. These, however, were by no means necessarily to be taken as not believing in the doctrine In most cases they were simply opposed to its definition, at this time, as an article of faith On the final vote on the question, July 18, 1870, only two prelates recorded their votes against the definition, and even these, with all the rest of their recusant brethren, ultimately acquiesced in the decrees of the council. For the significance of the definition, see INFALLIBILITY The council was adjourned and indefinitely postponed, Oct. 20, 1870, in consequence of the outbreak of the Franco-Prussian War.

Consult: Josef Fessler, *Das vatikanische Concilium, dessen aussere Bedeutung und innere Verlauf* (2d ed., Vienna, 1871); H. E Manning, *The True Story of the Vatican Council* (London, 1877); Johann Friedrich, *Geschichte des vatikanischen Konzils* (3 vols., Bonn, 1877–87); Thomas Mozley, *Letters from Rome on the Occasion of the Œcumenical Council, 1869–1870* (2 vols., London, 1891); J M. A. Vacant, *Etudes théologiques sur les constitutions du concile du Vatican* (2 vols., Paris, 1895); William Arthur, *The Pope, the Kings, and the People* . . (London, 1903), containing a bibliography The documents are in *Acta et Decreta Concilii Vaticani* (Freiburg, 1892).

VATICAN, PALACE OF THE The residence of the Pope in Rome, and the seat of the great library, museums, and collections of art which constitute one of the chief attractions of the city for visitors Pope Symmachus (498–514) was the first to build a residence on the site, which was formerly occupied by the gardens of Nero. For a long time, however, the popes resided mainly at the Lateran Nicholas V (1447–55) began a systematic policy of improving the Vatican. The buildings around the three small courts nearest St. Peter's date from his time: they include the Cappella Paolina, the Borgia apartments and the Sala Reggia. The Sistine Chapel (q.v.) was built by Pope Sixtus IV (1471–84). The same policy was pursued by Alexander VI and Julius II, who summoned Bramante (q.v.) to Rome in 1503 to connect by parallel galleries 400 yards long the two groups of buildings at the north and south ends of the present palace. Under Paul III and especially Leo X the work was continued, after Bramante's death in 1514, from his plans. He created the octagonal court of the Belvedere and the hemicycle or Nicchione at the north end, and the court of San Damaso at the south end, with the arcades later decorated by Raphael and known as his Loggia. The present papal residence overlooking the colonnade of St. Peter's was the work of D. Fontana (q.v.) under Sixtus V. Clement VIII, and Paul V. He also built the magnificent library (1586–90), dividing the great court in two. The Braccio Nuovo was built by Raphael Stern under Pius VII about 1810. In recent years Pius IX carried out many important works of completion or restoration. The palace covers about 13½ acres, and is said to contain over 1100 rooms. With its chapels, decorated chambers, and museums the Vatican forms one of the greatest treasure houses of art in the world. The decorations of the world-famous Sistine Chapel (q.v.) are treated under a separate heading and under MICHELANGELO, the Stanze and Loggia of Raphael and his tapestries under that artist's biography, the frescoes of the chapel of Nicholas V under FRA ANGEL-

ico, and the gorgeous decorations of the Appartamento Borgio under PINTURICCHIO. The collection of antiquities begun by Pope Julius II and increased by the Medicean popes in the early sixteenth century received most of its treasures under Clement XIV and Pius VI in the late eighteenth century. The museum of ancient sculpture, its most important part, ranks with that of Naples as the first in the world. Among its best-known statues and groups are the Apollo Belvedere, the Laocoon group, the Zeus Otricoli, the Belvidere "Hercules" torso, the best copy of the Apoxyomenos of Lysippus, of the Cnidian Aphrodite of Praxiteles, and many others. The Vatican also contains valuable Egyptian, Etruscan, and Christian museums; and a picture gallery, relatively small in size, contains several paintings of the first rank, such as the "Madonna di Foligno" and the "Transfiguration" by Raphael.

The library of the Vatican was first made a public library by Nicholas V. It contains over 34,000 manuscripts, including those of the Greek New Testament, of Vergil, Terence, and one of Dante with miniatures by Giulio Clovio.

Bibliography. By far the best description of the Vatican and its contents was written by various scholars connected with the Vatican and edited by Ernesto Begni and others, *The Vatican—its History—its Treasures* (New York, 1914). Briefer and more popular accounts are M. K. Potter, *The Art of the Vatican* (new ed., Boston, 1903), and D. B. W. Sladen, *How to See the Vatican* (New York, 1914). A magnificent series of plates (without text) of the architecture is contained in P. M. Letarouilly, *Le Vatican et la basilique de St. Pierre de Rome* (3 vols., Paris, 1882). For the Borgia apartments consult Ehrle and Stevenson, *Les fresques du Pinturricchio dans les Salles Borgia du Vatican* (Rome, 1898); for the museum, Venturi, *The Vatican Gallery*, English translation by L. C. Piovanelli (Rome, 1890).

VATICAN FRAGMENTS. See FRAGMENTA VATICANA.

VATTEL, vä'tĕl', EMMERIC DE (1714–67). A Swiss jurist and publicist, born at Couvet, near Neuchâtel. He studied at Basel and Geneva. In 1741 he published a defense of the philosophical system of Leibnitz. In 1744 he received an office in Dresden and from 1746 to 1758 he was the representative of Augustus of Saxony and Poland at Bern. From there he returned to Dresden, where he became a privy councilor. He wrote: *Loisirs philosophiques* (1747); *Mélanges de littérature, de morale et de politique* (1757); but his great work on international law, for which he is famous, is *Droit des gens, ou Principes de la loi naturelle, etc.* (1758). This has been translated into numerous foreign languages (into English in 1760, and with notes by Chitty in 1838), and has still great value.

VÄT'TER, or **VET'TER,** LAKE. A lake in Sweden, second in size to Väner (q.v.). It lies about 25 miles southeast of the latter (Map: Sweden, E 7). It is of elongated shape, with a length of 82 miles and a maximum breadth of about 14 miles, and has an area of 738 square miles. It occupies a deep inclosed valley whose bottom is below sea level, the altitude of the lake surface being 289 feet and the depth of the water 390 feet. The shores are high, steep, and picturesque, and the water is remarkably clear. The lake receives a few small streams from the plateau of southern Sweden; but peculiar disturbances, such as rapid currents, sudden waves and eddies without apparent cause, and periodic fluctuations in the level, support the belief that it is fed largely by springs. The outlet of the lake is the Motala River, discharging eastward into the Baltic. This river has been canalized, and the Gota Canal connects the lake with Lake Vaner, thus making it a link in the transpeninsular waterway. The chief town on Lake Vätter is Jonkoping, near its southern extremity.

VAU. See DIGAMMA.

VAUBAN, vō'bäN', SÉBASTIEN LE PRESTRE DE (1633–1707). A French military engineer and marshal, born near Avallon, in Burgundy. When about 17 he joined the Spanish forces under Condé on the frontier of the Belgian Netherlands. He studied military science and engineering while actively a soldier. He was taken by the French in 1653 and joined the French army, where his aptitude won him a commission two years later as a royal engineer. After the cession of Dunkirk by the English Vauban was charged with the task of fortifying it. The renewal of the war (1667) brought him service in Flanders. He received a wound at Douai, which he captured, and laid successful siege to Lille. He was now made Governor of Lille, with charge of all the works in Flanders, and was called upon to inspect and direct work on fortifications in all parts of France. At the invitation of Louvois he wrote his *Mémoire pour servir d'instruction dans la conduite des sièges.* At the siege of Maestricht in 1673 he introduced in western Europe the system of approaches by parallels, by which he reduced the city in 13 days. In 1678 at the conclusion of hostilities he was made commissary general of fortifications for France. Between 1688 and 1693, in the war against the League of Augsburg, he conducted several sieges—Philipsburg, Mannheim, Frankenthal, Mons, Namur, etc. He was made a marshal of France in 1703. In the course of his military life Vauban strengthened 300 old fortresses and built 33 new ones. He took part in 140 battles, including 53 sieges. He wrote several technical treatises, the principal one being *De l'attaque et de la défense des places* (1736). The *Œuvres militaires de Vauban,* edited by Gen. Latour Foissac, were published in 1796. Vauban was interested in economic subjects and advocated a single tax in his *Projet d'une dîme royale* (1707). Consult: Michel, *Histoire de Vauban* (Paris, 1879); Lloyd, *Vauban, Montalembert, Carnot: Engineer Studies* (London, 1887).

VAUCAIRE, vō'kâr', MAURICE (1864–). A French poet, novelist, and dramatist, born at Versailles. His verse, delicate in type, includes: *Arc-en-ciel* (1885); *Parcs et boudoirs* (1887); *Est-ce vivre* (1889); *Petits chagrins* (1894). Among his carefully written novels are: *Chipette, ou la dame frivole* and *Demi grand monde* (1897); *La maison de poupées* (1900); *Le masque de sable* (1904); *Le piège* (1907); *Patatras* (1908); *Une vraie jeune fille* (1911). He wrote these successful plays: *Un beau soir* (1892); *Le petit chagrin* and *Les girouettes* (1899); *Valet de cœur* (1903); *Au temps jadis* (1905); *Hans le joueur de flûte* (1910); *Malbrouk s'en va-t-en guerre* (1911).

VAUCLUSE, vō'kluz'. A department of southeast France, consisting of the Principality of Orange, the County of Venaissin, and other parts of the former Province of Provence (Map: France, S., K 4). Area, 1381 square miles.

The western part belongs to the Rhone valley, while the eastern part is filled with the spurs of the Provençal Alps The greater part of the department is under cultivation, and large wheat crops are raised. Viniculture is extensively carried on. Potatoes and mangold beets are also raised in large quantities, and the silk culture produces nearly 2,000,000 pounds of cocoons annually. The chief manufactures are paper, silk, alcohol, and chemicals, sulphur being the principal mineral product. Pop., 1901, 236,949; 1911, 238,656. Capital, Avignon.

VAUCLUSE, FOUNTAIN OF. A noted spring in the south of France, in the department and near the village of the same name. It is a circular pool, surrounded by lofty cliffs, which discharges from 117,000 to 350,000 gallons of water per minute Near by Petrarch lived for a number of years, composing many of his poems to Laura.

VAUD, vō (Ger. *Waadt*) A canton of Switzerland (Map: Switzerland, A 2). Area, 1244 square miles. The interior of Vaud consists chiefly of an elevated plateau. Wines, chiefly white, are produced. Stock raising is well developed. Vaud is a prominent industrial canton. Among its manufactures are watches, musical instruments, cigars, and chocolate. It has many tourists' resorts, and is noted for its numerous educational institutions, patronized to a large extent by foreigners. Pop., 1910, 315,428, largely French-speaking Protestants. Capital, Lausanne (q.v.). The region, after forming part of the Kingdom of Arles, was annexed to Germany early in the eleventh century. It was later ruled by the house of Zähringen, after whose extinction it passed in the thirteenth century to the counts of Savoy. It was gradually acquired by Bern during the fifteenth and sixteenth centuries, under whose rule it remained till 1798, when it became the Canton of Leman in the Helvetic Republic. In 1803 it entered the Confederation under its present name.

VAUDEVILLE, vōd'vĭl; *Fr. pron.* vōd'vēl'. Originally a popular song with words relating to some story of the day, whence it has come to signify a species of drama in which dialogue is interspersed with songs of this description and with more or less of dancing and variety acting. The name "vaudeville" is a corruption of *vau* (i.e., *val*) *de vire,* from *les Vaux de Vire,* the name of two picturesque valleys in the bocage of Normandy. One Olivier Basselin, a fuller in Vire, composed in the fifteenth century a number of very popular humorous and satirical drinking songs; these, with others of the sort, became known all over France by the name of the place where they originated. Jean le Houx published many in the sixteenth century. In Paris *vaux de vire* were sung especially on the Pont Neuf, to airs which therefore were called *ponts neufs;* and as the origin of the name for the songs was forgotten, it was related to the word "ville," and took its present form. As a kind of popular song, the vaudeville lasted through the eighteenth century. At the same time dramatic vaudeville began, at first in the theatres of the public fairs and then in connection with the *opéra comique,* and plays of this kind were composed by Le Sage and other well-known writers. In the nineteenth century Scribe, Desaugiers, and others wrote vaudevilles, and several Parisian theatres have been devoted to their production. In other countries vaudeville is more or less freely patterned after the French style, the number of houses devoted to performance of this type constantly increasing Consult: Gasté, *Étude critique et historique sur Jean le Houx et le vau de vire à la fin du XVIème siècle* (Paris, 1874); id. (ed.), *Les vaux de vire de Jean le Houx* (with introduction and notes, Paris, 1875); id., *Olivier Basselin et le vau de vire* (Paris, 1887)

VAUDOIS, vō'dwȧ. See WALDENSES.

VAUDOUX. See VOODOO.

VAUDREUIL, vō'drē'y'. LOUIS PHILIPPE DE RIGAUD, MARQUIS OF (1724–1802). A French naval commander, born at Rochefort, grandson of the following He entered the naval service in 1740, in 1754 became captain, and in 1777 chief of squadron. In the following year he participated in the battle off Ushant and in the early part of 1779 fought with distinction in Senegal. Later in the same year he took part in the capture of Grenada and was present at the siege of Savannah, where he was wounded. He shared in the French victories off Dominica (April and May, 1780), commanded a squadron in the fight between De Grasse and Graves in Chesapeake Bay (Sept. 5, 1781), and participated in the siege of Yorktown His failure to come to De Grasse's aid in the battle off Santo Domingo (April 12, 1782) possibly gave Rodney the victory, but certainly saved Vaudreuil's own squadron He sat in the States-General of 1789, showed himself an ardent Royalist, and defended the royal family from the mob at Versailles (Oct. 5, 1789). In 1791 he fled to England, where he remained during the Reign of Terror.

VAUDREUIL, PHILIPPE DE RIGAUD, MARQUIS OF (c.1641–1725). A French Governor of Canada. He was born near Castelnaudary, Languedoc, entered the army, and in 1687 was made brigadier general and sent to Canada. He served under Frontenac and led expeditions against the Iroquois Indians, gaining a notable victory over them in 1693. In 1701 he became Governor of Montreal and in 1703 Governor-General of Canada.

VAUDREUIL-CAVAGNAL, kȧ'vȧ'nyȧl', PIERRE FRANÇOIS, MARQUIS OF (1698–1765). The last French Governor of Canada, born in Quebec, son of the preceding. He entered the army and in 1733 was appointed Governor of Three Rivers. He became Governor of Louisiana in 1742 and in 1755 was made Governor-General of Canada, succeeding Duquesne. Between him and Montcalm (q.v.) much dissension prevailed. After the battle on the Plains of Abraham (1759) decisive action on the part of Vaudreuil might have driven Wolfe's weakened army from Quebec, but his faltering destroyed all chances of recovering the town. In 1760 he surrendered Montreal to the English against the will of General Levis, the military commander. In Paris he was brought to trial for mismanagement of Canadian affairs, but received full justification.

VAUGHAN, vȧn, BERNARD (1847–1922). An English Roman Catholic clergyman, brother of Herbert and John Stephen Vaughan (qq.v.). He was born in Herefordshire, was educated at Stonyhurst, and became a member of the Society of Jesus. For 18 years he took a conspicuous part in the religious and civic life of Manchester, but in 1901 went to London, where he worked among the poor of Westminster and in the East End. His sermons on "The Sins of Society" in 1906 attracted large audiences. He preached at Montreal in 1910, traveled in Canada, the United States, and Alaska, and lectured in China, Japan, Italy, and France. In 1915 he

became chaplain to Catholic troops of the British expeditionary army on the Continent. His publications include: *The Sins of Society* (1906; 10th ed., 1908); *Society, Sin, and the Saviour* (1907); *Socialism* (1910); *The Our Father, Our Country's Need Today* (1911); *Socialism from the Christian Standpoint* (1913); *What of Today?* (1914).

VAUGHAN, CHARLES JOHN (1816–97). An English clergyman and educator. He was born at Leicester, and educated at Rugby under Dr. Arnold, and at Trinity College, Cambridge, where he took his degree in 1838. He studied law for a time, but turned to theology and was ordained in 1841. He was vicar of St Martin's, Leicester, until 1844, in which year he was elected head master of Harrow In 1860 he became vicar of Doncaster, and gave much of his energy to the training of candidates for ordination. From 1869 to 1894 he was master of the Temple in London, and had a widespread influence as a preacher and as a prominent leader of the Broad Church party. In 1894 he was made president of University College at Cardiff. He was also, from 1879, dean of Llandaff, where he died Oct. 15, 1897. He published many books of sermons and commentaries, and *The Church of the First Days* (1864–65; in 1 vol., 1890).

VAUGHAN, HENRY (1622–95), known as The Silurist. An English poet He was born at Newton-by-Usk, South Wales, and studied law and medicine in London, withdrawing subsequently to his native place, where he became a physician (1650). Among his works are: *Poems with the Tenth Satyre of Juvenal Englished* (1646); *Olor Iscanus* (1651); *The Mount of Olives, or Solitary Devotions* (1652); and *Thalia Rediviva* (1673). His works were edited by Grosart (London, 1871) and by Martin (New York, 2 vols., 1915), and his poems by Chambers (London, 1896). His verse is often quaint.

VAUGHAN, HERBERT (1832–1903). An English Roman Catholic prelate, brother of Bernard and John S. Vaughan. He was born at Gloucester, and studied at Stonyhurst College, at Brugelette in Belgium, and also at the Accademia de' Nobili Ecclesiastici in Rome. After his ordination in 1854 he joined the Oblates of St. Charles, then under Cardinal Manning's direction. In 1862 he left St. Edmund's College, Ware, of which he had been for some time vice president, and devoted himself to missionary work in England and to founding St. Joseph's College at Mill Hill, near London, for training missionaries. He was especially interested in work among the negroes of America, and in 1871 accompanied thither the first detachment of priests sent from the college. He was chosen Bishop of Salford in 1872. After 20 years of work in this diocese he was appointed Archbishop of Westminster to succeed Cardinal Manning, becoming Cardinal in 1893. He was always an active worker on behalf of the cause which he represented: as proprietor of the *Tablet* and the *Dublin Review* he inspired a vigorous defense of the Roman Catholic position, which appeared also in his public utterances, always marked by an uncompromising attitude towards the other religious bodies in England. It was said that the papal decision against the validity of Anglican orders was due to his efforts. His interest in temperance, in work among children, and in commercial education under Catholic auspices (for which he built St. Bede's College) was well known.

VAUGHAN, JOHN STEPHEN (1853–). An English Roman Catholic bishop, brother of Bernard and Herbert Vaughan (qq.v.). He was born at Courtfield, Ross, studied at St. Gregory's College, and at Bruges and Rome, and was ordained a priest in 1876 He spent three years in traveling, lecturing, and missionary work in Australia, then undertook parochial work in London, and in 1898 became canon of Westminster. Between 1890 and 1903 he organized free Catholic lectures in various public halls in London. In 1896 he became domestic prelate to the Papal Court, resided in Rome in 1904–07, and made a preaching tour in the United States and Canada. Created a Bishop in 1909, he settled in Manchester, where after 1912 he was also rector of St. Bede's College. His writings include: *Concerning the Holy Bible* (1904); *Dangers of the Day* (1909); *The Purpose of the Papacy* (1910).

VAUGHAN, ROBERT (1795–1868). A Congregational minister, of Welsh stock, born in the west of England. He was trained for the ministry by an independent divine of Bristol. He became minister of an independent chapel at Kensington (1825), professor of history in London University (1834), and president of the Lancashire Independent College at Manchester (1843). Owing to ill health, he resigned his presidency in 1857, and later took charge of a congregation at Torquay, where he died. In 1845 he founded the *British Quarterly*, which he ably edited for 20 years. Among his works are: *The Life and Opinions of John de Wycliffe, D.D.* (1828); *Memorials of the Stuart Dynasty* (1831); *Causes of the Corruption of Christianity* (1834); *The Protectorate of Oliver Cromwell* (1838); *History of England under the House of Stuart* (1840); *Essays on History, Philosophy, and Theology* (2 vols., 1849); *Revolutions in English History* (3 vols., 1859–63); *English Nonconformity* (1862).

VAUGHAN, VICTOR CLARENCE (1851–). An American pathologist, born at Mount Airy, Randolph Co., Mo. Educated in medicine at the University of Michigan (M.D., 1878), he settled in Ann Arbor and joined the staff of his alma mater, where he held many positions, among them professor of physiological and pathological chemistry (1883–87), professor of hygiene and physiological chemistry (1887–1909), and thereafter dean of the medical department. In 1898 he served as surgeon in the Santiago campaign, during which time he also demonstrated the transmission of typhoid by flies. From 1908–09 he was president of the Association of American Physicians and in 1914 of the American Medical Association, and in 1915 he was elected to the National Academy of Sciences. Among his writings are: *Textbook of Physiological Chemistry* (1879; 3d ed., 1883); *Ptomaines and Leucomaines and Cellular Toxins* (1913), with others; *Protein Split Products* (1913), with others.

VAUGHAN, WILLIAM (1577–1641). A colonial pioneer and author, of an ancient Welsh family settled at Golden Grove, in Carmarthenshire, South Wales. He was educated at Jesus College, Oxford, graduating in 1595, and later traveled on the Continent. He established a colony at his own expense on Trepassey Bay, Newfoundland, and went out himself in or about 1622. While in his colony he wrote a quaint tract in prose and verse called *The Golden Fleece* (published 1626) describing the new land.

Vaughan was also the author of *The Golden Grove moralised, in three bookes: a Work very necessary for all such as would know how to Gouerne themselves, their houses, or their countrey* (1600), and several other books in English and in Latin, some of which are strangely mystical. *The Newlanders Cure* (1630; reprinted in the *North American Review* for March, 1817), dealing with the maladies common in the colony, is prefaced with a short autobiography. Vaughan's colony, owing to the severe climate, eventually failed.

VAULT (OF. *volte, voute, voulte*, Fr. *voûte*, vault, from Lat. *volutus*, p.p. of *volvere*, to roll; connected with Goth. *walwjan*, AS *wealwian*, Eng. *wallow*). A ceiling or roof constructed of arched masonry: or one having the appearance of being so constructed. The simplest type is the barrel vault, a continuous arch forming a semicylindrical covering over a space bounded by parallel walls: the vaults of sewers and tunnels are of this form. A groin vault is one formed by the intersection of two barrel vaults of equal height; the salient angles in which they meet are the groins. A cloistered vault is composed of four portions of barrel vaulting meeting to form a square or rectangular dome. The most monumental form of vault is the dome (q.v.). An octagonal dome is identical with an octagonal cloistered vault. A ribbed vault is one in which the vaulting surfaces (compartments or fillings) are divided from each other by arched ribs forming a framework which may be both structural and decorative, as in Gothic vaulting. (See FAN VAULTING; GOTHIC ARCHITECTURE; LIERNE RIB; RIB; RIBBED VAULTING.) The looplike or triangular surfaces generated by a small or low vault intersecting one of greater height are called penetrations. Vaults may be built of stone, brick, or tile. The shaping of the individual stones for a vault is a branch of the art of stonecutting and their design is a department of stereotomy (q.v.). The earliest systematic use of vaulting was by the Chaldæans and Assyrians, who employed the barrel vault, of either cylindrical or pointed-arch section, for drains, passages, and corridors or halls, and sometimes also a species of high dome. The Egyptians rarely employed vaulting; and it was not until the Romans adopted it that its architectural possibilities were developed. The earliest Roman vault is the massive barrel vault over the Cloaca Maxima. (See CLOACA.) It was in the temples, palaces, and baths of the Imperial age that they applied vaulting to the covering of spacious interiors, using the barrel vault over corridors, as in the Colosseum and in temples. They developed the groined vault in their thermæ and more complex edifices. Since a groined vault springs from four points at the corners of a square or rectangle, and permits of openings as high as the ridge of the vault, it could be used over large halls with clerestories, and over any desired area by suitably spacing the piers or supports. They also employed the dome. The Byzantines, using brick rather than stone, employed a great variety of vault forms, but their most distinctive architectural feature was the dome on pendentives. (See BYZANTINE ART; DOME; PENDENTIVE.) The ribbed groined vault, which became the most important element in the development of Gothic architecture (q.v.) appears first in the Lombard-Romanesque church of San Ambrogio at Milan (eleventh century). The Romanesque churches of France, before the adoption of this feature, were frequently vaulted with simple barrel vaults. In the twelfth century the four-part and six-part vault came into general use; the latter was, however, soon abandoned, and the four-part vault became universal. By means of the pointed arch, of diagonal or groin ribs (*ogives*) and the use of somewhat convex vault fillings for the compartments, the mediæval builders were able to vault the oblong bays over the central aisle with great simplicity of effect with four-part vaults. The English multiplied the ribs for both structural and decorative effect, and developed highly ornate vaults, culminating in fan vaulting (q.v.) of the perpendicular style (q.v.). The corresponding French flamboyant (q.v.) style retained generally the simpler forms of four-part vaulting. The problem of resisting the outward thrust of the vault gave rise to the device of the flying arch and buttress.

The Renaissance returned to Roman vault forms for the most part, but developed wholly new and splendid types of vault decoration, and added the dome on pendentives, the elliptical barrel vault with penetrations and other special forms. Various forms of vault appear in Mohammedan art (q.v.), especially in Persia and India. Modern architects employ at will all the historic types, and in America they have developed also a wholly new type of light, elastic vaulting with tiles, the Guastavino (q.v.) vault. Consult, for a discussion of the various types of vaulting, with admirable illustrations, "Vault," in Russell Sturgis, *Dictionary of Architecture* (New York, 1905); also Willis, "Essay on Vaulting," in *Transactions of Royal Institute of British Architects* (London, 1842); "Construction" and "Voûte," in Viollet-le-Duc, *Dictionnaire raisonné de l'architecture* (Paris, 1854–68); Haase, *Der Gewölbebau* (Halle, 1900); Porter, *The Construction of Lombard and Gothic Vaults* (New Haven, 1911); Clarence Ward, *Mediæval Church Vaulting* (Princeton, N. J., 1915). See ARCHITECTURE; ROMAN ART.

VAULTING. See VAULT.

VAULTING-SHAFT. A slender column or shaft from which spring the ribs of a Gothic vault. These shafts occur either singly or in clusters, and may spring from the ground or from the main pier cap, or be supported on small corbels in the wall. They are usually engaged, but may be free-standing. Their structural function is more apparent than real, but their æsthetic function is important.

VAULTS, SAFE-DEPOSIT. See SAFES AND SAFE-DEPOSIT VAULTS.

VAUTHIER, GABRIEL JEAN PAUL MOREAU-. See MOREAU-VAUTHIER, G. J. P.

VAUTIER, vō'tyā', **BENJAMIN** (1829–98). A Swiss-German genre painter. He was born at Morges, on Lake Geneva, studied at Geneva, then at the Düsseldorf Academy under Rudolf Jordan, and for some years devoted himself to the study of peasant life in the Bernese Oberland. After a short sojourn in Paris in 1856 he settled at Düsseldorf and in 1858 achieved success with his "Church Scene," which was followed by a series of characteristic episodes in the life of the Swiss and Swabian peasantry. Some of the most prominent among these pictures, distinctly literary rather than pictorial in character, and often distinguished by good drawing and sympathetic characterization, are: "Peasants at Cards Surprised by their Wives" (1862, Leipsig Museum); "Peasant and Broker" (1865, gold

medal, Paris, Basel Museum); "Funeral Repast in Bernese Oberland" (1865, Cologne Museum); "The First Dancing Lesson" (1868) and "At the Sickbed" (1873, both in the National Gallery, Berlin); "Toast to the Bride" (1870) and "Prodigal Son" (1885, both in the Kunsthalle, Hamburg); "A Breathing Interval at Wedding Dance" (1878, Dresden Gallery); "Arrest of Jewish Usurer" (1879), one of his most remarkable works, and "Forsaken" (1892, Breslau Museum). He also illustrated Auerbach's *Barfüssele*, Immermann's *Oberhof*, Goethe's *Hermann und Dorothea*, and other literary works. For his biography and art consult Rosenberg (Bielefeld, 1897), and Richard Muther, *History of Modern Painting* (Eng. trans., rev. ed., New York, 1907).

VAUVENARGUES, vōv'närg', LUC DE CLAPIERS, MARQUIS DE (1715–47). A French moralist, born at Aix, in Provence. He entered the army at 17 and served in Italy and Bohemia, devoting himself subsequently to literature. He was a man of lofty character and enjoyed the friendship of Marmontel and Voltaire. His *Introduction à la connaissance de l'esprit humain*, with certain *Réflexions* and *Maximes* appended (1746), is famous for its moral aphorisms and appendix. His complete works were edited by Gilbert (1857) and by Plon (1874). In English appeared *Selections from Characters, Reflections, and Maxims of La Bruyère and Vauvenargues* (1903). Consult Paléologue, *Vauvenargues* (Paris, 1890)

VAUX. See WAR IN EUROPE.

VAUX, vąks, CALVERT (1824–95). A British-American architect and landscape gardener, born in London, where he studied under Cottingham. In 1850 he removed to the United States, and became assistant to and later partner of A. J. Downing (q.v.), a well-known American landscape gardener. In 1857 he established himself in New York City, where he entered into partnership with Frederick Law Olmsted (q.v.), Mr. Downing having died in 1852. In association with Olmsted he made plans for Central, Riverside, and Morningside parks in New York City, for Prospect Park in Brooklyn, for parks at Bridgeport, Conn., and Chicago, Ill., and for the New York State reservation at Niagara Falls. He also designed the first structures for the Metropolitan Museum of Art and the Museum of Natural History in New York City. He became landscape architect to the Department of Parks of New York and a member of the consolidation inquiry commission for Greater New York. It was owing to his efforts that Central Park was preserved and developed in accordance with the original landscape designs. In his professional work he displayed artistic faculty, and was an active municipal official. He published *Villas and Cottages* (1857; 2d ed., 1864).

VAUX, RICHARD (1816–95). An American lawyer and politician, born in Philadelphia. He was admitted to the bar in 1836; was later secretary of the American legations at London and Brussels; member of Congress 1890–92; but he is best known as a penologist, contributing largely to the literature on the subject. Among his writings are: *Brief Sketch of the Origin and History of the State Penitentiary for the Eastern District of Pennsylvania* (1872); *Insideout, or Present Prison Systems and their Effects on Society and the Criminal* (1888); *The State and the Prison* (1886).

VAUX, THOMAS, second BARON (1510–56). An English poet, eldest son of Nicholas Vaux, first Baron Vaux of Harrowden, Northamptonshire His extant lyrics, numbering at least 15, were contributed to Tottel's *Miscellany* (1557) and to *The Paradise of Dainty Devices* (1576). Consult *Fuller Worthies' Library Miscellanies*, edited by A. B. Grosart, vol. iv (London, 1872).

VAUX, WILLIAM SANDYS WRIGHT (1818–85). An English antiquary and numismatist. He was educated at Balliol College, Oxford; in 1841 obtained a post in the department of antiquities of the British Museum; and from 1861 until his resignation in 1870 was keeper of coins and medals. During 1871–76 he catalogued the coins of the Bodleian Library at Oxford He was particularly expert in Oriental antiquities, and besides an edition for the Hakluyt Society (1854) of *The World Encompassed by Sir F. Drake*, published *Nineveh and Persepolis* (1850; 4th ed., 1855), which presented in popular form the discoveries of Layard and others; and, under the general title, *Ancient History from the Monuments*, the two volumes, *Persia from the Earliest Period to the Arab Conquest* (1875; new ed, by Sayce, 1893) and *Greek Cities and Islands of Asia Minor*

VAUXHALL (vąks'hąl) **GARDENS.** A former place of public amusement on the outskirts of London, on the Thames above Lambeth. It was laid out in 1661, and was originally called the "New Spring Gardens at Foxhall." It was finally closed in 1859, and is now quite covered by modern dwellings.

VAZOFF, vä'zŏf, IVAN (1850–1921). A Bulgarian author and patriot, born at Sopot. He lived in Rumania for a time, participated in revolutionary movements against the Turks in 1875–76, and fought in the Servian War of 1885. During his exile in Rumania he published three volumes of patriotic lyrics, and after the independence of Bulgaria had been gained—he was then elected to the National Assembly of eastern Rumelia—put forth his first prose works and his first drama, *Mikhalaki*. Two more collections of verse appeared in 1883, and then *Italy* (1884) and *Slivnitza* (1885). A member of the Russian party, Vazoff was exiled by Stephen Stambuloff (q.v.), and while living at Odessa wrote *Pod Igoto* (*Under the Yoke*), the novel which made him famous. This was published serially in 1889 upon his return to Bulgaria, and was subsequently translated into most of the European languages (Eng. trans. by Edmund Gosse, 1893; new ed., 1912). His other writings include: *Vagabonds* (1894), his most popular dramatic work; the romances *New Country* (1896) and *The Queen of Kazalar* (1902); and the drama *Ivailo* (1913). Consult: Joseph Angeloff, "Ivan Vazoff," in *Manchester Quarterly*, vol. lxxi (Manchester, 1899); R. A. Tsanoff, "Ivan Vazoff" in *Poet Lore*, vol. xix (Boston, 1908); W. S. Monroe, *Bulgaria and her People* (ib, 1914).

VĀYU, vä'yōō, or VĀTA, vä'tą (Skt., wind). A deified personification of the wind in the Vedic mythology of the Hindus. Both these names are applied to the wind, but Vāyu is rather the divinity and Vāta the element. In epic and Puranic mythology Vāyu occupies only an inferior position. Legend assigns to him a wife Anjana, and their child is the monkey-god Hanumān (q.v.). He is also King of the Gandharvas and regent of the northwest. In the Avesta (q.v.) Vāyu is also a name of the genius of the

air. Consult: W. J. Wilkins, *Hindu Mythology* (2d ed., London, 1900); A. Hillebrandt, *Vedische Mythologie* (Breslau, 1902); A. A. Macdonell, *Vedic Mythology* (Strassburg, 1897); L. D. Barnett, *Antiquities of India* (London, 1913).

VEBER, vā'bâr', PIERRE (1869–). A French novelist and dramatist, born in Paris. He became Chevalier of the Legion of Honor. His work is rather smartly cynical in tone. Among his novels are: *Les enfants s'amusent* (1894); *Chez les snobs* (1896); *M. et Mme. L'homme* (1898); *L'école des ministres* (1907); *Dans un fauteuil* (1909); *Les retirées* (1912). His plays include: *Julien n'est pas un ingrat* (1898); *Que Suzanne n'en sache rien* (1899); *L'ami de la maison* (1900), *La main gauche* (1901); *La marmotte* (1903); *L'amourette* (1905); *Florette et Patapon* (1906); *Ma fée* (1910); *La gamine* (1911).

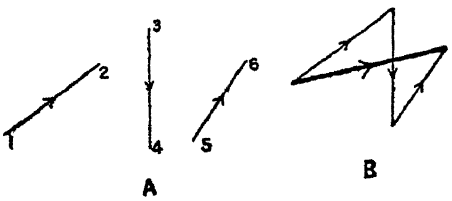
VEBI'NUM. See BOVINO.

VEBLEN, vĕb'lĕn, THORSTEIN B. (?–). An American economist. Graduating from Carleton College (Minn.) in 1880, he studied later at Johns Hopkins and at Yale (Ph.D, 1884). He taught political economy at the University of Chicago from 1892 to 1906, and economics at Leland Stanford thereafter till 1909, when he accepted a chair in economics at the University of Missouri. From 1896 to 1905 he was managing editor of the *Journal of Political Economy*. Veblen published *The Theory of the Leisure Class* (1899; new ed., 1912); *The Theory of Business Enterprise* (1904); *The Instinct of Workmanship, and the State of the Industrial Arts* (1914); *Imperial Germany, and the Industrial Revolution* (1915).

VECCHIETTA, vĕk-kyât'tâ, LORENZO, properly LORENZO DI PIETRO (c.1412–80). A Sienese painter, architect, and sculptor. Born at Castiglione di Valdorcia, he was a pupil of Sassetta, and is one of the most important painters of the later Sienese school. He was influenced by Donatello and was instrumental in introducing the spirit of the Renaissance into Sienese painting. There are frescoes by him in the Palazzo Pubblico (1461), the Hospital (1448), and the Baptistery (1450–53), in Siena; and a Madonna in the gallery of the same city. In the Uffizi at Florence is an important triptych, "Madonna with Saints" (1457). His best-known work of sculpture, "The Risen Christ," a statue, is in the Church of the Hospital, Siena.

VECELLI, vâ-chĕl'lê, TIZIANO. See TITIAN.

VEC'TOR (Lat. *vector*, one who carries or conveys, from *vehere*, to carry, convey). A segment of a straight line of a definite length in a definite direction. It may be represented therefore by a line with an arrow, as shown. A vector quantity is such a physical quantity as can be represented by a vector. Linear displacement, linear velocity, linear momentum, linear acceleration, and force acting on a particle are illustrations. Vector analysis deals with mathematical processes involving vectors. (See QUATERNIONS.) In this science addition, subtraction, and multiplication are defined Vector addition of two vectors (i.e., geometrical addition), e.g., consists in moving one or both of the vectors, each one parallel to itself, until two ends coincide, they being so selected that the arrows on the two vectors indicate a continuous advance; then in drawing a straight line from the free end of one vector to that of the other, this resultant vector having a direction corresponding to that of the two components. Similarly three vectors may be added. Thus, in Fig. A the vectors 12, 34, 56 may be added as shown, bringing 3 to coincide with 2, and 5 with 4, and then joining the two free ends, as in Fig. B. It is evident from geometry that the



order of the addition is immaterial so long as the arrows indicate continuous action. Thus it would do just as well to make 1 and 4 and 2 and 5 coincide, or 1 and 4 and 6 and 3; the final result is the same as before. See MECHANICS

VEDA, vā'da (Skt. *veda*, knowledge, from *vid*, to know; connected with Gk. *Foîδa*, *foida*, I know, *Fἰδειν*, *fidein*, Lat. *videre*, OChurch Slav. *vědě*, I know, OIIG *wizzan*, Ger. *wissen*, Goth., AS. *witan*, Eng. *wit*, to know). The collective designation of the ancient sacred literature of India, or of individual books belonging to that literature. At an unknown date, conventionally averaged up as about 1500 B.C., Aryan tribes, according to generally accepted theories, began to migrate from the Iranian highlands on the north of the Hindu Kush into the northwest of India, the plains of the river Indus and its tributaries. The non-Aryan aborigines were easily conquered, but the conquest was followed by gradual amalgamation of the fairer-hued conquerors with the dark aborigines. The Aryans brought with them a primitive pastoral civilization, a language which was a mere dialectic variety of the speech spoken in Iran, and religious beliefs which show close connection with the ancient Persian religion of the Avesta (q.v.), and, to a lesser and more problematic extent, with the beliefs of other Indo-Germanic peoples, such as the Greeks (see GREEK RELIGION) and the Teutons. (See SCANDINAVIAN AND TEUTONIC MYTHOLOGY.) From the very start we are confronted by a poetical literature, primitive on the whole, yet lacking neither in refinement of thought, nor in skill in the handling of language and metre. The literature is throughout religious, and includes prayers and sacrificial formulas, offered to the gods by the priests; charms for witchcraft and medicine, manipulated by magicians and medicine men; expositions of the sacrifice; theological comments and legends; higher speculations, philosophic and theosophic, growing up in connection with the simpler beliefs; and finally rules for conduct in everyday life at home and abroad. This is the Veda as a whole.

At the base of this entire literature of more than 100 books lie four varieties of metrical compositions known as the four Vedas in the narrower sense. These are the *Rig-Veda*, the *Yajur-Veda*, the *Sama-Veda*, and the *Atharva-Veda*. These four names come from a somewhat later time, and do not coincide exactly with the earlier names, nor do they correspond with the contents of the texts themselves. The earlier names are *ṛcaḥ*, stanzas of praise, *yajūṁṣi*, liturgical stanzas and formulas, *sāmāni*, melodies, and *atharvāṅgirasaḥ*, blessings and curses. The col-

lection known as the Rig-Veda contains not only "stanzas of praise," but also "blessings and curses," as well as most of the stanzas which form the basis of the *sāmāni* The Atharva-Veda, likewise, contains *rcah* and *yajūmsi*, as well as "blessings and curses." The Yajur-Veda also contains many "blessings and curses," in addition to its main topic. The Sama-Veda is merely a collection of a certain kind of "stanzas of praise" which occur for the most part in the Rig-Veda, but are here set to music by means of definite musical notations.

The Rig-Veda is on the whole the most important as well as the oldest of the four collections. A little more than 1000 hymns, equaling in bulk the surviving poems of Homer, are arranged in 10 books called *maṇḍala*, or circles. Six of them (ii–vii), the so-called family books, form the nucleus of the collection. Each of these is the work of a different seer and his descendants, as can be seen from the hymns themselves. The eighth book and the first 50 hymns of the first book, belonging to the family of Kanva, are arranged strophically in groups of two or three stanzas. The most marked peculiarity of these hymns is that they form the bulk of the stanzas sung with melodies in the Sama-Veda. The hymns of the ninth book are addressed directly to Soma (q.v.). The remainder of the first book and the entire tenth book are more miscellaneous in character and problematic as to arrangement. On the whole they are of later origin, for themes foreign to the narrower purpose of the *ṛcah*, such as theosophic hymns and witchcraft hymns, appear in considerable number. The poems of the latter class frequently reappear, usually with variations, in the Atharva-Veda.

Generally speaking the Rig-Veda is a collection of priestly hymns addressed to the gods of the Vedic pantheon during sacrifice. This sacrifice consisted of oblations of intoxicating *sōma* (q.v.) and melted butter or ghee (q.v.) which was poured into the fire. The ritual of the Veda is advanced in character, by no means so simple as was once supposed, though not as elaborate as that of the Yajur-Veda and the Brahmanas. (See below.) The chief interest of the Rig-Veda lies in the gods themselves and in the myths narrated in the course of their invocation. The mythology represents an earlier, clearer stage of thought than is to be found in any other parallel literature. Above all it is sufficiently primitive to show clearly the process of personification by which natural phenomena developed into gods. (See the subsection *Vedic Religion* under INDIA; NATURE WORSHIP.) The original nature of the Vedic gods, however, is not always clear; some of them are so obscure in character as to make an analysis of them a difficult and important chapter in Vedic philology. But on the whole the keynote of Rig-Vedic thought is the nature myth.

The Yajur-Veda represents the growth of ritualism or sacerdotalism; its *yajūṁṣi*, liturgical stanzas and formulas, are in the main of a later time, and are partly metrical, partly prose. The materials contained in the Rig-Veda are freely adapted, with secondary changes of expression, and without regard to the original order of their composition. The main object is no longer devotion to the gods themselves. The sacrifice has become the centre of thought, its mystic power is conceived to be a thing per se, and every detail has become all-important A crowd of priests (17 is the largest number) conducts a vast, complicated, and painstaking ceremonial, full of symbolic meaning even in its smallest minutiæ. From the moment the priests seat themselves on the sacrificial ground and proceed to mark out the altars (*vēdi*) on which the sacred fire is built, every act has its stanza or formula, and every utensil is blessed with its own fitting blessing. These formulas are no longer conceived as prayers, but as magic. The words as well as the acts have inherent power. If the priest chants a formula for rain while pouring a certain sacrificial liquid, rain shall and must come. In fact, and in brief, the Yajur-Veda means the deification of the sacrifice in every detail of act and word.

The Sama-Veda is the least clear of all the Vedas. Its stanzas, or rather groups of stanzas, are known as *sāmāni*, melodies. The *sāman* stanzas are preserved in three forms. First, in the Rig-Veda, as ordinary poetry, accented in the same way as other Vedic poetry. Secondly, in the *ārcikas*, a kind of libretto forming a special collection of *sāman* verses, most of which, though not all, occur also in the Rig-Veda. Here also there is a system of accents, peculiar in its notation, but purely with reference to the unsung *sāmans*. In the third *sāman* version, the *gānas*, or song books, we find the real sung *sāmans*. Here not only the text, but the musical notes, are marked. Still this is not a complete *sāman*. In the middle of the sung stanzas appear exclamatory syllables, the so-called *stōbhas*, such as *ōm*, *hāu*, *hāi*, *hōyi*, or *him;* and at the end certain concluding words, such as *atha*, *ā*, *īm*, *nām*, and *sāt*. The Sama-Veda is devoted chiefly to the worship of Indra (q.v.). It seems likely, therefore, that it is the civilized version of savage Shamanism (q.v), an attempt to influence the natural order of things by shouts and exhortations, for the Brahmans as a rule blended their own hieratic practices and conceptions with what they found among the people. The *sāman* melody and the exclamations interspersed among the words may, therefore, be the substitute for the self-exciting shouts of the Shaman priests of an earlier time.

The oldest name of the Atharva-Veda is, as stated above, *atharvāṅgirasah*, a compound formed of the names of two semimythic families of priests, the Atharvans and Angirases. At a very early time the former term was regarded as synonymous with holy charms, or blessings; the latter with witchcraft charms, or curses. In addition to the name Atharva-Veda there are two other names, practically restricted to the ritual texts of this Veda: *bhṛgvaṅgirasah* or "Bhrigus and Angirases," in which the Bhrigus, another ancient family of five priests, take the place of the Angirases; and *Brahma-Veda*, probably Veda of the Brahma, or holy religion in general. (See BRAHMA.) The Atharva-Veda is a collection of 730 hymns, containing some 6000 stanzas, divided into 20 books. About one-sixth of the mass, including two entire books (xv and xvi), is written in prose, similar in style to that of the Brahmanas (see below), the rest being poetry in the usual Vedic metres. These, however, are handled with great freedom, often betraying either ignorance or disregard of the metrical canons, as they appear in the Rig-Veda. The Atharva-Veda did not attain to perfect canonicity until the period of classical Sanskrit, simply on account of the nature of its contents, which are somewhat apart from the hieratic worship of the gods and the sacerdotalism of the

other three Vedas. The contents of the Atharva-Veda are popular rather than hieratic, and superstitious rather than religious. It is a picture of the lower life of ancient India, painted on a very broad canvas. It exhibits the ordinary Hindu not only in the aspect of a devout and virtuous adherent of the gods, and performer of pious practices, but also as the natural, semi-civilized man: rapacious, demon-plagued, and fear-ridden, hateful, lustful, and addicted to sorcery.

The themes of the hymns of the Atharva-Veda may be grouped as follows: charms to cure disease and possession by demons; prayers for long life and health; imprecations against demons, sorcerers, and enemies; charms pertaining to women; charms pertaining to royalty; charms to secure harmony, influence in the village assembly, and the like; charms to secure prosperity in house, field, cattle, business, gambling, etc.; charms in expiation of sin; prayers and imprecations in the interest of Brahmans, and wedding and funeral stanzas. Curiously enough, the Atharva has a large number of cosmogonic and theosophic hymns, being in this respect a more significant precursor to the Upanishads (q.v.) than is the Rig-Veda itself.

The redactions of these four Vedas, called *samhitas* by the Hindus, have been handed down in various schools, branches, or recensions, which present a given Veda in forms differing not a little from one another. The school differences of the Rig-Veda are of no importance, except as they extend also to the Brahmanas and Sutras. (See below.) There are two Sama-Veda redactions, that of the school of the Kauthumas and the Ranayaniyas; and two of the Atharva-Veda, ascribed to the school of Saunakiyas and the Paippaladas. The Yajur-Veda especially is handed down in recensions that differ from one another very widely. There is first the broad division into White Yajur-Veda and Black Yajur-Veda. The most important difference between these two is that the Black Yajur schools intermingle their stanzas and formulas with the prose exposition of the Brahmana, whereas the White Yajur schools present their Brahmana in separate works. The White Yajur-Veda belongs to the school of the Vajasaneyins and is subdivided into the Madhyandina and Kanva schools. The important schools of the Black Yajur-Veda are the Taittiriyas, Maitrayaniyas, Kathas, and Kapishthalas. Sometimes these schools have definite geographical locations. For example, the Kathas and the Kapishthalas were located, at the time when the Greeks became acquainted with India, in the Punjab and in Kashmir. The Maitrayaniyas appear at one time to have occupied the region around the lower course of the river Narmada, and the Taittirivas, at least in modern times, are in the south of India.

The poetic stanzas and the ritualistic formulas of the Vedas collectively go by the name of *mantra*, pious utterance, or hymn. These were followed at later periods by a very different literary type, viz., the theological treatises called *brāhmanas*. (See BRAHMANA.) Aside from the light which these texts throw upon the sacerdotalism of ancient India, they are important because they are written in connected prose, the earliest in the entire domain of Indo-Germanic speech. They are especially important for syntax, representing in this respect the oldest Indian stage even better than the Rig-Veda, owing to the restriction imposed upon the latter by its poetic form. The Brahmanas also were composed in schools or recensions, but the various Brahmana recensions of one and the same Veda differ at times even more widely than the Samhitas of the Mantras. Thus the Rig-Veda has two Brahmanas, the Aitareya and the Kaushitaki or Sankhayana. The Brahmana matter of the Black Yajur-Vedas is given together with the hymns themselves; but the White Yajur-Veda treats its Brahmana matter separately, and with extraordinary fullness, in the famous *Śatapatha-Brāhmana*, the Brahmana of the Hundred Paths, so called because it consists of 100 lectures. Next to the Rig-Veda and Atharva-Veda this work is the most important production in the whole range of Vedic literature. Two Brahmanas belonging to independent schools of the Sama-Veda have been preserved, that of the Tandins, usually designated as the *Pancavimśa-Brāhmana* and that of the Talavakaras or Jaiminiyas. To the Atharva-Veda is attached the very late and secondary *Gōpatha-Brāhmana*, though its contents are in reality foreign to the spirit of the Atharvan hymns.

A later development of the Brahmanas are the *Aranyakas*, or Forest Treatises. (See BRAHMANA and BRAHMANISM.) Their later character is indicated both by the position they occupy at the end of the Brahmanas and by their theosophical character. The two important Aranyakas are the Aitareya and the Taittiriya, belonging, of course, to the Vedic schools of these names. The chief value of the Aranyakas is that they form in contents and tone a transition to the Upanishads, which are either embedded in them, or, more usually, form their concluding portions. See UPANISHAD.

Both Mantra and Brahmana are regarded as part of revelation (*śruti*); the rest of Vedic literature as tradition (*smrti*) derived from holy men of old. This literature has a characteristic style of its own, being written in the form of brief rules, or *sūtras* (See SUTRA.) They are, in the main, of three classes, each of which is associated with a particular Vedic school, reaching back, as a rule, to the school distinctions of the Samhitas and Brahmanas. The first class of Sutras are the *Srāuta* or *Kalpa Sūtras*, which may be translated Sutras of the Vedic Ritual. They are rule books compiled, with the help of oral priestly tradition, from the Brahmanas. They are brief manuals of the Vedic sacrifices, as distinguished from the more diffusive Brahmanas, whose ritual acts are interrupted by elaborate explanation and illustrative legends. To the Rig-Veda belong two Srauta Sutras corresponding to its Brahmanas, the Asvalayana to the Aitareya Brahmana, and the Sankhayana to the Brahmana of the same name. To the White Yajur-Veda belongs the Srauta Sutra of Katyayana, closely adhering to the Satapatha Brahmana. No less than six Srauta Sutras belong to the Black Yajur-Veda, but only two of them have as yet been published, that of Apastamba, belonging to the school of the Taittiriya, and the Manava, belonging to the school of the Maitrayaniya. The Sama-Veda has two Srautas, that of Latyayana and Drahyayana, belonging respectively to its two schools of Kauthuma and Ranayaniya; and the Atharva-Veda has the late and inferior Vaitana.

Of far greater, indeed of universal, interest is the second class of Sutras, the *Grhya Sūtras*, or House Books. These are treatises on home life which deal systematically with a well-defined

body of facts connected with the everyday existence of the individual and the family. Though composed at a comparatively late Vedic period, they contain practices and prayers of great antiquity, and supplement most effectively the contents of the Atharva-Veda. They also are distributed among the four Vedas and their schools. The Rig-Veda has the Grihya Sutras of Asvalayana and Sankhayana; the White Yajur-Veda that of Paraskara; the Black Yajur-Veda a large number, as those of the schools of Apastamba, Hiranyakesin, and Manava; the Sama-Veda has the Gabhila and the Khadira; to the Atharva-Veda belongs the important Kausika Sutra, which, in addition to the domestic ritual, deals with the magical and medicinal practices specially characteristic of that Veda.

The third kind of Sutras are the *Dharma Sūtras*, or Law Sutras, which also deal to some extent with the customs of everyday life, but are engaged for the most part with religious and secular law. These Sutras also are either attached to the body of canonical writings of a certain Vedic school, or are shown by inner criteria to have originated within such a school. The oldest legal Sutras are the Apastamba and Baudhayana, belonging to the Black Yajur schools of the same name, the Gautama belonging to the Sama-Veda, the Vishnu belonging to the Katha school of the Black Yajur-Veda, and the Vasishtha (q.v.) of less certain associations. The earliest metrical law books, written in classical Sanskrit, are also based on lost Sutra collections of definite Vedic schools. The most famous of these, the *Mānava Dharma Sāstra*, or Law Book of Manu (see MANU), is founded upon the Dharma Sutra of the Manava, or Maitrayaniya school of the Black Yajur-Veda, while the briefer Law Book of Yajnavalkya derives its origin from a school of the White Yajur-Veda. See BRAHMANISM; HINDUISM.

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VEDANGA, vā-däng'ä (Skt., *Vēdānga*, member of the Veda). The name of six Sanskrit works, whose object is to teach how to read and understand correctly Vedic texts, and how to apply them correctly to sacrificial purposes. The first four of the six Vedangas are philological in character and the other two deal with the sacrifice and its season. The names and scope of the six are as follows: (1) *Siksa*, or phonetics. It is represented by a short treatise of 35, or, in another recension, of 59 verses, which explains the nature of letters, accent, and pronunciation, and is ascribed to Panini (q.v.). (2) *Chandas*, or metre, which is ascribed to Pingala. (3) *Vyākarana*, or grammar, by which native authorities understand the celebrated work of Panini. (4) *Nirukta* (q.v.), or etymology. (5) *Jyōtisa*, or astronomy, as employed in fixing the days and hours of the Vedic sacrifices. (6) *Kalpa*, or works on the Vedic ceremonial, which systematize the ritual taught by the Brahmana portion of the Veda, omitting, however, all legendary or mystical detail (see KALPA-SŪTRA). They are composed in the Sutra style. (See SŪTRA.) The Vedanga was edited in Bombay, 1902. Consult: Weber, *History of Indian Literature* (Eng. trans., Boston, 1878); Henry, *Les littératures de l'Inde* (Paris, 1904); Winternitz, *Geschichte der indischen Literatur* (Leipzig, 1908 et seq.); A. A. Macdonell, *Sanskrit Literature* (London, 1913).

VEDANTA, vā-dän'tä (Skt. *Vēdānta*, conclusion of the Veda, later interpreted as ultimate aim of the Veda). The second great division of the *Mimamsa* (q.v.) school of Hindu philosophy. It is chiefly concerned in the investigation of Brahma (q.v.), or the Supreme Spirit, and the relation in which the universe, and especially the human soul, stands to it; and in contra-

distinction from the *Pūrvamīmāṁsā*, or the investigation of the former part of the Vedas, especially the *Brāhmanas* (see BRĀHMAṆA; BRAHMANISM; VEDA), it is also called *Uttaramīmāṁsā*, or the investigation of the latter part of the Vedas, the *Aranyakas* and *Upanishads* (q.v.), which treat of Brahma, the Supreme Spirit. Sometimes the name given to it is *Śārīrakamīmāṁsā*, or the investigation of embodied Brahma. In its method the Vedanta differs from the Nyāya (see NYĀYA; VAIŚĒSHIKA) by endeavoring to explain the universe as a successive development from one ultimate source or principle, and it is distinct from the Sānkhya (see SANKHYA; YOGA), inasmuch as that system is based on the assumption of a duality of principles whence the universe derives its origin.

The object matter of the Vedanta is the proof that the universe emanates in a successive development from a Supreme Spirit, or Atman, which is also called Brahman, or paramātman; that the human soul is therefore identical with Brahma; that the separate existence of the human soul is the result of its ignorance of this identity; and that its final liberation from metempsychosis (q.v.) is attained by a removal of this ignorance, i.e., by a proper understanding of the truth of the Vedanta doctrine. In essence, therefore, Vedanta is an idealistic monism. Its first beginnings are found in the early Upanishads (q.v.), but as a completed system it dates from about the time of our era, being later than the Yoga. It is referred to Badarayana (eighth century), whose *Brahma-Sutra*, as explained by Sankara, is the authoritative work of the Vedantists, although the interpretation of Ramanuja (twelfth century) differs in some important particulars from that of Sankhara. The former teaches that the individual soul is ever distinct from the Supreme Soul, whereas Sankara holds that when *avidyā*, or ignorance, is removed, the individual soul becomes one with the Supreme, according to the doctrine of nonduality.

According to the Vedanta, as thus interpreted by Sankara, Brahma is both the efficient and material cause of the world, creator and creation, doer and deed. It is one, self-existent, supreme, as truth, wisdom, intelligence, and happiness; devoid of the three qualities of darkness, passion, and truth, in the sense in which created beings possess them; and at the consummation of all things the whole universe is resolved or absorbed into it. From Brahma individual souls emanate, as innumerable sparks issue from a blazing fire. The soul, therefore, is of divine substance, and as such infinite, immortal, intelligent, sentient, true. Its separate existence, as distinct from Brahma, is the cause of its ignorance; and this ignorance, which consists in regarding the world as a reality capable of subsisting without Brahma, has the double power of enveloping and projecting. By means of the former it makes the soul liable to mundane vicissitudes, such as the sensations of pleasure and pain. The projective power of ignorance, when encompassing the soul in its condition of pure intellect, produces out of the darkness which then prevails the five subtile elements; ether, which is the substratum of the quality sound; air, which arises from ether, the substratum of touch; from air, fire or light, the substratum of color; from light, water, the substratum of savor; and from water, earth, the substratum of smell. From these subtile elements are then produced 17 subtile bodies and the five gross elements. The former, also called *liṅgaśarīra*, are the five organs of perception, the organs of hearing, touch, sight, taste, and smell, which arise severally from the pure or inactive particles of each of the subtile elements. There are, further, two intellectual organs, which are produced from the mingled pure or inactive particles of the subtile elements, *buddhi*, understanding, the function of which is to arrive at a certainty or conclusion, and *manas*, an organ of volition and imagination. Lastly, there are the five organs of action, the voice, the hands, the feet, the organ of excretion, and that of generation, which are severally produced from the active particles of each of the subtile elements; and the five vital airs, which are produced from the mingled active particles of the subtile elements, the air breathed forth, which has its place in the fore part of the nose; the air breathed downward, which has its place in the lower intestines; the air which circulates through the whole body; the ascending air, which has its place in the throat; and the descending air in the middle of the body, which causes assimilation and digestion of food, produces semen, excrements, etc. Later Vedantists postulate 10 such vital airs, assuming in addition to those already mentioned, the airs which severally cause retching, winking, hunger, yawning, and fattening. The five gross elements are the five subtile elements, when they have become so divided and combined that each of them retains a preponderating portion of itself, and consequently of the quality of which it is the substratum, and also contains smaller portions of the other subtile elements, and the qualities of which they are the substrata. From these gross elements then arises the world. The soul, when existing in the body, is incased in a succession of sheaths. The first or interior sheath consists of buddhi, associated with the organs of perception; the second, of manas, associated with the organs of action; and the third, of the vital airs, together with the organs of action. These three sheaths constitute the subtile body of the soul, which attends the soul in its transmigrations. The collective totality of such subtile bodies is the supreme soul, as regarded in its relation to the world. The fourth and exterior sheath of the soul is composed of the gross elements; and the collective aggregate of such gross bodies is the gross body of the deity. This whole development being the result of ignorance, the soul frees itself from its error by understanding that the different stages in which this development appears do not represent real or absolute truth; and when its error has completely vanished it ceases to be reborn, and becomes reunited with Brahma, whence it emanated. The difference between esoteric and exoteric Vedanta consists in the ability or nonability to recognize that Brahma is impersonal, without attributes, and that every soul is all Brahma. This knowledge alone is liberating; but the empiricist, who cannot understand this, may be put in the way of attaining enlightenment by moral and religious practices, such as are enjoined by the Pūrvamīmāṁsā, as explained above. The doctrine of *bhakti*, or faith, does not belong to the older Vedanta; it is, however, an interesting feature of the later periods of this philosophy (see VAISHNAVAS); and the same observation applies to the doctrine

of *Māyā*, or illusion, according to which the world has no reality whatever, but is merely the product of imagination; for the older Vedanta merely teaches that the world is not the truth, but does not deny its material reality.

The oldest work on this philosophy, attributed to Badarayana or to Vyasa (q.v.), called the *Brahma-Sūtra*, consists of four *adhyāyas*, or lectures, each subdivided into four *padas*, or chapters, each pada containing a number of Sutras. The number of the latter is 558, and that of the *adhikaranas*, or topics treated in them, 191. The most important commentary on this work is the *Śārīraka-bhāṣya*, by Sankaracarya; and this commentary in its turn has been commented on by a great variety of writers. Originally edited at Calcutta in 1818, the text of the Sutras with this commentary were reëdited by Vidyaratna in 1863 (with a gloss on the commentary by Govindananda, ib.), and translated into German by P. Deussen (Leipzig, 1887) The most popular elementary treatise on the Vedanta, the *Vēdāntasāra*, by Sadananda, with the commentary of Tīrtha, was edited in 1829 (Calcutta); with this and another commentary by Nrisinhasarasvati in 1849 (ib.); edited and translated by Ballantyne, in *A Lecture on the Vedānta* (Allahabad, 1850); and edited by Jacoby (Bombay, 1894). A very useful compendium of the *Adhikaranas* is the *Adhikaranamata*, by Bharatitirtha, which, with the commentary of Anandachandra-Vedantavagisa, was edited in 1862 (Calcutta), and as an appendix to the Brahma-Sutras, with extracts from this commentary in the *Bibliotheca Indica* (ib., 1863). Thibaut published the *Sūtras* with a valuable introduction in the *Sacred Books of the East* (vols. xxxiv, xxxviii, and xlviii, Oxford, 1890–1904), and the system has been explained by Deussen in his *System des Vedanta* (Leipzig, 1883; Eng trans, Chicago, 1912), to which may be added the explanation in Muller, *Six Systems of Indian Philosophy* (New York, 1899). Consult also: F. Max Müller, *Introduction à la philosophie Vedanta* (Paris, 1899); Tripārthi, *Sketch of Vedanta Philosophy* (2d ed., Bombay, 1901); Deussen, *Allgemeine Geschichte der Philosophie* (2d ed, Leipzig, 1906); *Das angeblich von Rāmānuja verfasste Vedāntatattvasāra* (ed. and trans. into German by E. von Voss, ib., 1906); *Bodhasār, a Treatise on Vedānta with Commentary by Narahari* (ed. by S. Dayanand, Benares, 1906); M. Walleser, *Der ältere Vedānta* (Heidelberg, 1910); P. D. Shāstrī, *The Doctrine of Māyā in the System of the Vedānta* (London, 1911); and the publications of the Vedanta Society.

VED'DAS. A people of southeastern Ceylon, who have sometimes been regarded, chiefly upon somatic and osteological grounds, as a separate race of mankind. They are one of the most primitive of human types, representing, perhaps, the original stock which, traveling to the north, produced the Dravidian peoples of southern Hindustan, and going to the south gave rise to the Australians. The features of the Veddas are Hindu rather than Negroid or Mongoloid; the hair is jet black, wavy, or curly, but never kinky. They are somewhat darker in color than the neighboring Singhalese, and are of slender build, erect carriage, and small stature (full-grown males about 5 feet). A noteworthy characteristic is their monogamous form of marriage. They are praised for honesty, hospitality, morality, and good nature. The Veddas have primitive songs and dances, their religious ideas centre in a cult of the dead They use the fire drill and make bows and arrows, but obtain arrow heads and axes from the Singhalese, with whom the more secluded Veddas traffic by a sort of dumb show. From the Singhalese also they have written charms, and occasionally a palm-leaf book serving as an oracle or fetish The Village Veddas are largely vegetarians, but the Rock Veddas hunt birds and animals. Those still existing are divided into three classes. The Coast Veddas of Batticaloa, who have some civilization, associate freely with their Singhalese neighbors, devote themselves to fishing, and in appearance only differ from the primitive Singhalese of the same region. The Village Veddas of the wooded lowlands (Bintenne) are nomadic harvesters of the jungle products, build rude huts, and collect into family groups. The most primitive and secluded are the Rock Veddas, so called from their cave life in the jungles of the Badulla and Nilgala hills. They live chiefly by hunting, and do not associate in a tribal life, but band together only in small family groups. Nevertheless the Saligmanns have discovered a clan system with maternal descent. At the basis of the marriage regulations lies the institution of cross-cousin unions, i.e., of cousins related through parents of opposite sex. A woman's son thus marries his mother's brother's daughter, but under no conditions his mother's sister's or his father's brother's daughter. Consult: Virchow, *Ueber die Weddas von Ceylon* (Berlin, 1881); Sarasin, *Die Weddas von Ceylon* (Wiesbaden, 1891); Deschamps, *Au pays des Veddas* (Paris, 1892); C. G. and B. Z. Seligmann, *The Veddas* (Cambridge, 1911).

VED'DER, ELIHU (1836–1923). An American painter and illustrator He was born in New York City, and after some instruction under T. H. Mattison, at Sherburne, N. Y., he studied with Picot in Paris. In 1857 he went to Italy, and he remained chiefly in Florence till the outbreak of the Civil War in 1861, when he returned to the United States. Not being permitted to enlist, by reason of a defect in his left arm, he remained in New York City and Boston until December, 1865, when he again went to Paris, and in 1867 he settled in Rome. He was elected to the National Academy of Design (1865) and the American Academy of Arts and Letters. A man of original, powerful, and weird imagination, Vedder is known for work pregnant in meaning, with a significance beyond the mere artistic. It is characterized by classical tendency in form and composition, simplification of detail, and accentuation of the mysterious forces of nature. Although his use of color is limited, it has, in the main, a large and decorative quality. His figures, although usually small in scale, are of heroic mien. Among his best-known oil paintings are: "Roman Girls on the Seashore," the "Phorcydes," the "Cumean Sibyl," "Venetians on the Main," a "Crucifixion," the "Lair of the Sea Serpent," "Lazarus," "The Sphinx," and "The Fisherman and the Djinn" (all in the Boston Museum); "The African Sentinel" and "The Pleiades" (Metropolitan Museum, New York); "The Keeper of the Threshold" (Carnegie Institute, Pittsburgh); "Storm in Umbria" (Art Institute, Chicago); "Allegorical Subject" (Brooklyn Museum). His mural decorations include a panel in Bowdoin College; five panels illustrating "Good and Bad Govern-

ment" and a mosaic "Minerva," in the Congressional Library at Washington. His dignified and sympathetic illustrations of FitzGerald's translation of Omar Khayyam (1884) gained him a wide reputation In 1910 he published *The Digressions of V*, and in 1914 *Miscellaneous Moods in Verse.*

VEDDER, HENRY CLAY (1853–). An American Baptist church historian. He was born at De Ruyter, N. Y, graduated at the University of Rochester in 1873, and at Rochester Theological Seminary in 1876. He was an associate editor of the *Examiner* in 1876–92, and its chief editor from 1892 to 1894, when he became professor of Church history in Crozer Theological Seminary, Chester, Pa He edited the *Baptist Quarterly Review* in 1885–92. His publications include· *Baptists and Liberty of Conscience* (1883); *A Short History of the Baptists* (1891; new ed., 1907); *The Higher Criticism* (1892); *American Writers of To-day* (1894; new ed., 1910); *A History of the Baptists of the Middle States* (1898); *Balthasar Hubmaier: the Leader of the Anabaptists* (1905); *Christian Epoch Makers* (1908); *Church History Handbooks* (4 vols., 1909); *Socialism and the Ethics of Jesus* (1912); *The Reformation of Germany* (1913); *The Gospel of Jesus and the Problems of Democracy* (1914).

VEDRINES, ve-drēn', JULES. A French aviator. See AËRONAUTICS, *Aviation,* Speed Records.

VEEN, vān, MARTIN VAN. See HEEMSKERK, MARTIN VAN.

VEERE, vâr', or **CAMPVERE,** or TER-VERE. A small fortified town of the Netherlands, situated on the east coast of the island of Walcheren, in the Province of Zealand, 4 miles northeast of Middelburg (Map: Netherlands, B 3). The town has fallen into decay; but its former prosperity is indicated by the town hall of white freestone, with an elegant tower, and by the large and beautiful cathedral, which is no longer used, both of which rank among the finest architectural relics of former centuries in Holland. It was the first town to proclaim William III, Prince of Orange, General Stadtholder. The town effectually repelled the attack of the Spaniards in 1572.

VEERY. The tawny or Wilson's thrush (*Turdus* or *Hylocichla fuscescens fuscescens*), one of the best-known thrushes (q.v.) of the eastern and middle United States. It is about 7½ inches long, nearly uniformly cinnamon brown above, white beneath, tinged with buff, the sides of breast and throat with small wedge-shaped brown spots. The veery is a notable songster, but the notes, though of peculiar attractiveness and resembling somewhat the rhythmic continued ringing of a bell, are perhaps impossible to describe in words. The nest is of bark, rootlets, and leaves, and is built on or near the ground, and the eggs are usually four and greenish blue. The veery is found in cold, damp woods, and in some northerly places is the most numerous of the thrushes. It feeds largely upon insects, destroying many cutworms, beetles, and grasshoppers. See Plate of EGGS OF SONG BIRDS.

VEFIK PASHA, vĕ'fĭk pä-shä'. See AHMED or ACHMET, VEFIK PASHA.

VEGA, vā'gä, GARCILASO DE LA. See LASO DE LA VEGA, GARCÍ.

VEGA (EL INCA), GARCILASO DE LA. See LASO DE LA VEGA (EL INCA), GARCÍ.

VEGA, GEORG, BARON (1765–1802). An Austrian mathematician, born at Sagoritza, Carniola, and educated at Laibach. In 1780 he became teacher of mathematics in a regiment of artillery. He served with distinction in the wars against the Turks and the French, and rose to the rank of colonel. Vega is especially known for his *Logarithmische, trigonometrische und andere Tafeln* (1783, and many subsequent editions), and similar tables, which are still useful. He also wrote: *Hydrodynamik* (2d ed., 1819); *Anleitung zur Zeitkunde* (1801); *Natürliches Mass-, Gewichts- und Munzsystem* (1803). Consult Kaučič, "Georg Freiherr von Vega," in *Organ der militarwissenschaftlichen Vereine,* vol. iii (Vienna, 1886).

VEGA CARPIO, vā'gä kär'pē-ô, LOPE FELIX DE, generally called Lope de Vega (1562–1635). The most ingenious dramatic poet of Spain, surnamed El Fenix de España, and called by Cervantes *mónstruo de la naturaleza,* because of his productivity. Born in Madrid, Nov. 25, 1562, he received his elementary training there at the Imperial College under the Jesuits. Two of the earliest of his extant plays, *El verdadero amante* and *Los hechos de Garcilaso de la Vega,* were written when he was 12 years old. He took part in an expedition against the Azores (1582). His *Hermosura de Angélica* (1602), a long poetical continuation of the *Orlando Furioso* of Ariosto (far inferior to the work of the Italian), was practically finished while he served with the Armada. After his return from the scene of Spain's naval humiliation, Lope wrote the *Arcadia* (1598), a pastoral novel, in mingled prose and verse, which, under fictitious names, introduces love episodes in which the author and some of his friends had figured. The epic *La Dragontea* (1598) is an attack upon Sir F. Drake. In 1599 appeared a religious poem, the *San Isidro,* in which he celebrated the life and deeds of the patron saint of Madrid. To 1602 may be ascribed the *Rimas,* a collection of sonnets, and to 1604 the prose romance *El peregrino en su patria.* The *Peregrino* contains also four *autos* (religious dramas) and a list of more than 200 plays that he had already composed. With the *Jerusalén conquistada* (published 1609) he undertook to surpass Tasso; but the epic of the Italian is in every way superior to Lope's poem.

After some works of minor importance, such as the *Soliloquios* published under the name of Gabriel Padecopeo, there came his beautiful religious pastoral, *Pastores de Belén.* After the death of his second wife (1612) he took holy orders in 1614. His piety appears to have been sincere even if his life was not blameless, and he gave renewed expression to his religious feelings in the *Triunfo de la fé en el Japón* (1618). He essayed the prose tale in four stories, *Las fortunas de Diana, La desdicha por la honra, La prudente venganza,* and *Guzmán el Bravo.* The *Triunfos divinos* is a collection of religious lyrics, and the *Corona trágica* (1627) is a religious epic intended as a defense of Mary Stuart, Queen of Scots. As a poetical catalogue and eulogy of more than 300 Spanish poets, he composed his *Laurel de Apolo,* which can hardly be considered as a model of just criticism. The *Dorotea* (1632) is a prose romance in dramatic form, in which the author undoubtedly embodied many personal experiences; on this account its biographical value has been somewhat stressed. It was a favorite

work with Lope himself. Under the pseudonym of "the licenciado Tomé Burguillos" he produced in 1634 certain *Rimas* and the mock-heroic poem *Gatomaquia*. This is both witty and interesting.

Lope was a poet of great versatility. He essayed nearly every kind of writing, but it is in the drama that his genius showed itself in many ways unexcelled. While his dramatic work is impaired by many imperfections, his faults are atoned for by his exuberant invention, by the skill with which he develops character, and by the unfailing spiritedness of his dialogue. His fertility is unparalleled. He is supposed to have written between 1500 and 1800 plays (*comedias*), in addition to several hundred *autos* (religious pieces) and *entremeses* (interludes). Of these there are extant 431 *comedias* and 50 *autos*. In the comic and the tragic vein Lope treated all manner of subjects—historical, legendary, picaresque, religious, and those that have to do with everyday life. It was he who gave the greatest development to the stock comic character called the *gracioso;* and he first gave dramatic emphasis to the *pundonor*, or point of honor, as an all-pervading principle of Spanish cultured life. By refusing to be bound by the pseudo-classic unities Lope did for Spain what Shakespeare did for England—gave it a national theatre. Of his many pieces the following may be given special mention: *El castigo sin venganza; Porfiar hasta morir; La estrella de Sevilla*, which is one of the best of all; *El mejor alcalde el Rey; El acero de Madrid; La esclava de su galán; El perro del hortelano; La boba para los otros y discreta para sí; Los cautivos de Argel; Si no vieran las mujeres; El príncipe perfecto; Los Tellos de Meneses;* and *La fuente Ovejuna*

For printed editions of Lope's works, consult the *Colección de las obras sueltas de Lope de Vega* (21 vols, Madrid, 1876–79); the plays and other works contained in vols. xxiv, xxxiv, xxxviii, xli, and lii of the *Biblioteca de autores españoles* (ib., 1859 et seq.); *Comedias inéditas*, vol. vi of the *Libros españoles raros ó curiosos* (ib., 1873); *La Dorotea, acción en prosa* (ib., 1886); and especially the definitive edition of his *Obras, publicadas por la Real Academia Española*, which, begun at Madrid, 1890, has prefixed to its first volume the *Nueva biografía* of C. A. de la Barrera, and, carried on under the editorship of Marcelino Menéndez y Pelayo, who prepared the *Observaciones preliminares*, had already reached the fifteenth volume when Menéndez y Pelayo died. Consult also V. Fox (Lord Holland), *Some Account of the Life and Writings of Lope Felix de Vega Carpio* (London, 1817); James Fitzmaurice-Kelly, *A History of Spanish Literature* (New York, 1898), revised French and Spanish versions *Littérature espagnole* (Paris, 1913) and *Literatura española* (Madrid, 1913); id., *Lope de Vega and the Spanish Drama* (London, 1902); id, *Chapters in Spanish Literature* (New York, 1908); Arturo Farinelli, *Grillparzer und Lope de Vega* (Berlin, 1894); Edmund Dorer, *Die Lope de Vega Litteratur in Deutschland* (ib, 1877); Forster, *Some French and Spanish Men of Letters* (London, 1891); Franz Grillparzer, "Studien zum spanischen Theater," in his *Werke*, vol. viii (Stuttgart, 1871); G. H. Lewes, *The Spanish Drama: Lope de Vega and Calderón* (London, 1846); Albert Ludwig, *Lope de Vegas Dramen, aus dem karolingischen Sagenkreise* (Berlin, 1898); W. von Wurzbach, *Lope de Vega* (Leipzig, 1899); Marcelino Menéndez y Pelayo, *Estudios de crítica literaria*, series ii (Madrid, 1895); Lope de Vega, "Arte nuevo de hacer comedias," critical edition by Alfred Morel-Fatio, in *Bulletin hispanique*, vol. iii (Bordeaux, 1901); H. A. Rennert, *Life of Lope de Vega* (Glasgow, 1904); id., *Spanish Stage in the Time of Lope de Vega* (New York, 1909); Lope de Vega, *Las burlas veras* (ed. by S. L. M Rosenberg, Philadelphia, 1912); id, *Novelas á la Señora Marcia Leonarda* (critical ed., by J. D. and L. A. Fitz-Gerald, Erlangen, 1913). For further bibliography, consult James Fitzmaurice-Kelly, *Bibliographie de l'histoire de la littérature espagnole* (Paris, 1913).

VEGA DE ARMIJO, vā'gȧ dȧ är-mē'hō, MARQUÉS DE LA. See AGUILAR Y CORREA, ANTONIO.

VEGETABLE COLORS. A term for natural vegetable dyes as distinguished from mineral colors and those prepared by chemical processes such as the coal-tar colors. They include heartwoods, barks, roots, dried leaves and berries, lichens, etc., and though not as much employed as before the introduction of artificial coloring substances, they still are extensively used. The more important colors will be found under their own heads. These include: *red*, brazilwood, sandalwood, madder, safflower, archil, and kermes; *yellow*, old fustic and young fustic, quercitron, arnotto, and turmeric; *blue*, indigo, woad, logwood, and litmus; *green*, chlorophyll; *brown*, catechu and kino. These dyestuffs must be extracted, and for that purpose the dyewoods are cut or ground into small chips or powder and then cured or fermented, or the dye extracted by heating with water or boiling; in some cases the coloring matter is subsequently concentrated. These processes are also apt to involve chemical treatment of some kind For the use of vegetable colors, see DYEING, especially the table of natural dyestuffs with the artificial coloring matters that have in many cases displaced them.

VEGETABLE GELATIN. See AGAR AGAR.

VEGETABLE IVORY. See IVORY, VEGETABLE.

VEGETABLE MARROW. A variety of squash highly esteemed as a summer esculent.

VEGETABLE ORANGE. See MUSKMELON.

VEGETABLE OYSTER, OR OYSTER PLANT. See SALSIFY.

VEGETABLES (Lat. *vegetabilis*, enlivening, animating, from *vegetare*, to quicken, animate, from *vegetus*, lively, from *vegere*, to be active). As each vegetable and its culture are treated in separate articles on the individual crops, as beans, beets, cabbage, potatoes, peas, etc., this article is confined to the food value of vegetables.

The various parts of plants eaten include roots (turnips, salsify); bulbs (onion, garlic); tubers (potato, etc.); stems (sea kale, asparagus); leaf buds (Brussels sprouts); leaves (lettuce, cabbage); flower buds (cauliflower, capers); flowers (artichoke); fruits, green (cucumbers, okra); fruits, ripe (tomato, melon); seeds, unripe (corn, peas); seeds, mature (lentil, bean). Few vegetables are eaten entire; they generally contain some inedible matter as seeds, skin, etc., and when prepared for the table some edible material is also commonly lost; this varies with different vegetables, different specimens of the same vegetable, and with methods of preparation. The pods of fresh beans

and peas constitute on an average about 50 per cent of the entire weight of the unshelled vegetable, and the cob of corn somewhat over 50 per cent. When potatoes, carrots, sweet potatoes, and parsnips are peeled the material removed constitutes about 20 per cent of the original weight, fresh vegetables losing usually less than withered ones. The following table shows the average percentage composition of the edible portion of various vegetables:

The mineral matter of ash consists chiefly of salts of various organic acids, and also phosphates and chlorides. Vegetables contain various organic acids, ethers, and other similar bodies which are not estimated separately in proximate analysis like those quoted above, but are included in the group nitrogen-free extract. They are largely accountable for flavors, though various salts and sugars also have a similar influence. In few cases have these flavors been

AVERAGE COMPOSITION OF EDIBLE PORTION OF VEGETABLES

VEGETABLES	Water	Protein	Fat	Nitrogen-free extract	Crude fibre	Ash	Fuel per pound
FRESH	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Calories*
Artichoke (Jerusalem)	79 5	2.6	0 2	15.9	0.8	1.0	365
Asparagus	94.0	1 8	0 2	2 5	0.8	0.7	105
Beans (shelled, green)	58 9	9.4	0.6	29	.1*	2 0	740
Beans (string)	89 2	2.3	0 3	5 5	1.9	0.8	195
Beets	87 5	1.6	0.1	8 8	0.9	1.1	215
Cabbage	91.5	1 6	0 3	4 5	1.1	1.0	145
Carrots	88 2	1.1	0.4	8.2	1.1	1.0	210
Cauliflower	92 3	1 8	0 5	3.7	1.0	0 7	140
Celery	94 5	1.1	0 1	3	.3	1.0	85
Collards	87.1	4 5	0 6	6	3	1 5	225
Corn (green)	75.4	3 1	1 1	19.2	0.5	0.7	470
Cucumber	95 4	0.8	0 2	2 4	0 7	0.5	80
Eggplant	92.9	1 2	0.3	4.3	0.8	0.5	130
Greens (dandelion)	81 4	2 4	1 0	10	6	4 6	285
Kohl-rabi	91.1	2 0	0.1	4.2	1.3	1.3	145
Leeks	91.8	1.2	0 5	5	8	0.7	150
Lettuce	94.7	1.2	0.3	2.2	0 7	0.9	90
Mushrooms	88 1	3 5	0 4	6 0	0.8	1 2	210
Muskmelon	89 5	0.6		7.2	2.1	0.6	185
Okra	90 2	1 6	0 2	4.0	3.4	0.6	175
Onions	87 6	1 6	0.3	9 1	0 8	0.6	225
Parsnips	83.0	1 6	0.5	11.0	2.5	1.4	300
Peas (green)	74 6	7 0	0 5	15 2	1.7	1.0	465
String or sugar peas	81 8	3 4	0.4	12.1	1.6	0.7	335
Cowpea (green)	65.9	9 4	0 6	22	.7	1.4	620
Potato	78.3	2.2	0.1	18.0	0.4	1.0	385
Sweet potato	69.0	1.8	0 7	26.1	1.3	1.1	570
Pumpkin	93.1	1.0	0 1	4.0	1.2	0.6	120
Radish	91 8	1.3	0.1	5 1	0.7	1.0	135
Rhubarb	94.4	0 6	0.7	2.5	1.1	0.7	105
Rutabaga	88.9	1.3	0 2	7.3	1.2	1.1	190
Spinach	92.3	2.1	0 3	2 3	0.9	2.1	110
Squash	88.3	1.4	0.5	8.1	0.9	0.8	215
Tomato	94 3	0.9	0 4	3.3	0.6	0.5	105
Turnip	89.6	1.3	0.2	6.8	1.3	0.8	185
Watermelon	92.4	0.4	0.2	6	.7	0.3	140
DRIED							
Beans (shelled)	12.6	22.5	1.8	55.2	4.4	3.5	1605
Lentils	8.4	25 7	1.0	59	.2	5.7	1620
Peas	9.5	24.6	1.0	57.5	4.5	2.9	1655
Cowpea	13.0	21.4	1.4	56 7	4.1	3.4	1590
CANNED							
Artichoke (globe)	92.5	0.8	..	4.4	0 6	1.7	110
Asparagus	94 4	1.5	0.1	2.3	0.5	1.2	85
Beans (string)	93.7	1 1	0.1	3.3	0.5	1.3	95
Beans (green)	72.7	7.0	0 2	17 3	1.2	1.6	480
Brussels sprouts	93.7	1.5	0.1	2.9	0.5	1.3	95
Corn	76.1	2.8	1.2	18.2	0.8	0.9	455
Okra	94.4	0.7	0 1	2.9	0 7	1.2	85
Peas (green)	85 3	3.6	0.2	8.6	1.2	1.1	255
Pumpkin	91.6	0.8	0.2	5.6	1.1	0.7	150
Squash	87.6	0.9	0 5	9.8	0.7	0 5	235
Tomato	94.0	1.2	0.2	3.5	0.5	0.6	105

*The figures printed between the columns "nitrogen-free extract" and "crude fibre" indicate the sum total of these two ingredients, which in some instances have not been determined separately.

It will be seen that (excepting the dry legumes mentioned above, or other dry vegetables) vegetables have a high water content and a comparatively low percentage of nutrients in proportion to bulk. The principal nutrients are carbohydrates, including nitrogen-free extract (starch, sugar, etc.) and crude fibre. Some vegetables, notably the legumes, contain fairly large amounts of protein. The fat (or ether extract) consists of coloring matters, wax, etc., in addition to true fat or oil. This group is not abundant in vegetables commonly eaten. studied chemically. (See FOOD.) When vegetables are cooked the chief change in percentage composition is in the water content. They may become drier if baked or fried, or more moist if stewed or boiled. The various chemical bodies are modified by cooking—albumens coagulated, starches to some extent broken down into simpler substances, and other changes brought about which are not so well understood. Besides the loss in paring and otherwise preparing vegetables, there may be a loss during cooking. For instance, when cabbage is boiled the water

extracts nearly half of the total food material, which, ordinarily thrown away, is lost When potatoes are boiled the loss may be considerable, being greatest when they are peeled and soaked before boiling and least when they are boiled with the skins on. The materials lost in boiling vegetables are albuminoid and nonalbuminoid nitrogen, mineral matter, and sugars. Little starch is lost, except by abrasion. In vegetables like carrots, which contain a fair proportion of sugar, the amount extracted in boiling has been found to be nearly 1 pound of sugar in a bushel. In the ordinary household such losses are not important.

Although fresh vegetables contain a high percentage of water, they are nevertheless of value as nutriment. Like other bulky foods, they are eaten in large quantities and may furnish a considerable proportion of the total nutrients. This is especially true of vegetables, like potatoes, which contain large amounts of starch. Combined with concentrated foods, especially those which contain protein (eggs, cheese, meat, etc.), vegetables contribute to a well-balanced diet. They are also important for iron and other mineral matters. Vegetables owe their laxative properties in part at least to the mild organic acids they supply (as citric acid in tomatoes) and in part to their mineral salts. Vegetables, like fresh fruits, are an important source of vitamins and similar physiologically active substances.

From a number of statistics collected in connection with nutrition investigations conducted by the United States Department of Agriculture it appears that vegetables (other than dried legumes) furnish about 21 per cent of the total food, 6 per cent of the total protein, and 13 per cent of the total carbohydrates in the diet of the average American family. Their cost varies with the season, rarity, distance from market, and other factors. High-priced vegetables may increase the cost of living out of all proportion to the nutrients they furnish, though this use may be justified on the ground that they render the diet more attractive. A great variety of vegetables is probably not necessary to health, and the man of limited means may provide as wholesome a diet with the aid of seasonal inexpensive vegetables as one who can afford to purchase delicacies. Vegetables frequently stimulate the appetite for other foods. The variety of fresh vegetables eaten, as well as the quantity, has been increased in recent years, owing to increased facilities for growing out of season, marketing, transportation, and storage. Canned vegetables are essentially cooked vegetables in which fermentation is prevented by sterilization and the exclusion of air. Evaporated vegetables, which are also popular, especially for camps and expeditions, are practically concentrated foods which need only water and cooking. Many of them are used for soups, etc. Besides being used as food, various vegetables, e.g., tomato, onion, garlic, and garden peppers green and ripe (both sweet and sharp), are employed for flavoring and for garnishing. (See HERBS, CULINARY, AND SEASONING VEGETABLES.) Some, like potatoes, are used for the manufacture of starch.

Consult United States Department of Agriculture, Office of Experiment Stations, Bulletin 28 (revised), *Composition of American Food Materials* (Washington, 1899); Bulletin 43, *Losses in Boiling Vegetables* (ib., 1897); Farmers' Bulletin 121, *Beans, Peas, and Other Legumes as Food* (ib., 1900).

VEGETABLE SILK. See SILK

VEGETABLE SPONGE. The netted fibrous interior of the mature fruit of several species of *Luffa*, more particularly of *Luffa ægyptiaca* and *Luffa acutangula* See GOURD

VEGETABLE TALLOW. See TALLOW TREE.

VEGETABLE TISSUE. The structural substance of plants It is composed of cells which have a common origin and law of development and may consist of one or more of the tissue elements such as parenchyma and its various subdivisions and prosenchyma and its diverse forms.

VEGETARIANISM. The practice or doctrine of living upon foods obtained from the vegetable world, to the exclusion of animal food

On physiological grounds it is urged that the formation of the teeth and the intestines in man prove that he was not intended to be a carnivorous but a fruit and vegetable eating animal. The length of the intestine shows him to be midway between the herbivora and the carnivora, and neither fitted for digesting grasses, which require a long intestine, nor flesh, which needs a short one, but nearer akin to the fruit-eating apes. It is maintained that a vegetable diet is best for man physically, intellectually, and morally; that with it life is longer, more enjoyable, and bodily strength and symmetry superior; that the use of animal food stimulates, begets a fierce disposition, and a carelessness about life; whereas a vegetable diet has very opposite effects. It is further contended that all the elements necessary for perfect nutrition are contained in vegetables, and that a proper dietary can be selected which is not open to objection on account of bulk. As to economy it is urged that a diet of meals and grain can be purchased for much less than one of meat, and confers more working power; that a given acreage of land will support more people if devoted to growing grain and vegetables than if used for the raising of cattle or sheep. On moral grounds it is contended that it is wrong to slaughter animals unnecessarily, and that the constant killing and eating of animals reacts unfavorably on man's higher nature. Lastly, it is pointed out that animal food is often the means of communicating disease to man, e.g., tuberculosis, trichiniasis.

Scientific opinion is not favorable to vegetarianism. The structure of man's stomach and intestines, and the variety of intestinal juices are held to prove that nature intended him for an omnivorous animal, his digestive organs being fitted to derive nourishment from every kind of food. The possession of biting, tearing, and grinding teeth (incisor, canine, and molar) is also suggestive. It has been a matter of almost universal experience that, although a vegetable diet may keep a man in apparent health for some time, it eventually results in loss of strength and general resisting power against disease. That a mixed diet (i.e., one including meat) enables the individual to do more physical work and increases the staying powers has often been proved. While there are some races that live almost exclusively on a vegetable diet, and others that exist wholly on animals (e.g., the Eskimo), it cannot for a moment be contended that these are the equals of peoples living on a mixed diet.

As a matter of fact vegetarians are apt to sup-

plement their diet with animal proteids—milk, eggs, cheese, etc. Of late years the vegetarian propaganda, for a long time based largely on moral, religious, or sentimental grounds, has sought the aid of science and has evinced a disposition to depart from sectarian and fanatical doctrines. As a curative agent a vegetable diet is sometimes indicated for longer or shorter periods; and the temperance practiced by the vegetarian in other directions is doubtless beneficial Buttner describes a vegetarian as one who does not habitually make use of flesh food, in contradistinction to the habitual meat eater. Some experiments by Benedict and Roth, who used the resources of the Nutrition Laboratory of the Carnegie Institution at Washington, and of the Battle Creek Sanitarium, demonstrated that the basal gaseous metabolism, both in men and women vegetarians, did not differ markedly from that of nonvegetarians of similar height and weight, thus refuting the contention sometimes put forward by enthusiasts, that their chosen diet confers exceptional endurance and capacity for work. It also contradicts the belief that vegetarians live on a somewhat lower metabolic plane than flesh eaters. Consult: J. L. Buttner, *A Fleshless Diet; Vegetarianism as a Rational Dietary* (New York, 1910); Benedict and Roth, "The Basal Caloric Output of Vegetarians as Compared with that of Nonvegetarians of Like Weight and Height" in the *Proceedings of the National Academy of Science* (Washington, 1915); M. McI. Gillmore, *Meatless Cookery* (New York, 1914); H. W. Wiley, *Not by Bread Alone* (ib., 1915). See DIET.

VEGETATIVE PROPAGATION. One of the three ways by which plants produce new individuals. It is distinguished from reproduction by spores and by sexual cells in that only ordinary vegetative cells are involved. Historically it is the oldest method of reproduction among plants, but it is a very common method throughout the plant kingdom. In fact, any node of a vascular plant, when put in proper soil conditions, can strike root, which enables the branch developed by the bud to become an independent plant. Advantage is taken of this power of nodes in artificial propagation by cuttings, slips, layering, etc. Many plants, as the strawberry, develop special branches (stolons) which strike root; and most creeping plants multiply by producing new plants at the nodes. The term "brood bud" or "brood body" is often employed to designate the initial buds in such propagation.

VEGETIUS, vē-jē'shĭ-ŭs (FLAVIUS VEGETIUS RENATUS). A Roman military writer of the fourth or fifth century. He was the author of *Rei Militaris Instituta,* or *Epitoma Rei Militaris,* which rests on good sources. Although confused and unscientific the work is an interesting and valuable exposition of the Roman art of warfare. It is usually divided into four books, of which the first treats of the levying and training of recruits; the second, of the different classes into which soldiers are divided, and the organization of the legion; the third, of strategy; and the fourth, of the attack and defense of fortresses and of marine warfare. The work was much studied in the Middle Ages, and was then frequently translated. It has been edited by Schwebel (1767) and by Lang (2d ed., 1885). A work on veterinary art, entitled *Mulo Medicina,* is usually ascribed to the same author. It is printed in Schneider's *Scriptores Rei Rustucæ* (4 vols, Leipzig, 1797). Consult Seeck, *Die Zeit des Vegetius* (Berlin, 1876); W. S. Teuffel, *Geschichte der romischen Literatur,* vol. iii (6th ed., Leipzig, 1913); M. Schanz, *Geschichte der romischen Litteratur,* vol. iv, part i (2d ed., Munich, 1914).

VEGLIA, vĕl'yà. An island belonging to the Province of Istria, Austria, situated southeast of Triest, in the Gulf of Quarnero, in the Adriatic (Map: Austria, D 4) Area, 145 square miles. It forms an administrative district with a population (1910) of 20,975. It has forests, and exports grain, wine, silk, and marble. The capital, Veglia, is on the southwest coast, and has a cathedral interesting for its architecture.

VEHMGERICHTE, fām'ge-rĭK'te, or **FEMGERICHTE** (Ger., tribunals of punishment). Westphalian courts of justice which had considerable influence in Germany during the latter part of the Middle Ages. They arose by natural development from the courts of freemen When they had reached their fullest development the Vehmgerichte included a vast body of free judges (*Wissende,* i.e, initiated) who constituted a secret society, scattered all over Germany. They met sometimes in secret and received complaints, to answer which they had the right to summon any one in Germany, though the trial itself took place ordinarily in Westphalia only. The death penalty was inflicted by means of hanging. The chairman of these courts, which were to a great extent held in the open country, was known as the Freigraf, i.e., the free count. Their importance was due to the fact that in the time of turmoil and petty courts, controlled by robber barons, the Vehmgerichte were tribunals which at least made an effort to render impartial judgments. Consult: Thomas Lindner, *Die Veme* (Münster, 1888); Friedrich von Thudichum, *Femgericht und Inquisition* (Giessen, 1889); Thomas Lindner, *Der angebliche Ursprung der Vemgerichte aus der Inquisition* (Paderborn, 1890); Paul Wigaud, *Das Femgericht Westfalens* (2d ed, Halle, 1893).

VEI, vī, or VAI. A tribe of negroes on the west coast of Africa from Monrovia northward. They are the only negroes who possess a form of writing, developed by a native in the form of a syllabary by adaptations of Roman letters. They are pagans, of Mandingan race and speech Consult Sir Harry Johnston, *Liberia* (London, 1906). See AFRICAN LANGUAGES, *Negro;* MANDINGO.

VEII, vē'yī. An ancient city, the Etruscan city nearest to Rome, and in early times its most formidable rival. Its site was at Isola Farnese, a village about 12 miles north of Rome. According to Roman historians the struggle between the two cities began as early as the time of Romulus, and continued under each of the kings, except Numa, and always to the advantage of the Romans. The Veientines had their revenge under Porsena (q.v.); but after his time, being repeatedly defeated, they had recourse to the plan of sheltering themselves behind their walls on the approach of the Roman legions, and of sallying out on predatory expeditions as soon as they had retired. To relieve the Republic from this annoyance, the Fabian clan, to the number of 306, with their followers, probably 10 times as numerous, undertook to garrison a fortress near Veii, and to act as a guard against the marauders. They were, however, enticed into an ambuscade, and

cut off to a man at the Cremera. (See FABIUS.) For the next 60 years hostilities often broke out, followed by ill-observed truces. At last the Romans determined to rid themselves of their rival by a siege. The city held out for 10 years, but was finally taken by Camillus (c.396 B.C.). After its fall it was gradually deserted; and although, in later times, a colony was planted there by Cæsar, and another by Augustus, it always remained an insignificant place. There are scanty remains of the Etruscan and also of the Roman city. Consult: L. Canina, *L' antica città di Veio* (Rome, 1847); George Dennis, *Cities and Cemeteries of Etruria*, vol. i (London, 1883); R. A. Lanciani, *Pagan and Christian Rome* (Boston, 1893).

VEIL (Fr. *voile*, Lat. *velum*, the former signifying sail as well as veil; and the latter, curtain also). A cloth, net, gauze, or lace head drapery worn by women and usually covering the face. The veil is symbolic of privacy of married life and of fidelity to the marital vows, as is illustrated among Christians by the phrase "take the veil" employed when a virgin becomes "the bride of Christ," otherwise a nun When Mohammedan women go out in public, they protect the face from the gaze of strange men by a veil of muslin reaching to the feet, and leaving only the eyes exposed When the women of ancient Rome married, they assumed a veil with red stripes. Among Spanish women the veil is almost as important a part of costume and of self-decoration and flirtation as the fan, inviting rather than repelling masculine attentions. Among other women of Europe and America, the veil is affected mostly by the fashionable, sometimes to protect the face from sun or wind or dust, but often for style or smartness only. Sacramental veils are those that cover the ecclesiastic vessels in the celebration of Holy Communion.

VEIL, GREMIAL. See COSTUME, ECCLESIASTICAL, *Vestments, Episcopal.*

VEIL, HUMERAL. See COSTUME, ECCLESIASTICAL, *Vestments, General;* HUMERAL VEIL.

VEILE, vā'y'-le. A port and the capital of the District of Veile in Jutland, Denmark, situated in a beautiful hilly and forested region, at the mouth of the Veile, and at the head of the Veile Fiord, 16 miles northwest of Fredericia (Map: Denmark, C 3). Fisheries principally engage the attention of the people. Pop., 1901, 14,592; 1911, 17,261.

VEILED PROPHET OF KORASSAN, kō'-rās-sān', THE. See HAKIM IBN ALLAH.

VEILLER, vāl'ēr, LAWRENCE (?–). An American pioneer in housing reform. He published: *Housing Conditions and Tenement Laws in Leading American Cities* (1900); *Housing Reform, a Handbook for Practical Use in American Cities* (1910); *A Model Tenement House Law* (1910); *A Model Housing Law* (1914). With R. W. De Forest, he edited *The Tenement House Problem* (2 vols., 1903).

VEIN (OF., Fr. *veine*, from Lat. *vena*, blood vessel, from *vehere*, to carry, convey). In anatomy, a blood vessel which conducts the venous (or blue) blood from the capillaries back to the heart. The exceptions to this description are the pulmonary veins, which return the red, oxygenated blood from the lungs to the heart; the portal veins, which receive the blood from the pyloric, gastric, cystic, superior mesenteric, and splenic veins, and, entering the liver, break up into small branches which pass through all parts of that organ; and the umbilical veins, which convey the blood from the fœtus to the mother's placenta. The veins enlarge as they proceed, gathering blood from their tributaries, and finally pour it through the ascending and descending venæ cavæ into the right auricle of the heart. (See CIRCULATION.) Their coats are similar to those of the arteries, but much thinner, and even transparent. The internal coat consists of an epithelial layer, supported on several laminæ of longitudinal elastic fibres. The middle or contractile coat consists of numerous alternating layers of muscular and elastic fibres, the muscular fibres being disposed circularly round the vessel. The muscular fibres are wanting in some parts of the venous system, and specially developed in others. In the venæ cavæ and pulmonary veins near the heart, striped muscular fibres may be detected, continuous with those in the auricles. The external or areolar fibrous coat consists of connective or areolar tissue and of longitudinal elastic fibres; within some of the larger veins, as the inferior vena cava, through its whole length, the external iliacs, the azygos, etc., there is also a longitudinal network of unstriped muscular fibres. Valves are most numerous in the veins of the extremities, especially the lower ones, these vessels having to act against the force of gravity more than most others. They are absent in the venæ cavæ, the hepatic, portal, renal, pulmonary, and some other large veins, and in very small veins generally. The veins are nourished by nutrient vessels, or vasa vasorum, like the arteries; but except in a few instances (including the inferior vena cava), nerves are not distributed to them.

The chief diseases of the venous system have been already sufficiently described in the articles JUGULAR VEIN; PHLEBITIS, OR INFLAMMATION OF THE VEINS; PHLEBOLITE; PHLEGMASIA ALBA DOLENS, OR MILK LEG; THROMBOSIS; and VARICOSE VEINS.

VEINS. In geology, those mineral aggregates that have been deposited from solution or by sublimation in fissures or cracks and that consequently have a rather regular form with parallel walls. They are the work of underground waters and to some extent of the heated gases and vapors given off by uncooled igneous magmas in the depths of the earth. The minerals in veins include both metallic and nonmetallic kinds, the two being usually intermixed; the valuable ingredients constitute the ore and the rest is called the gangue. Veins vary in size from very small bodies that can be seen in a hand specimen to those hundreds of feet wide and reaching to unexplored depths in the earth. They constitute one of the more important types of ore deposits, and are sources of gold, silver, and other metals. See ORE DEPOSITS.

VEINSTONE, PHLEBOLITE, or PHLEBOLITH. A concretion sometimes found in obliterated veins and formed by the deposit of lime in the degenerated clot. See PHLEBOLITE.

VEIT, fit, PHILIPP (1793–1877). A German historical painter, born in Berlin. First instructed by Friedrich Matthäi at the Dresden Academy, he continued his studies in Vienna until 1813, when he entered the German army, and fought in the War of Liberation. In 1815 he went to Rome, where he identified himself with the Nazarenes (see PRE-RAPHAELITES) and helped to decorate the Casa Bartholdi (frescoes

now in the National Gallery, Berlin) and the Villa Massimi. Among his other works at Rome were the "Triumph of Religion," in the Museo Chiaramonti, Vatican, and the "Immaculate Conception," in Trinità de' Monti. In 1830 he was appointed director of the Städel Institute at Frankfort. To this period belong the portraits of Charlemagne, Otho the Great, Frederick II, and Henry VII, for the Romer, and the great triptych in fresco, "Introduction of the Arts into Germany through Christianity," with "Italia" and "Germania" (1836, Städel Institute). In 1834 Veit resigned his position and in 1853 was called to Mainz as director of the gallery. To this period belong the "Two Marys at the Sepulchre"; the water-color "Frederick William of Prussia Awaiting the Last Judgment" (Berlin Gallery); the "Assumption" (1846, in the Liebfrauenkirche, Frankfort); and the cartoons for a cycle from sacred history for the cathedral at Mainz, subsequently executed by his pupils. Veit was less ascetic and possessed a stronger sense of color than his fellow Nazarenes, but remained all his life true to their principles. Consult Spahn, *Philipp Veit* (Bielefeld, 1901).

VEITCH, vēch, JOHN (1829–94). A Scottish philosopher and author, born in Peebles and educated at the University of Edinburgh. He served as professor of logic, rhetoric, and metaphysics at St. Andrews (1860–64), and as professor of logic and rhetoric at Glasgow from 1864 till his death. Among his works pertaining to philosophy are the *Memoir of Dugald Stewart* (1857); *Memoir of Sir William Hamilton* (1869); *Knowing and Being* (1889); and *Dualism and Monism* (ed. by R. M. Wenley, 1895). To general literature he contributed the excellent *Feeling for Nature in Scottish Poetry* (1887) and the still more valuable *History and Poetry of the Scottish Border* (1893). After his death his widow prepared for the press *Border Essays* (1896). Consult the *Memoir* by Mary R. L. Bryce (Edinburgh, 1896).

VEJER DE LA FRONTERA, vā-hĕr' dā lä frōn-tā'rä. A town of the Province of Cadiz, Spain, on the right bank of the river Barbate, 28 miles southeast of Cadiz, and 5 miles east of Cape Trafalgar (Map: Spain, B 4). The surrounding country is covered with orchards and orange groves. Pop., 1900, 11,309; 1910, 13,388.

VELA, vā'lä, VINCENZO (1820–91). An Italian sculptor, born in Ligornetto, Canton of Ticino, Switzerland. He studied under Sabatelli and Cacciatore at Milan, and was strongly influenced by Bartolini. In 1838 he took the first prize for sculpture at Venice, and at the Milan exhibition in 1851 gained immediate fame with his "Spartacus," now in St. Petersburg. In 1852 he became professor in the Academy of Turin, where he produced most of his important works, including many lifelike statues of prominent personages, such as Carlo Alberto (Royal Palace, Turin) and Cavour (Exchange Genoa); and harmoniously conceived ideal figures, of which the best known are "Harmony in Tears" (1855), for the tomb of Donizetti in Santa Maria Maggiore, Bergamo; "France and Italy"; "Primavera"; "Columbus and America," a colossal bronze group at Vera Cruz, Mexico; and "Desolation" (Lugano). His masterpiece is the "Dying Napoleon," at Versailles (replica in the Corcoran Gallery, Washington). Among his latest works is the Zolaistic relief "Victims of Toil" (National Gallery, Rome). Vela was one of the principal representatives of the Realistic school in Italy during the nineteenth century. Consult the monograph by Manzoni (Milan, 1906).

VELA'BRUM. A low, marshy district of ancient Rome between the Palatine and Capitoline Hills, reaching from the Vicus Tuscus to the Forum Boarium.

VELÁZQUEZ, or **VELÁSQUEZ,** vā-läs'kāth, DIEGO (c 1460–c.1522). A governor of Cuba, born in Cuéllar, Spain. He accompanied Columbus on his second voyage, and later participated in the conquest of Hispaniola. In 1511 Diego Columbus, Governor of Hispaniola, sent him with a force of 300 men to conquer Cuba. This, with the assistance of reinforcements brought by Pánfilo de Narváez (q.v.), he easily accomplished, and then threw off the authority of Diego Columbus. He founded Baracoa, Báyamo, Trinidad, Puerto Príncipe, Santiago de Cuba, Havana, and other places. In 1517 a slave-catching expedition which went out with his approval discovered Yucatan. In the following year Velázquez sent out an expedition under Juan de Grijalva, and when this commander brought back word of the riches of Mexico, he sent out the expedition under Hernando Cortés. Before Cortés sailed, Velázquez, fearing that he might prove too independent, revoked his commission, but Cortés disregarded his authority and went to Mexico. Velázquez later sent the force under Narváez to seize Cortés, but Cortés captured Narváez. Velázquez died shortly afterward, in 1522 or 1523, as a result, it is said, of vexation over the loss of his riches.

VELAZQUEZ (VELASQUEZ), DIEGO RODRÍGUEZ DE SILVA Y (1599–1660). The chief painter of the Spanish school, one of the greatest masters of all times. He was born at Seville, June 5, 1599, the son of Juan Rodríguez de Silva, of Portuguese descent, and of Doña Gerónima Velazquez, both of the petty nobility (hidalgos). After attending school till his thirteenth year he was apprenticed to the painter Herrera, but, unable to endure that master's ferocious temper, he left him after a year to study with Pacheco. From the former he acquired little besides a taste for genre subjects and a tendency towards naturalism, but with the latter he remained five years. Although a poor painter, Pacheco was an excellent teacher, and the influence of his sound precepts may be seen in the wonderful sureness of Velazquez's drawing and the thoroughness of his work.

The earliest works of Velazquez are in the style of the Spanish Naturalists, and yield no evidence of the prevalent Italian influence. They show a sombre color scheme, vivid contrasts of light and shadow, sure but hard outlines, and trenchant Naturalistic characterization. With the exception of the single portrait of an unknown man in the Prado, Madrid, such as survive are genre and religious subjects, and the principal are the "Water Carrier of Seville" (Apsley House, London); "The Musicians" (Berlin); "Breakfast" (Hermitage, St. Petersburg); "Old Woman Cooking Eggs" (Sir Francis Cooke); "Adoration of the Magi" (Prado, Madrid); "Christ in the House of Martha" (National Gallery, London).

In 1618 Velazquez married Pacheco's (q.v.) daughter, and in 1622 he went for the first time to Madrid. Although he did not succeed at first in obtaining the royal patronage, he made the friendship of the Sevillian, Fonseca, Gentleman Usher to the King. His portrait of Fonseca won him the favor of Philip's all-powerful Min

ister, the Count-Duke Olivarez, who, in 1623, summoned him to Madrid to portray the King. His success was such that he was appointed court painter, with the exclusive privilege of portraying the King, and given a pension and a studio in the Alcâzar. His success was insured by his brilliant victory in a competition with the three Italian painters in the King's service, the subject being "The Expulsion of the Moriscos" (1627), destroyed by fire.

From now on the life of Velazquez was spent in the service of the King. Most of the early portraits of his great patron, Olivarez, have disappeared. One is preserved in the well-known plate of Paul Pontius, with emblematic design by Rubens, and there is a full length in Dorchester House The earliest surviving portrait of Philip IV is probably the bust (a study for the full-length portrait executed in 1623) in the Prado Museum. The full-length portrait of Don Carlos, Philip's brother (Prado), the finest of this period, was executed in 1627.

The visit of Rubens as ambassador of Isabella, Regent of the Netherlands, to Madrid in 1628, was not without influence upon Velazquez, for it was through Rubens's advice and intercession with the King that he obtained the coveted leave to visit Italy. Before his departure (1629) Velazquez executed the masterpiece of his early manner, the subject of which may betray Flemish influence, though this is not evident in the execution. In "Los Borrachos" (The Topers) (Prado, Madrid), more properly entitled "Bacchus," the wine god sits on a cask amidst a band of weather-beaten drinkers, crowning a soldier of the party with vine leaves His figure is a wonderful example of the artist's treatment of the nude, while the expression and animation on the faces of the topers perhaps surpass anything else in this particular genre.

After a short stay in Venice, where he admired Titian and copied Tintoretto, he visited Ferrara, and in 1630 made Rome his headquarters. The Spanish Ambassador leased for him the Villa Medici, to which he was attracted by the antique statuary; delightful mementos of his own stay there are the two sketches of the Medici gardens (Prado). At Rome he learned the art of uniting harmoniously all the elements of a picture. The influence of Guido Reni and his school is evident in his chief picture of the period, the "Forge of Vulcan" (Prado), which shows great advance over his previous treatment of the nude in the five fine figures of the smithy, among whom Vulcan listens with indignant amazement to Apollo's account of his wife's follies. To the same period belongs probably the fine youthful portrait of himself in the Capitoline Museum, executed with a few masterly brush strokes. In 1630 Velazquez was summoned to Naples to portray the King's favorite sister, the Infanta María (Prado), who was about to become Queen of Hungary. While there, he probably met his compatriot Ribera, head of the Italian Naturalists.

For the next 18 years (1631–49) he remained in constant attendance on the King and was in the strictest sense a court painter. Philip IV was a mighty hunter; Velazquez portrayed him in a hunting costume, fowling piece in hand, with his favorite dog, as he did also his brother, the Cardinal-Prince Ferdinand, and Don Balthasar, his little son and heir, with two splendid dogs—all in the Prado Museum. No one painted dogs better than Velazquez. The "Boar Hunt" (National Gallery) and the "Stag Hunt" (Prado) show with admirable realism and fine landscape effect how such courtly pageants—for they were nothing more—were conducted.

To the fact that both the King and Olivarez were excellent horsemen we owe Velazquez's splendid series of equestrian portraits. No one could paint a horse better than he. It was always the heavy Andalusian breed, seemingly round and clumsy, but in reality as swift as they were strong. These are his most celebrated portraits. In the portrait of Philip IV (1635) the King and his horse move as one being in the impressive Castilian uplands. The Queen's horse moves with measured, stately tread, while Prince Balthasar gallops across the plain on his chestnut pony in the fresh spring morning. His green velvet jacket and his gold embroidered red scarf are fine bits of color in the green landscape, and the pony is foreshortened with such consummate skill as to present the outlines of a ball. Fourth in the great series is Olivarez, in shining armor, charging at full speed at the head of a troop of cavalry. Here, too, there is fine foreshortening—the horse gallops from us and we see the Duke's head over his shoulder. All of these august personages were of course painted many other times—the little Prince in his riding school (two copies in England) and as a suitor (Vienna and Buckingham Palace). During the King's military expedition to Aragon (1644) Velazquez painted him in brave military array, the gay colors of which form a pleasing contrast to the usual sombre hues of his costume.

Among other famous portraits of the middle period are those of "An Unknown Man" (Apsley House, London), the sculptor Martinez Montañez (Prado), the Duke of Modena (Modena Gallery), Don Antonio Pimentel (Prado), and Don Diego del Corral (Prado). Although he portrayed women less often than men, he did it with rare charm, as may be seen in the supposed portrait of Doña Juana Pacheco (Prado), a true Spanish type, and the "Lady with a Fan" (Wallace collection, London).

By superintending the decoration, Velazquez was of great assistance to Olivarez in the construction of Buen Retiro, a county seat designed to surprise the King. For it he painted his principal historical and perhaps most celebrated picture, the "Surrender of Breda," more widely known under the name of "Las Lanzas" (1639–41, Prado), the most decorative of all his works and unusually bright in color. The subject, an incident in the war against the Netherlands, furnished the occasion for an admirable contrast between the Germanic and Latin races from the point of view of the latter. Of the two religious pictures belonging to this period, the remarkable "Crucifixion" (Prado) depicts the youthful and symmetrical body of Christ upon the cross, in the midst of black space, but without any attempt to render the agony, which forms the chief theme of his "Christ at the Column" (National Gallery, London). The supposed influence of Tintoretto upon his work during this period is in reality to be ascribed to El Greco. This appears in his cool color schemes, use of silvery grays and carmines, and even the occasionally elongated form of the head and figure. Of the landscapes in the Prado attributed to him the "View of Saragossa," though touched up considerably by Velazquez, and the "Fortunes of Pamplona" are probably by his son-in-law Mazo.



VELAZQUEZ
"ÆSOP," FROM THE ORIGINAL IN THE PRADO MUSEUM, MADRID

On the fall of Olivarez, in 1643, Velazquez continued to portray and honor him, notwithstanding the general execrations. Nor did he lose the King's favor on this account, but as director of the partial reconstruction of the Alcázar he received the coveted leave to revisit Italy in 1649. Most of his time was occupied with his task of buying paintings and statuary for the new apartments; but while in Rome he found time for two magnificent portraits—one of his slave, the mestizo Juan de Pareja (Earl of Radnor), a preparatory exercise for his portrait of Pope Innocent X in the Doria Gallery, Rome. One of his supreme masterpieces, it seems molded by a broad and masterly brush rather than painted, and it foreshadowed his third style, characterized by maximum effect with minimum effort, perfection of naturalism, and light effects to the point of optical illusion A powerful study is in the Hermitage, St Petersburg, and there are doubtful versions in the Gardner collection, Boston, and Apsley House, London

Soon after his return to Spain, in June, 1651, Velazquez was appointed aposentador mayor (marshal of the palace), with a yearly salary of 3000 ducats and quarters in the Alcázar The position involved the grave responsibility of looking after the quarters of the royal family at home and on its numerous journeys He had long administered the royal galleries, which owed their chief attractiveness to him In 1659 he received the cross of Santiago, the highest honor attainable by a Spanish nobleman. As aposentador he arranged the Spanish part of the gorgeous festivities at the marriage by proxy of Philip's sister to young Louis XIV of France, on the Isle of Pheasants in the river Bidassoa, on the northern boundary of Spain. His exertions and responsibilities in this connection resulted in a fever, of which he died after his return to Madrid, Aug. 6, 1660. He was noble and courteous in manner, kind and generous in disposition, and loved by all. Among his pupils, the chief were his son-in-law Juan Bautista del Mazo, who succeeded him as painter to the King; Juan de Pareja, a former slave, José Leonardo, a more gifted pupil; Carreño de Miranda.

Among the many portraits of Velazquez's last period are those of Philip's last queen, Marianna of Austria (Prado and Vienna), in the absurd court costume of the day; the little Infanta Margarita (Louvre and Vienna); and Philip IV in his old age (Prado, National Gallery, etc.). The so-called "Las Meninas" (Prado) represents Margarita and her maids of honor being painted by Velazquez. The artist also appears in the so-called "Family of Mazo," a group of nine persons. "Las Hilanderas" (the Spinners, Prado) represents a scene in the royal tapestry manufactory with such consummate treatment of light and atmosphere, that, according to the painter Raphael Mengs, "it was not painted by the hand, but by pure force of the will" To this period also belong most of the portraits of the court fools, dwarfs, imbeciles, etc. (Prado), in which the painter has achieved an apotheosis of the ugly. Such are the jesters, known as "Barbarossa," "Don Juan de Austria," and "Pablillos de Valladolid"; the dwarfs, Sebastian de Morra and "El Primo"; the idiots, "El Bobo de Coria" and "El Niño de Vallegas." Perhaps in the same category belong two old beggars, whom the artist has dubbed "Æsop" and "Menippus"—wonderful examples of a broad treatment. Velazquez also attempted mythological subjects, among which were a rather unsuccessful "Mars" (Prado), the imaginative "Mercury and Argus" (Prado), and the beautiful and important "Venus with a Mirror" (National Gallery, London) Near the close of his life he painted two fine religious pieces (Prado): the dignified and noble "Coronation of the Virgin," in which, of all his works, the Italian influence is most predominant, and "The Anchorites," probably his last work, representing two gray-beards, Saints Anthony and Paul the Hermit, in a desolate landscape of sublime grandeur

In the public collection of the United States Velazquez is represented in the Hispanic Society of America by portraits of Olivarez, Cardinal Pamfili, and a young girl, supposed to be the artist's granddaughter, all excellent examples, in the Metropolitan Museum, New York, "Christ and the Pilgrims of Emmaus" (an early work) and Philip IV of Spain (both in the Altman collection), and the Infanta María Teresa (Morgan collection); in the Boston Museum by "Don Baltazar Carlos and his Dwarf," and a doubtful Philip IV He is also represented in several private collections including the Gardner collection, Boston, the Frick collection, New York, and the Widener collection, Philadelphia.

When the portrait of Juan Pareja was exhibited in the Pantheon at Rome, it was the general opinion of painters that "all else seemed painting, this alone truth." The work of Velazquez could not be better characterized, for it was perhaps the most consummate naturalism the world has ever seen. He made no imaginative effort, nor did he ever attempt to render a mental image, but painted only what he saw. He is the most objective of painters; the subject itself tells the whole story. This wonderful naturalism was achieved by his mastery of light, shadow, and atmosphere. In the purely technical qualities of painting he has never been surpassed, if, indeed, he has ever been equaled. His draftsmanship was firm, his modeling delicate, and he possessed a good knowledge of form. His subdued color scheme enabled him to use occasional patches of bright color with telling effect, and no man has ever rendered values more exactly. His brush was light and sure, never a stroke too many or too few. Small wonder, then, that he has been termed the painter's painter, "le peintre le plus peintre qui fût jamais," as Bürger puts it. His influence on the realistic and especially the impressionistic painting of the nineteenth century was wholesome and profound

Bibliography. The chief historical sources for the life of Velazquez, besides the original documents, are his father-in-law's (Pacheco) *Arte de la pintura* (Seville, 1649); Palormino, *Museo pictórico* (Madrid, 1724; Eng. trans., 1739); and Bermúdez, *Diccionario* (Madrid, 1800). By far the best of the earlier works on Velazquez, and still authoritative on historical points, is that of Carl Justi, *Velazquez und sein Jahrhundert* (2 vols., Bonn, 1888; Eng. trans., London, 1889) The conceded authority on Velazquez is the painter A. de Beruete, whose monograph (London, 1906) is the best from a critical point of view. Consult also: Sir Walter Armstrong, *The Art of Velasquez*, and id., *The Life of Velasquez*, in "Portfolio Artistic Monographs," Nos. 28, 29 (New York, 1896); *Masters in Art*, vol. i (Boston, 1900), containing a bibliography; H. Stokes, *Velazquez and his Works* (London, 1902); R. A M. Stevenson,

Velasquez, in "Great Masters in Painting and Sculpture" (ib., 1902), John La Farge, "Velasquez," in "Great Masters" (New York, 1903); Richard Muther, "Velasquez," in *Die Kunst*, vol. xxiii (Stuttgart, 1905), Walther Gensel, "Velazquez," in *Klassiker der Kunst*, vol. vi (ib., 1905); Hermann Knackfuss, "Velazquez," in *Kunstler-Monographien*, vol. vi (Bielefeld, 1905); C L. Hind, *Days with Velasquez* (New York, 1906); Calvert and Gallichan, *Velazquez* (ib., 1908); Aman-Jean, *Velazquez* (Paris, 1913); Randall Davies, *Velasquez* (London, 1914)

VELBERT, fĕl'bĕrt. A manufacturing town in the Rhine Province, Prussia, situated on a rocky elevation 15 miles northeast of Düsseldorf. Small iron and brass wares are produced, and cast iron articles and brick are shipped out. Pop, 1900, 16,689; 1910, 23,134.

VELDE, vĕl'de, VAN DE. A celebrated family of Dutch artists—ESAIAS (1590–1630), born at Amsterdam, lived chiefly at Haarlem, and painted landscapes with figures, a favorite subject being attacks and combats of brigands—JAN (c.1595–1652), probably his brother, was an engraver and etcher, a pupil of Matham, and a member of the Painters' Guild of Haarlem.—WILLEM the Elder (c.1611–93) was a marine painter, born at Leyden and chiefly active at Amsterdam. He was appointed by the States-General to sail with De Ruyter's fleet to commemorate the victories over the English. In 1675 he removed to London, having been appointed marine painter to Charles II, and afterward to James II. The Museum of Amsterdam and the gallery of Hampton Court are richest in his works.—His son and pupil, WILLEM the Younger (1633–1707), born at Amsterdam, was probably the foremost marine painter of the Dutch school. He studied also under Simon de Vlieger and, accompanying the Dutch fleets, created his best works in portraying their victories over the English. From 1679 until his death he lived in England. His pictures are perfectly executed, the tone is usually silver and gray, and a fine harmony pervades them. The English galleries and the Museum of Amsterdam are especially rich in his works, the latter possessing the "Cannon Shot." Thousands of his drawings survive, the Museum of Rotterdam alone possessing over 600.—ADRIAEN (1635–72), youngest son of Willem the Elder, was one of the principal animal and landscape painters of Holland. He was a pupil of his father and of Jan Wynants and was influenced by Potter and Wouverman. A little of the Italian influence is evident in his work. The figures in his landscapes are painted with great finesse, and he succeeded especially well in composition, and in the subtle gradation of neutral tints. Above 200 of his pictures survive. He was also one of the best etchers of the Dutch school. Consult: Franken and Van der Kellen, *L'Œuvre de Jan de Velde* (Amsterdam, 1883); Michel, *Les Van de Velde* (Paris, 1892); Wilhelm Bode, *Great Masters of Dutch and Flemish Painting* (New York, 1909); C. Hofstede de Groot, *Catalogue Raisonné of the Works of the Most Eminent Dutch Painters of the Seventeenth Century*, vol. iv (Eng. trans., New York, 1912).

VELDEKE, fĕl'de-ke, HEINRICH VON. A German poet of the twelfth century, whose home was near Maestricht, on the Lower Rhine. He is known as the father of Middle High German courtly poetry, for though he wrote in his native dialect, which had an excellent standing with the educated, his verses, with the exception of *Servatius*, were rewritten in the former idiom. The *Servatius* (Bormann's edition, Maestricht, 1858) is a weak rendering of the legend of St. Servatius. A more important work was the *Eneide* (editions: Ettmuller, Leipzig, 1852; Behaghel, Helbronn, 1882), rather closely following the French poem of Benoît de Sainte-More. He wrote also *Von Salomo und der Minne*. But it is from his lyrics that we learn his character. He took the last step in the introduction of pure rhyme into German poetry. Consult: Foa, *Enrico di Veldeke e la sua Eneide* (Parma, 1892); Kraus, *H. von Veldeke und die mittelhochdeutsche Dichtersprache* (Halle, 1899); and Scherer, *Deutsche Studien*, vol. ii, p. 71.

VÉLEZ, vā'lās. A town of the Department of Santander, Colombia, 103 miles north of Bogotá (Map. Colombia, C 2). It produces a wide variety of fruits and is noted for its manufacture of sweetmeats and preserves It is difficult of access and this fact made it of importance, as a place of refuge, during its early history. It was the second city founded in New Granada, dating from 1539. In the vicinity are many natural curiosities. Pop., 1912, 8637

VÉLEZ DE GUEVARA, vā'lāth dā gā-vā'rā, LUÍS (1579–1644). A Spanish lawyer, poet, dramatist, and novelist, born at Ecija, in the Province of Seville. He owed his position in the King's favor to the brilliance and wit with which he conducted his cases. He was long a member of the literary coterie of Philip IV, and became Court Chamberlain. Of his 400 plays (written in the style usual in Spain's Golden Age) the names of only some 80 survive. The best are two tragedies *Más pesa el Rey que la sangre* and *Reinar despues de morir* (perhaps the best ever written concerning the two heroic legends of which they treat), and the comedy *La luna de la sierra* Guevara's most remarkable work, however, is the satirical novel *El diablo cojuelo* (1641), which served as the germinal idea for Lesage's *Diable boiteux*. Consult the edition by Adolfo Bonilla y San Martín, vol. ii of the *Sociedad de Bibliófilos Madrileños* (Madrid, 1910); Th. G. Ahrens, *Zur Charakteristik des spanischen Dramas im Anfang des XVII Jahrhunderts* (Halle, 1911).

VÉLEZ-MÁLAGA, vā'lāth-mā'lā-gā. A town of the Province of Malaga, Spain, 40 miles southwest of the city of Granada, on the left bank of the river Vélez (Map: Spain, C 4). The town is irregularly built on account of its uneven surface. The ancient Church of San Pedro is its most famous structure. The harbor is well protected and has an excellent anchorage. Raisins form an especial article of export, and the oil produced here has a ready sale in foreign markets. Municipal pop., 1900, 23,492; 1910, 24,140 Vélez-Málaga, called the key of Andalusia, was captured by Ferdinand the Catholic in 1487.

VELIGER (Lat., sail bearing). The free-swimming larval stage through which gastropod mollusks pass. The veliger is so called from two sail-like flaps (*velum*) on each side of the head, by means of which they move or rotate through the water. Each circular flap is edged with coarse cilia, by whose movements the larva is propelled. See MOLLUSCA.

VELIZH, vă-lyēzh'. A district town in the

Government of Vitebsk, Russia, situated on the Duna, 54 miles northeast of Vitebsk (Map: Russia, D 3). It manufactures brick, pottery, and leather. Pop, 1910, 15,778

VELLA, vĕl'la, GIUSEPPE (c.1750–1820). Chaplain of the Order of St. John of Jerusalem, known chiefly by his literary forgeries. He was born on the island of Malta. In 1782 he met at Palermo the Ambassador from Morocco to the court of Ferdinand I, Muhammed ibn Uthman, and accompanied him to the convent of San Martino. Having learned from Luigi Moncada that it was commonly believed in Sicily that there was an Arabic work of great importance in the convent library, Vella stated, after Muhammed's departure, that the visitor from Africa had found this work, containing a correspondence between the Arabic governors in Sicily and their sovereigns in Africa. Subsequently he announced that he had been in correspondence with Muhammed ibn Uthman, who had told him of a second manuscript, like the one in San Martino, which had been found at Fez, and later still had reported the discovery of another manuscript and a number of medallions corroborating the historical statements. Vella found a patron in Alfonso Airoldi, Archbishop of Heraclea (Torre di Capo Bianco), and judge of the apostolic legation and the Kingdom of Sicily. Under his auspices there appeared between 1789 and 1792 six volumes of the *Codice diplomatico di Sicilia sotto il governo degli Arabi*. To the alleged translation by Vella, Airoldi added an extensive introduction and notes. When doubts were expressed as to the authenticity of the original text, Vella published at Palermo in 1793 the first volume of the pretended manuscript, with the Italian translation, under the title *Kitab dwan Misr* or *Libro del consiglio d'Egitto*. King Ferdinand I paid the expenses. Simone Assemani (q.v) and Joseph Hager detected the imposture, and Vella himself finally confessed the forgery. He was sentenced in 1796 to 15 years in prison. Silvestre de Sacy has given an account of this extraordinary case in *Magasin encyclopédique*, V, tome 6, pp. 330–356; VI, tome 5, pp. 328–339.

VELLEIUS PATERCULUS, GAIUS. See PATERCULUS, G. V.

VELLETRI, vĕl-lā'trē. A city in the Province of Rome, Italy, situated on the slope of the Alban Hills, 26 miles by rail southeast of Rome (Map· Italy, D 4). The chief features include the seventeenth-century Cathedral of San Clemente, the see of a Cardinal-Bishop, the interior of the Palazzo Ginatti, and the public library with 36,000 volumes. An excellent quality of wine is produced here. Pop. (commune), 1901, 19,574; 1911, 21,843 (town, 19,834). Velletri, the Volscian *Velitræ*, was captured by the Romans in 338 B.C.

VELLORE, vĕl-lōr'. A city and military cantonment in the North Arcot district, Madras, British India, 80 miles west by south of the city of Madras, on the Palar River, here spanned by a handsome bridge (Map: India, D 7). One of the Hindu temples is noted for its magnificent sculptures and carvings. The eleventh-century fort is of considerable historic note, the mausoleums containing the remains of the family of Tippu Sahib. There is also an American mission college. The manufacture of perfumery is the leading industry. Pop., 1901, 43,537; 1911, 45,863.

VELLUM. See PARCHMENT AND VELLUM.

VELOCIPEDE. See BICYCLE.

VELOCITY (Lat. *velocitas*, from *velox*, swift; connected with *volare*, to fly), LINEAR A term used in mechanics (q v) to express linear speed in a particular direction, linear speed being the distance a particle goes in a unit of time if the motion is uniform, or the distance it would go in the next unit of time if during that time its motion were not to change A particle moving northward with a speed 10 is said to have a velocity 10, north A linear velocity has evidently the same properties as a straight line of definite length drawn in a definite direction, viz, direction and numerical value; therefore, a velocity is a vector quantity and can be pictured by such a line. (See VECTOR.) Angular velocity is angular speed around a particular axis, angular speed being the angle rotated through by a body turning on an axis in a unit of time if the angular motion is uniform; or, if the motion is irregular, the angle which would be turned through in the next unit of time if the motion were to remain unchanged for that length of time. To express the angular velocity of a body three things are necessary: a line to coincide with the axis, this line to be pointed in such a direction as to indicate the sense of the rotation—right or left handed—and the line to have a length equal or proportional to the angular speed. A straight line like this, of a definite length, direction and position, is called a rotor or a localized vector.

VELOCITY OF LIGHT. This quantity through the efforts of many experimenters has been determined with a high degree of precision and plays an important part in both theoretical and practical optics and astronomy. The values obtained by various experimenters are given in the following table:

	Kilometers per second
Foucault, 1862	298,000
Cornu (1), 1874	298,500
" (2), 1878	300,400
Cornu, discussed by Listing	299,990
Young and Forbes, 1880–81	301,382
Michelson (1)	299,910
" (2)	299,853
Newcomb (selected results)	299,860
" (all results)	299,810

A detailed description of the methods will be found in the article LIGHT in the paragraph on *Velocity of Light*. Consult: Cornu, in *Reports of International Congress of Physics* (Paris, 1900); Thomas Preston, *Theory of Light* (3d ed, London, 1901); and A. A. Michelson, "The Velocity of Light," in *Decennial Publications University of Chicago*, vol. ix (Chicago, 1902).

VELOCITY OF PROJECTILES, ETC. See BALLISTICS.

VELPEAU, vĕl'pō', ALFRED ARMAND LOUIS MARIE (1795–1867). A French surgeon. Born at Brèche (Indre et Loire), he studied medicine at Tours and Paris (M.D., 1823) and settled in the French capital. There he was connected with several hospitals, and was professor of clinical surgery in the Faculty of Medicine (1834–67). In 1842 he became a member of the Institute. Although he made no great discoveries in surgery, he gained a lasting influence as writer and teacher. His principal works are: *Traité d'anatomie chirurgicale* (1825); *Traité complet de l'art des accouchements* (1829; 2d ed., 1835; Eng. trans., Philadelphia, 1831); *Nouveaux éléments de médecine opératoire* (1832; 2d ed., 1839; Eng. trans., 1847); *Traité des maladies du*

sein (1853; 2d ed., 1858), based upon a personal experience covering 2000 observations.

VELVET (It *velluto*, Fr. *velours*, Ger. *Sammt*) Velvet, like damask, is primarily a silk weave developed on the shuttle loom in China (See SILK.) The pile surface is formed by an extra set of warp threads looped over wires, so that the loops rise in relief. When the pile is to be a cut pile the wires have a knife at the end which cuts the loops as it is withdrawn Plain velvets have a uniform surface of cut pile of solid color. The more elaborate figured velvets can be profitably made only on hand looms. Many of them have pile figures that contrast boldly with flat satin, twill, or taffeta ground. Some of the early Venetian velvets had figures still further elaborated by cutting the pile two different heights. The Genoese velvets were distinguished for contrasts of cut with uncut pile Plain velvets are often woven double on the machine loom, without wires, the pile being formed by special warps that pass back and forth between the upper and the lower parts of a double cloth. The cutting of this common pile produces two velvets with a minimum of effort, and some of these double-woven velvets, by a process originated and developed in America, have figures produced by bringing only part of the pile warps to the surface in the ground The result is a two-tone velvet, suggesting damask as closely as a cut-pile surface can suggest a flat surface. Velvets are also figured by printing and embossing after the fabric leaves the loom. See PLUSH.

VELVET ANT. Any one of the hymenopterous insects of the family Multillidæ. They resemble the true ants in general shape, but lack the scale on the peduncle of the abdomen. They do not form communities and are more closely allied to digger wasps than to ants. The body is often clothed with hairs, hence the name velvet The hair is frequently bright colored, in some species red, contrasted with black The males only are winged. There are about 160 North American species, most numerous in the South, the largest of which is the Texan horse ant, or cow killer; it burrows in the ground and provisions its tunnels with insects. Velvet ants sometimes enter bee hives and do considerable damage Other species have been found in Europe in the nests of bumblebees, and in the United States in the nests of certain burrowing bees. Probably all the velvet ants are parasitic in this way. Many of the females stridulate. These insects sting viciously. See HORSE ANT.

VELVET BEAN. *Stizolobium deringianum* and several allied species, important annual leguminous plants extensively grown in Florida and the Gulf States, as well as in many tropical countries for forage, as cover crops, and for soil improvement. The Florida velvet bean, which is the best known, is a rapidly growing long-season vine with numerous purple flowers which are succeeded by black velvety pods, 2 to 4 inches long, each containing two to five marbled or speckled seeds. There are a number of other species which have pubescent but not black velvety pods. They differ also in the color of the beans and length of growing season. Formerly the velvet beans were included in the genus *Mucuna*, the species of which have woody perennial stems.

VELVET GRASS. See SOFT GRASS.

VELVETLEAF. See CISSAMPELOS; SIDA.

VENABLE, vĕn'a-b'l, FRANCIS PRESTON (1856–). An American chemist and educator, born in Prince Edward Co., Va. He graduated at the University of Virginia in 1879; studied at Bonn, and at Göttingen (Ph.D., 1881), and in 1880–1900 was professor of chemistry at the University of North Carolina. This institution he served as president from 1900 to 1915, when he resumed his work as a professor Venable was president of the American Chemical Society in 1905. His larger works include: *Manual of Qualitative Analysis* (1883); *Short History of Chemistry* (1894); *Development of Periodic Law* (1896); *Inorganic Chemistry According to Periodic Law* (1898), with J. L Howe; *Study of the Atom* (1904)

VENA'TIO. See CIRCUS; GLADIATOR.

VENA'TION (from Lat *vena*, leaf). The arrangement of veins in foliage leaves. The venation is very important in determining the general contour and margin of the leaf, and it is so consistently developed in different groups that it furnishes important characters in classification. See LEAF.

VENDÉE, vän'dā'. A department of west France, forming a part of the former Province of Poitou, and lying on the Bay of Biscay (Map: France, N., D 6). Area, 2690 square miles The surface is low and marshy along the coast, becoming hilly and wooded in the east. The department is essentially agricultural, though considerable quantities of coal and salt are produced. Nearly the whole area is arable, though much is in pasture land, and large numbers of cattle are raised. The normal wheat crop amounts to over $7,000,000 annually, and the production of oats, potatoes, and beets as well as of wine is also considerable. Pop., 1901, 441,-311; 1911, 438,520. Capital, La Roche-sur-Yon.

During the French Revolution the Vendée and the neighboring regions (Poitou, Anjou, Brittany) were the scene of a great Royalist uprising of the peasants, who were actuated in part by religious motives. The immediate cause of the insurrection, which broke out in March, 1793, was the proposed levy of 300,000 men by the Revolutionary government The war was characterized by frightful massacres; villages were ravaged and burned, and prisoners tortured and killed. The officers sent by the Convention were wholly incompetent and there was a lack of unity of action and definite plans, with the result that the Vendeans under Cathelineau, Larochejacquelein, and Charette de la Contrie (qq.v.) were at first almost universally successful. In the fall of 1793, however, a more vigorous campaign was inaugurated on the part of the government. The Vendeans suffered a great defeat at Le Mans on December 12 at the hands of Westermann and Marceau, and a few days later sustained another blow at Savenay. The backbone of the insurrection was broken. Frightful atrocities were perpetrated at Nantes by the orders of Carrier, the deputy of the Convention (see CARRIER, J. B.), and Turreau with his "infernal columns" laid waste the rebellious districts. Charette and other Vendean leaders made terms with the Convention in 1795. The war was, however, soon renewed, but order was finally restored by Hoche in 1796, although the complete pacification of the region was not effected until several years later. (See CHOUANS.) In 1815, during the Hundred Days, there was a Vendean insurrection against Napoleon, and in 1832 an abortive attempt was made to excite a rising in favor of the Duchess of Berry.

VENDÉMIAIRE, vaN'dā'myâr' (Fr, from Lat. *vindemia*, vintage, from *vinum*, wine + *demere*, to remove, from *de*, down, away + *emere*, to take, buy) The first month in the French revolutionary calendar. It ran from September 22 to October 21 in the years I–III and V–VII, from September 23 to October 22 in the years IV, VIII–XI, XIII, and XIV, and from September 24 to October 23 in the year XII.

VENDET'TA (It, feud, vengeance). A family feud, having for its object blood revenge for an injury by the nearest of kin. The next of kin of the dead assume responsibility for punishment, but if the offender escapes, his nearest relatives are held responsible. Families have been in a state of siege often for years The vendetta is held by the Corsican to be one of the most positive of family obligations Sometimes the feuds are harmonized by mediators (*paolanti*) and an oath is taken to forego vengeance. Private wars for blood revenge have characterized barbarism and the early stages of civilization among many peoples, but, owing to the isolation of Corsica and its peculiarly primitive social conditions, the practice has survived there in its completeness. An analogous custom is found among mountaineers of eastern Kentucky and Tennessee and western Virginia, who have reverted to many primitive customs under the influence of isolation In Montenegro and among the Albanians, Bedouins, Druses, and many less civilized peoples this is found in a greater or lesser degree. The vendetta seems to have its origin in the idea of clan or tribal responsibility and patriarchal rule, preceding the development of the state and of a system of public justice. See AVENGER OF BLOOD; BLOOD FEUD.

VENDÔME, väN'dôm'. The capital of the arrondissement of Vendôme, in the Department of Loir-et-Cher, France, on the right bank of the Loir, 20 miles northwest of Blois (Map: France, N., G 5). The town is attractive for its charming specimens of architecture. The church of the Trinity (12th–15th century) has a remarkable transition belfry and a fine Flamboyant façade The ruins of the Renaissance abbey (1030) to which it belonged lie near La Madeleine has a stained-glass window (1529) and a handsome spire. On the left bank of the Loir are the ruins of the eleventh-century castle of the counts of Vendôme. There are a hôtel de ville, a museum, a library rich in manuscripts, a lyceum with a flamboyant chapel (1623–39), and a bronze statue of the poet Ronsard. The manufactures are gloves, cotton goods, leather, and cheese. Pop., 1901, 9457; 1911, 9804. Christianity was introduced here as early as the fifth century. The Dukedom of Vendôme was created by Francis I for a prince of the Bourbon family in 1515. It finally fell into the hands of Henry IV. He bestowed it on one of his natural sons, who founded the house of Vendôme.

VENDÔME. A noble house of France, founded by César, a son of Henry IV of France, by Gabrielle d'Estrées, who was legitimatized. César, born in 1594, received the Duchy of Vendôme in 1598, and under Louis XIII played a conspicuous part in politics as one of the most inveterate intriguers against Richelieu, suffering, in return, imprisonment and exile. After joining the party of the Fronde against Mazarin, he made his peace with the court and fought against his former friends He became Admiral of France, and in 1655, the year of his death, defeated the Spanish fleet before Barcelona His son Louis (1612–69) became Viceroy of Catalonia, married Laure Mancini, one of the nieces of Mazarin, and after her death, in 1656, entered the Church and rose to be Cardinal Louis left two sons, Louis Joseph, Duke of Vendôme (q.v.), and Philippe (1655–1727), the last of the line The latter entered the Order of the Knights of Malta, and became grand prior. In the wars of Louis XIV he attained the rank of lieutenant general.

VENDÔME, PLACE. A square in Paris, laid out under Louis XIV It has borne the names Place des Conquêtes, Place des Piques, and Place Vendôme (from a former palace of the Duke de Vendôme) In it stands the Vendôme Column, built at the command of Napoleon, in 1806–10, to commemorate his 1805 Russian victories. This column is of masonry, incrusted with bronze plates obtained by melting down 1200 captured cannon. These plates, in a spiral nearly 300 yards in length, picture scenes of that campaign. The column is 142 feet high, and was designed by Denon, Gondouin, and Lepère, after Trajan's Column at Rome In May, 1871, the column was thrown down by the Communists. The fragments, however, were preserved, and in 1875 it was reërected, with slight alteration, upon its original site

VENDÔME, FRANÇOIS DE. See BEAUFORT, DUC DE.

VENDÔME, LOUIS JOSEPH, DUKE DE (1654–1712). A French general, the son of Louis, Duke de Vendôme. He was born in Paris, July 1, 1654, served during the Dutch campaign of 1672, and afterward under Turenne in Germany and Alsace, and under Créqui in Flanders. After the Peace of Nimeguen (1678) he retired to his château of Anet, near Dreux, until the outbreak of war in 1688. He fought under Luxembourg in the Low Countries, and later commanded the left wing of Catinat's army at the battle of Marsaglia (Oct. 4, 1693). In 1695 he was assigned to the head of the army in Catalonia, and achieved a series of brilliant successes, closing with the capture of Barcelona. After the outbreak of the War of the Spanish Succession he succeeded Villeroy in Italy (1702), won the victories of Ustiano and San Vittoria, and compelled the temporary retirement of Prince Eugene. In 1703 he carried on a successful campaign against the Austrians, and in the summer of 1706 he was recalled to supersede Villeroy in the Low Countries. His quarrels with the Duke of Burgundy, who had received a command under him, led to the defeat of the French at Oudenarde (q.v.). After the capitulation of Lille he was recalled. In 1710 Vendôme was sent, at the urgent request of Philip V, to Spain, where the British and Austrians were carrying all before them. His appearance brought together a numerous army of volunteers, and Philip was restored to his capital before the close of the year. Stanhope and the British troops were defeated at Brihuega, December 9, and on the following day Starhemberg and the Austrians were routed at Villaviciosa The King raised his deliverer to the rank of a prince of the blood royal. Vendôme was an excellent soldier and a man of keen intellect, but indolent and grossly immoral. He died at Vinaroz, Catalonia, June 15, 1712. Saint-Simon, in his *Mémoires*, gives a highly

colored and unfriendly picture of the man. Consult also De Bellerive, *Les dernières campagnes de Louis Joseph de Vendôme* (Paris, 1714), and Voltaire, *Le siècle de Louis XIV.*

VENDOR'S LIEN. In the law of real property, the right of the vendor to compel a sale of the property to satisfy the unpaid purchase price, or any balance thereof. This right is of equitable origin and is effective against subsequent purchasers with notice, as well as others who, with either actual or constructive notice of the vendor's rights, acquire an interest in the land The most effective way of giving notice to the public is to begin an action in equity to enforce the lien, and at the same time file a lis pendens (q.v.) against the property. It does not actually become a specific lien against the property until its existence and validity are established by the decree of a court. This lien may be waived by taking security on which a third person is liable, but not by merely taking a note or other obligation of the vendee alone. In code states the common method of enforcing a vendor's claim for unpaid purchase money is by a single action in equity to enforce the lien and incidentally to recover the amount due. In the law of sales of personal property the term is employed to denote the right of a seller of goods and chattels to retain possession thereof until the purchase price is paid, where no credit is given, even though the title has passed to the purchaser. In some states the seller is given the right to sell and apply the proceeds to the payment of the purchase price without further formality. See STOPPAGE IN TRANSITU, LIEN; SALE.

VENEER. Pieces of richly grained or colored wood, often as thin as paper, glued to furniture and woodwork to produce a surface more beautiful than that of the wood forming the frame. Sometimes the veneer is applied in large sheets, as in Empire furniture; sometimes in tiny pieces cunningly fitted together in floral and other decorative forms, as in Dutch and French marquetry. See MARQUETRY.

VENER, LAKE See VÄNER, LAKE.

VENERABLE BEDE. See BEDE.

VENEREAL (vē-nē'rē-*al*) **DISEASE.** See GONORRHŒA; SYPHILIS; HYGIENE, *Military Hygiene.*

VE'NESEC'TION (from Lat. *vena*, blood vessel + *sectio*, a cutting, from *secare*, to cut), PHLEBOTOMY, BLOODLETTING, or BLEEDING. An incision into a vein for the abstraction of blood. Although the operation may be performed on many of the superficial veins, it is usually restricted to the median basilic vein at the bend of the elbow. While venesection was extensively practiced everywhere up to the middle of the nineteenth century, it is now practically obsolete, though there has been a tendency to revive its application in a few diseases and conditions, notably in the first stages of lobar pneumonia. Other conditions benefited by venesection are active congestion with hæmorrhage, especially when occurring in the lungs and brain, i.e., pulmonary and cerebral hæmorrhage. The value of bleeding in eliminating toxins from the blood has been pointed out by Maragliano; and Bouchard has shown that 500 grams of blood abstracted from the vein of a patient suffering from uræmia contains 8 grams of extractive matters—approximately equivalent to the amount thrown off by the kidney in 24 hours. A large amount of blood, 1000 c.c. or more, may be withdrawn, if it is replaced by an infusion of normal saline solution. Consult H. Stern, *Theory and Practice of Bloodletting* (New York, 1915).

VENETIAN (vē-nē'shan) **SCHOOL OF PAINTING.** One of the most important of the Italian schools. It excelled all others in color Bright without being gaudy, always harmonious, and with full allowance for all the subtle effects of light and shade, Venetian color has never been surpassed All other qualities, such as form, ideas, illustration, were subordinated. The Venetian dealt with the beautiful only as it appealed to the eye, with the fullness of material life, with purely pictorial effects. He tended to avoid dramatic action and to portray restful subjects fraught with the joy of living. Even his religious subjects were worldly, the figures being Venetian nobles. He especially delighted in the pageantry of the powerful Venetian state and in mythological representations. He also brought the landscape, though used primarily as a background, to high perfection

The color note in Venetian painting is chiefly due to its Byzantine origin, and was promoted by the gorgeous play of natural color in the island city. Until far into the fifteenth century the Byzantine style of painting with gold backgrounds and stiff hieratic figures prevailed. The first painters to show emancipation were the so-called Vivarini (q.v.) family of Murano. Through the more important family of the Bellini the Paduan influence entered Venetian painting. Giovanni Bellini (1430?–1516) first evolved the essentially Venetian style and trained the succeeding generation Of his pupils, Giorgione (1478–1510) introduced the high Renaissance and Titian (1477–1576) achieved the most perfect flower of Venetian painting. During the sixteenth century, while art declined elsewhere, it produced at Venice such geniuses as Tintoretto and Paul Veronese. It flourished even in the seventeenth century, and during the eighteenth flowered in Tiepolo. From the early sixteenth century Venetian painting dominated the painting of the tributary cities of the mainland, such as Brescia, Bergamo, and Verona. It also influenced practically all other European schools—Spanish and Flemish during the seventeenth century, and English during the eighteenth century through Reynolds. For a more detailed account of the history, see PAINTING, *Renaissance*, the articles on the individual artists mentioned.

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VENEZUELA, vĕn'ē-zwē'lå, *Sp. pron.* vā'nā-thwā'lā *or Amer. Sp. pron.* vā'nā-swā'lā (It., Little Venice, so called from the pile dwellings seen by the early explorers on the Maracaibo). A republic on the north coast of South America. Its area is estimated at 393,976 square miles.

Topography. Venezuela is divided into four topographical regions: (1) the mountainous district of the northwest and north; (2) the Maracaibo region; (3) the *llanos;* and (4) the Guiana highlands. The mountains of the first region may be classed under two great systems,

The first, the Venezuela Andes, starts from the Nido de Pamplona in Colombia and runs northward in two branches. The westernmost, passing directly north, forms the boundary between Colombia and Venezuela and ends in the Goajira Peninsula, its highest point being in the Sierra de Perija (10,000 feet); the other runs to the northeast, subdividing north of the highlands of Trujillo into the two chains of the Coro system. This eastern range has the loftiest mountains of Venezuela, with five peaks above the limit of perpetual snow, the highest, the Sierra Nevada de Mérida (Picha Concha), attaining an altitude of 15,400 feet The eastern range of the Venezuelan Andes is separated by the valleys of the Yaracui and Cojede rivers from the Caribbean Mountains—the other system of this region—which run eastward from Lake Maracaibo, with a break at the plain of Barcelona, to the Paria Peninsula. These mountains form two parallel ranges—the Coast Range (Sierra de Mar) proper (in many places rising precipitously from the sea), and a somewhat more southerly range, paralleling it about 30 miles distant. Between these two ranges run spurs inclosing valleys and lakes, of which Lake Valencia is the most important. The western portion contains the highest peaks—Naiguata (9127 feet) and Silla; the largest peak of the eastern portion is Turumiquire.

The Maracaibo region lies between the two ranges of the Venezuelan Andes, and comprises Lake Maracaibo and the surrounding lowlands. The chief agricultural districts of the Republic are found in the Maracaibo and the mountainous regions. The *llanos* (q.v.) extend south and southeast from the Cordillera and Caribbean systems to the Orinoco River. This vast region consists of grassy plains, reaching to an altitude of about 650 feet, broken here and there by trees along the river courses. It is largely unexplored and the chief occupation of the inhabitants is cattle raising. The Guiana highlands, the fourth region, belong topographically to Guiana, and consist of plateaus (about 1000 feet above the sea) and generally low mountains, which reach in Roraima an altitude of over 8000 feet, and are varied by open areas and forests. This region is largely unexplored. A considerable part of the Brazilian boundary is formed by the Parima and Pacaraima mountains. There are no active volcanoes among the mountains of Venezuela, but destructive earthquakes are common Caracas, La Guaira, Barquisimeto, and Mérida were destroyed by earthquake in 1812, and other severe disturbances occurred in 1868 and 1894 The coast line of Venezuela is some 1700 miles long, with numerous gulfs and bays, of which Maracaibo, Paria, and Coro are the most important. The north coast is generally short and steep, but the plains of Maracaibo and Coro are low and in some places marshy. Of the numerous islands belonging to Venezuela, Margarita (q.v.) is the only one of importance.

Hydrography. The fluvial system of Venezuela, with six rivers navigable for large vessels, is probably the most important of South America. Of its 1000 or more streams the larger number are affluents of the Orinoco (q.v.), which, with its great tributaries—the Apure, Meta, and Negro (the latter united by the Cassiquiare to the Amazon system)—forms the great outlet for the interior of Colombia, as well as of Venezuela. The other important drainage areas are those of the Caribbean Sea, of Lakes Maracaibo and Valencia, and the Gulf of Paria. In addition to the lakes mentioned, there are about 200 others of small importance. Few countries are so well watered as Venezuela.

Climate. The climate of Venezuela is affected more by the altitude than by the latitude, and the country, though in the tropics, is divided into hot, temperate, and cold zones The hot zone, or the *Tierra caliente*, ranges from the sea level to an elevation of 1915 feet. It has a mean annual temperature varying from 74° F to 91° F. The heat of the coast region is tempered by the trade winds. Scattered cases of yellow and pernicious fever occur in this region, especially around Lake Maracaibo, but epidemics are unknown On the llanos the rainy season—from April to October—is likely to engender fevers, but in general the warm lands of Venezuela are fairly healthful, much more so than most portions of the Caribbean coast. The temperate zone, or the *Tierra templada*, lies between 1915 and 7030 feet above the sea level. It extends broadly from the limit of the cocoa palm and cacao to that of the banana and sugar cane, and has a delightful and salubrious climate. The rainy and dry seasons divide the year here as in the lower zone, but with much less definiteness The mean annual temperature ranges from 50 to 77 degrees. Above an altitude of 7030 feet is the cold zone, or *Tierra fria*, with a mean annual temperature ranging from 60° to 0° F. The line of perpetual snow begins at about 14,000 feet.

Flora and Fauna. In a general way the flora may be said to resemble that of Brazil, with a wide variety on account of the presence of lofty mountains. Extensive forests of full tropical luxuriance, overgrown with air plants and lianas, and harboring many vegetal types of striking appearance and economic importance (lignum-vitæ, brazilwood, coral trees, numerous palms, etc), are found on the slopes of the northern mountains and in the south and southwest near the Brazilian and Colombian borders. Above 3000 feet begins the plant life of the temperate zones. The llanos are generally covered with long grass, interspersed near the marshy regions with clumps of trees, but in the dry districts cactus, agave, and hardy shrubs are found. Mangrove swamps are common at the mouth of the Orinoco. The forest products comprise rubber, vanilla, brazilnuts, tonka beans, various fibrous plants, dye and cabinet woods, and drugs, but as yet the forest wealth of the country is little utilized. The fauna includes the various species of the neotropical region of South America (howling and other monkeys, jaguar, puma, spectacled bear, peccary, sloth, anteater, armadillo, tapir, lamantin; a vast variety of birds of fine plumage, including the flamingo, heron, cock of the rock, umbrella bird, bell bird, puff bird, toucan, quezal, nightjar, and the guacharo or oilbirds; anaconda and boa, rattlesnake, crocodile, cayman, etc.), and many of the elements of the north and south temperate regions.

Geology and Mining Interests. The Andean ranges of the southwest are for the most part of plutonic formation in which granite and gneiss predominate, with lateral ridges of upper green sandstone and limestone. The valleys and plains on either side of these ranges are covered by detrital deposits. The northernmost range of the coast system is of crystalline formation, but the lower southern chain is largely com-

posed of stratified Cretaceous rocks. The soil throughout this whole region is very deep and fertile, making it one of the richest agricultural centres of the continent. The llanos and the lowlands of Maracaibo are largely made up of Tertiary and Quaternary deposits, composed chiefly of marl, sand, shingle, and conglomerate mixed with alluvial deposits. The Guiana highland is one of the oldest members of the Archean system, composed of gneisses, hornblende schists, and granites, overlaid in part by red and white sandstones, conglomerate, and red shale. The mineral resources are supposed to be of great value, but are at present little developed. The greatest yield of gold is found in the Territory of Yuruari, though the exports of that metal from this region have fallen off greatly since the early eighties, when the annual yield averaged nearly 200,000 ounces. The salt mines of the Araya Peninsula, worked since the sixteenth century, have been leased by the state to a company which pays an annual rental of $675,000. Copper, silver, and iron are abundant in the other mountainous regions of the Republic. An inferior quality of coal is found near Barcelona and at the head of the Gulf of Paria Rich deposits of asphalt are known to exist in the Maracaibo region and in the State of Bermúdez, and petroleum of fine quality in the State of Los Andes. Excellent granite is found near Carácas and marble is common.

Agriculture and Stock Raising. Venezuela's chief industry is agriculture However, only about one-third of the area is estimated as cultivable, and of this cultivable portion only about one-third is tilled. Coffee easily ranks first, both as an agricultural product and as an article of export. The coffee exports in 1913 amounted to about $15,000,000 Cacao is an important product, for which the warm moist lands of the coast are especially adapted Sugar cane is extensively grown, owing to the duties, which exclude foreign sugars, but the product is almost wholly consumed at home, largely in the distillation of native spirits. For domestic consumption cereals, beans, potatoes, manioc, fruits, and vegetables are produced, but the demand for wheat exceeds the home supply Tobacco thrives in the lowland regions, though the present grades are inferior Copaiba, vanilla, and caoutchouc are gathered for the purpose of exportation. Balata, a gum similar in qualities to India rubber, is the most valuable of the forest products, and the value of the product averages about $2,000,000 per annum, most of it sent to the United States. Tonka beans are also an important product. Vanilla beans are gathered for exportation chiefly to Europe. Cattle raising has always been an important industry, and in the northwest the raising of sheep and goats has become important also. The 1915 estimates of live stock, given in round numbers, are as follows: cattle, 2,180,000; horses, 200,000; goats, 1,683,000; sheep, 177,000; hogs, 1,683,000; mules and asses, 407,000.

Manufactures. In the large cities there are establishments for cotton weaving and the making of shoes and hats, agricultural implements, and furniture, also breweries, distilleries, soap, candles, glass, and several small cotton mills.

Transportation and Communication. The Orinoco, with its great tributaries, the Apure and the Meta, affords excellent communication with the interior. The roads, away from the vicinity of the larger cities, are mere mule tracks. The first railroad, joining Carácas with its seaport, La Guayra, was completed in 1883, at a cost of $100,000 per mile Though a narrow-gauge road, its construction was a difficult engineering feat, on account of the steep grades involved. In 1914 there were in operation 539 miles of railway. Venezuela has cable communication with the outside world through a French line. Most of the railway lines are constructed with English capital.

Commerce. La Guayra and the other ports of Venezuela are connected with the United States and Europe by several lines of steamers, giving the Republic frequent communication with the outside world. The coasting trade of Venezuela (local only) was carried on in 1913 by 8 steamers and 15 sailing vessels, the tonnage of the steamers being 2046 and the sailing vessels about 2500. The Orinoco Steamship Company has a virtual monopoly of the steamship business of that river The local trade is largely in the hands of German, English, and Spanish merchants. The principal ports are La Guayra, Puerto Cabello, Maracaibo at the north and Ciudad Bolívar on the Orinoco The total number of ships entering the ports of the Republic with foreign cargoes during the fiscal year 1913–14 was 1089, with a tonnage of 1,057,878. The principal exports during 1914 were as follows coffee (largely to the United States, France, Holland, and Germany), $12,343,000; cacao (mainly to France, England, the United States, and Spain), $3,918,000; cowhides and goatskins (chiefly to the United States), $1,752,000, rubber (chiefly to the United States, France, Germany, and England), $126,679; asphalt (mainly to the United States), $289,000; and gold, $613,000. Other exports are fustic, divi-divi, tobacco, cattle (to Cuba), copaiba, balata gum, lumber, and sugar. The exports to the United States in the fiscal year 1914–15 amounted to $9,361,000, and the imports from the United States amounted to $6,082,000 The total imports in 1914–15 were valued at $13,992,000, of which about 45 per cent came from the United States, about 20 per cent from Great Britain, 11 per cent from Germany, and the rest principally from France, Spain, the Netherlands, and Italy. The exports in that year were $21,423,000. The following table shows (United States dollars) the changes in the commerce of the Republic:

	1909–10	1914–15
Imports	12,458,000	13,992,000
Exports.	18,103,000	21,423,000

Among the principal imports from the United States are cotton goods, iron goods, petroleum, provisions, and chemicals; from Great Britain, cotton and linen manufactures, woolens, jute goods, and ironware; from Germany, hardware and beer; from France, wines and oils

Government. The Constitution of Venezuela, adopted in 1830 and amended in 1864, 1881, 1901, 1904, and 1909, was changed again in 1914. By this last change Venezuela is divided into 20 states, 2 territories, and a federal district. The Congress consists of two bodies, and its members elect the President, whose term is seven years The capital is Carácas.

Finances. The budget of Venezuela for the year 1913–14 balanced at $10,237,000. About one-half of the revenue is derived from customs. The chief expenditures are for the Finance and the War and Marine departments. The foreign

debt in 1915 was computed at $21,083,000; the outstanding internal debt was $11,287,000. The Bank of Venezuela and the Bank of Caracas are the leading financial institutions, with a combined capital of 18,000,000 bolivars. The former is the main bank of issue, and to some extent transacts the business of the government. The metric system is in legal force, but the Spanish weights and measures are commonly employed.

Army. In 1915 the standing army consisted of 20 battalions of infantry, of 400 men each, and 7 batteries of artillery, of 200 men each; total, 8400 men. There is a national militia, unorganized, and of unknown strength. See under NAVIES.

Population. The population in 1913 was estimated at 2,755,685. There has been no census since 1891. The following table showing the area and population of the divisions of the country is estimated for 1909 based on this census.

DIVISIONS	Square kilometers	1909
Federal District	1,930	113,204
Anzoátegui	43,300	134,064
Apure	76,500	29,937
Aragua	5,600	94,994
Bolívar	238,000	55,744
Carabobo	4,650	169,313
Cojedes	14,800	87,935
Falcón	24,800	139,110
Guárico	66,400	183,930
Lara	19,800	189,624
Mérida	11,300	88,522
Miranda	7,950	141,446
Monagas	28,900	74,503
Neuva Esparta	1,270	40,197
Portuguesa	15,200	96,045
Sucre	11,800	92,020
Táchira	11,100	101,709
Trujillo	7,400	146,585
Yaracuy	7,100	85,844
Zamora	35,200	62,696
Zulia	65,500	150,776
Delta-Amacuro *	40,200	7,222
Amazonas *	281,700	45,097
Total	†1,020,400	2,323,527

* Territory. † 393,976 square miles.

The estimated population of Caracas is 73,000, Maracaibo 50,000, Valencia 40,000, Barquisimeto 32,000, Puerto Cabello 14,000, La Guaira 12,000. Marriages in 1912 numbered 9365, births 75,892, deaths 65,729, immigrants 9672, emigrants 7991. In no South American country has there been such a complete admixture of the Spanish, native, and negro elements. There are very few pure native whites or pure negroes. Most of the population is gathered in the agricultural and mountainous sections of the northwest.

Education and Religion. The early culture of the people of Caracas, commented upon by Humboldt, gained for that city the title of "the Paris of Latin America," and Venezuelan writers have occupied a brilliant position in the Spanish-American literary field. (See SPANISH-AMERICAN LITERATURE.) In 1870 education was made free and compulsory. In 1911 the reorganization of primary education was undertaken, with the purpose of creating larger schools in the villages. The town schools are fairly well kept up, but in the country districts there is a great indifference shown toward education. Possibly 25 per cent of the population can read and write. For primary instruction there are 1408 federal and 150 state schools. There is a central university at Caracas and there are five universities in other parts of the Republic. The University of Caracas has a school of engineering and other professional schools, an observatory, and a national library. The state religion is Roman Catholicism, but other forms are tolerated, though most of the Protestants are foreigners.

History. The coast of Venezuela was first sighted by Columbus during his voyage of 1498, and a year later Ojeda and Vespucius examined it more carefully, giving to it the name of Little Venice. The first settlement was made at Cumaná in 1520, but real colonization began under Juan Ampues in 1527 with the founding of Coro. The seat of government remained at Coro until 1576, when it was transferred to Caracas. Charles V, whose European wars had obliged him to borrow extensively, agreed, in 1527, with the Augsburg banking and merchant firm of the Welsers to grant them the entire Province of Venezuela, in return for advances of money. In 1528 Ambrose Alfinger sailed for the colony, with a force of 400 adventurers, representing the new rulers. Disappointed in the expectation of finding mines of gold ready to be exploited, he and his successor, George Spira, who brought over another body of retainers in 1533, raided the interior regions for produce, enslaving the natives, and demoralizing the whole country, so that in 1545 Charles V rescinded the grant. The rest of the sixteenth century was marked by exploring expeditions, the founding of settlements and cities, and wars with the natives. In order to break up smuggling, revive commerce, and bring larger revenue to the crown, Venezuela was granted in 1728 to a Biscayan merchant organization, Compañía Guipuzcoana. While this monopoly created considerable popular opposition, yet the plan worked fairly well for some time, but eventually the Compañía found it more profitable to enter into arrangements of mutual advantage with the Curaçao merchants. This arrangement was so unpopular that civil war was threatened in 1748, but the Compañía maintained its hold until 1778. The nominal government was in the hands of a captain general, subordinate to the royal audiencia at Santo Domingo, for most of the time down to 1786, when an independent audiencia was established at Caracas.

The history of the war for independence against Spain in Venezuela is to a great extent the record of the careers of Miranda and Bolívar. A popular uprising gave the revolutionists command of the capital, and on April 19, 1810, the cabildo of Caracas deposed the royal Governor and selected a junta or council to rule during the regency in Spain. The next year Bolívar led a popular demonstration which culminated in a formal manifesto or declaration of independence (July 5, 1811), and the proclamation of a republican constitutional government. Meanwhile, Domingo Monteverde took command of the royalist forces and gradually gained the upper hand over the patriots. The fortress of Puerto Cabello was betrayed to him, and Bolívar was forced to retire to La Guayra. Miranda, unable to maintain an army in the field, concluded a peace, July 29, 1812, and joined Bolívar, by whom he was arrested and handed over to the Spanish commander. Bolívar took refuge in Cartagena, raised an army, and in August, 1813, reëntered Caracas in triumph. In 1815 General Morillo arrived from Spain with 10,000 troops and Bolívar was forced to retire to Haiti. In January, 1817, he returned, established a gov-

ernment at Angostura, and had himself elected President or Dictator, a position which he succeeded in making secure by December, 1819, when the Congress at Angostura elected him President of Colombia, representing a new republic embracing Venezuela and New Granada. On June 24, 1821, the decisive victory of Bolívar and Paez (q.v.) at Carabobo over the Royalist army practically ended the Spanish domination in this part of South America. In 1829 Venezuela, under the influence of Paez, seceded from Colombia and constituted itself an independent republic. The subsequent history of the country was uneventful until 1846, when an era of insurrections and civil wars began between the conservative and liberal factions, which lasted, with scarcely a break, down to 1870. In 1854 a law for the abolition of slavery was enacted. In 1864 a federal constitution was adopted. In 1870 Guzmán Blanco became Dictator, was made constitutional President in 1873, and controlled the country until 1892. He imposed heavy taxes, fostered public works and railways, and established a stable currency. His régime was followed by new revolutions.

When the Republic succeeded to the title of Spain, in 1821, the boundary between Venezuela and Guiana was somewhere between the Essequibo and the Orinoco. Spain claimed to the former river. English and Dutch settlers had established themselves throughout the region drained by the lower Essequibo, bringing that section practically under the British government. In 1839–40 a British agent, Schomburgk, traversed this country and mapped it, laying down a boundary line which gave to Guiana the larger part of the territory. Venezuela promptly protested, and in 1844 England claimed the Schomburgk line was unofficial and only preliminary to further negotiation. All attempts of Venezuela to secure arbitration failed, as Great Britain insisted on the recognition of the Schomburgk line as a prerequisite of arbitration. Numerous efforts of the United States to have her good offices accepted by the parties likewise failed. In 1886 England occupied the main mouth of the Orinoco and fortified her position there. Venezuela promptly broke off all diplomatic relations. Realizing the hopelessness of contending with Great Britain in arms, the Venezuelan government decided to resort to public opinion. An agent was sent to the United States, who spread abroad pamphlets and statements, and interviewed newspaper men and politicians, and in December, 1894, President Cleveland recognized the widespread public interest in the dispute by an allusion to it in his annual message to Congress. This was followed by a resolution of Congress recommending arbitration and by Secretary Olney's strong note (July 20, 1895), to England, which marks the widest extension of the Monroe Doctrine (q.v.). The British government having notified the United States that it had nothing to arbitrate with Venezuela, a special message, sharp in its tone with regard to Great Britain, was sent by Cleveland to Congress, leading that body to appropriate funds ($100,000) for a commission to investigate "the true divisional line between Venezuela and British Guiana." In November, 1896, before the commission had reported, Great Britain yielded to the demand of the United States for arbitration. Eventually, in February, 1897, an agreement was reached and a treaty of arbitration duly signed. The arbitration tribunal made its award on Oct. 3, 1899, drawing a compromise line, which gave Great Britain rather the larger share of the disputed area and with which Venezuela was somewhat dissatisfied.

Immediately following the election of General Ignacio Andrade to the presidency in September, 1897, a revolt under General Hernández broke out, but was crushed at once. Owing to the weak and vacillating policy of Andrade, General Cipriano Castro began a revolt in the summer of 1899, defeated the government troops in a series of sharp engagements, and in October entered Carácas at the head of an army and proclaimed himself provisional President. Andrade fled and the revolutionary government was securely established, but hostilities were continued throughout 1900. In March, 1901, Castro was elected President by the Venezuelan Congress to fill out Andrade's unexpired term. Numerous insurrections, directed by the Conservative leader, Matos, broke out in 1901 and the fighting continued with varying success into 1902. In September of that year the Castro government appeared to be on the point of falling, but after a three days' battle near Victoria on October 13 the revolutionists were signally defeated and their army dispersed. Almost immediately the international complications which had been threatening for several years reached a crisis. For some time France, Germany, Great Britain, and other countries had been pressing for the satisfaction of certain claims, resulting from a great variety of causes, including losses to the property of foreign residents through the successive revolutions, and the nonpayment of principal and interest on debts contracted for public works. During the summer a settlement was arranged with France. But the British and German governments became more importunate in their demands, and reached an agreement to act together, and to take means to collect their debts forcibly if they were not at once satisfied. The British and German ministers filed the ultimatums of their governments and left Carácas. On December 10 the allies instituted what they termed a peaceful blockade of the Venezuelan ports. On December 11 Italy became a party to the blockade. On December 13 the allies bombarded Puerto Cabello, and Castro, convinced of the hopelessness of resistance, requested Herbert W. Bowen, the American Minister, to begin negotiations for a settlement. On Jan. 21, 1903, Fort San Carlos was bombarded by the allies. On February 13 negotiations, which had been removed to Washington, were concluded by the signing of protocols by Mr. Bowen and the representatives of the Allied Powers, submitting to The Hague Tribunal the question as to whether the claims of the three Powers were entitled to preferential treatment as against those of other nations. At the same time the amount to be paid to the three Powers was to be determined by mixed tribunals at Carácas. In February, 1904, The Hague Tribunal pronounced in favor of the Allied Powers. In 1904 a radical revision of the constitution was effected, which allowed Castro to be reelected for the term 1905–11. Castro pursued a dictatorial policy and was obliged to face numerous minor revolts. In addition he succeeded in getting into trouble with various foreign nations. In 1908 Castro was involved in difficulties with Colombia, France, Great Britain, Netherlands, and the United States. Diplomatic relations were broken with the United States, and the

Dutch made a naval demonstration in Venezuelan waters Venezuelan commerce was practically ended by the quarantine enforced against Venezuelan ports by the foreign countries.

In the midst of these difficulties, Castro departed for Europe (December, 1908) and left the Vice President, Juan Vicente Gómez, as acting President. The reaction against the despotic policy of Castro took the form of a popular demonstration in Caracas. In view of this event, Gómez, who was not in sympathy with the existing foreign policy, dismissed Castro's cabinet, assumed control of the situation, and took steps to renew friendly relations with the various Powers. Early in 1909 Castro was accused of instigating an attempt to assassinate Gómez and was deposed Gómez became provisional President, and, although Castro tried to return and assume his powers, he was unsuccessful A new constitution, based on that of 1864, was promulgated in November, 1909, and in April, 1910, Gómez was chosen constitutional President. During the celebration of the centenary of independence in 1911, Castro planned to start a revolt, but was frustrated by the seizure of his ships as piratical vessels by the government of Haiti. Gómez pursued an energetic policy as President and endeavored to better the conditions of the country, so long disturbed by revolutionary movements. During 1913, some difficulties with France were adjusted and a new naturalization law was enacted. Two minor revolts were suppressed after Gómez had assumed dictatorial powers. In 1914 V. Marquez Bustillos was made provisional President, in order that General Gómez, who became commander in chief of the army, might be reëlected to the presidency for another term A new constitution was adopted on June 19, 1914. During this year new revolts took place, the principal one being led by General José María Hernández (El Mocho), but they were suppressed without much difficulty. On May 3, 1915, General Gómez was elected by Congress for the presidential term 1915–22. During 1914–15 laws were enacted providing for compulsory education, public works, sanitation, and a new electoral system. Venezuela was greatly affected by the European War and new revenue and tariff measures were adopted to relieve the financial difficulties.

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VENEZUELA, Gulf of, or **Gulf of Maracaibo.** An inlet of the Caribbean Sea in northwest Venezuela (Map· Venezuela, C 1) It is confined between the peninsulas of Goajira and Paraguana, which approach so as to leave an opening 50 miles wide. Within this the gulf has a length of 165 miles from east to west, and a width of 50 miles In the south it communicates by a narrow passage with the Lake of Maracaibo, which occupies a portion of the same lacustrine basin, the two sheets of water being separated by very low peninsulas.

VENGEANCE, vän'zhäns', Le. A French frigate of 54 guns, disabled by the *Constitution* under Commodore Truxtun in 1800.

VENGEROV, vĕn-gyô'rôf, Semion Afanasievitch (1855–). A Russian literary critic and historian. Besides holding the chair of Russian literature at St. Petersburg University, his alma mater, he lectured in a number of other educational institutions and edited a *History of Russian Literature* for a Russian encyclopædia. His publications include: *Russian Poetry* (7th ed., 1897–1901), an anthology; *A Critical and Biographical Dictionary of Russian Authors* (6 vols, 2d ed., 1915), which comes down to 1900; *Outlines of the History of Russian Literature* (2d ed., 1907); *A History of the Newest Russian Literature* (2d ed., 1909), ably supplementing the six-volume work above mentioned; and *The Heroic Character of Russian Literature* (1911), which deals with the martyrology of Russian authors. Vengerov edited the collected works of Schiller, Shakespeare, Byron, Pushkin, and Belinsky. His own collected works appeared in five volumes at St Petersburg in 1911–12.

VENIAL SIN (OF. *venial*, Fr. *véniel*, from Lat. *venialis*, pardonable, from *venia*, pardon). A term denoting, in Roman Catholic theology, the less heinous class of offenses against the law of God, as distinguished from those which are called mortal. (See Mortal Sin.) Venial sins only weaken and diminish, but do not utterly extinguish sanctifying grace in the soul. Sins may be venial either objectively or subjectively; objectively, when the object of the law, or what is technically called the matter of the sin, is light or trivial, as in the case of a petty theft, a slight departure from truth, or a passing ebullition of impatience or anger; subjectively, when, even though the matter or object is grave, there is but imperfect advertence, or not full consent, on the part of the subject or agent, as in the case even of a grievous injury done without full knowledge or intention on the part of the agent, or without full and deliberate consent. It is held that venial sins, on repentance, may be re-

mitted by prayer or by the use of sacramentals (q.v.), without recourse to the sacrament of penance, which is ordinarily necessary in the case of mortal sin. Catholics hold that persons dying in a state of venial sin are not excluded forever from heaven; but the soul departing from life so stained with venial sin is compelled to undergo a purification in purgatory.

VENICE. A port of Italy, the capital of the Province of Venice, 164 miles by rail east of Milan, situated on 120 small islands in the lagoon between the mouths of the Piave and the Po (Map: Italy, D 2). The railway enters over a causeway 2⅓ miles long. The city is 7 miles in circumference A long narrow line of low sand dunes (*lidi*, fortified by masonry) protects it from the open sea on the east. The lagoons are classed as *lagune vive*, where the tide rises and falls a little over two feet, and the shallow *lagune morte*, where the water remains about at one level and is somewhat stagnant. At times the winds cause the waters to rise several feet, so that even the main squares of Venice are submerged The climate is warm in summer and more or less raw and foggy in winter. The mean annual temperature is 56½° F.

Venice is unique and the most beautiful of cities. It outwardly and richly reflects the fact that it had a great school of art, and represents in full flower the transition from the Byzantine ideals to the Renaissance through the Romanesque and the Gothic in its numerous notable palaces, public edifices, and churches. These structures are distinguished by their many loggie and colonnades, by their wealth of exterior decoration and incrustations of marble; while the interiors are enriched by the brushes of the superb Venetian colorists—Bellini, Giorgione, Palma Vecchio, Titian, Paris Bordone, Tintoretto, and Paul Veronese. Venice yielded but slowly to the rococo invasion. Sansovino, Sammicheli, and Palladio were the prominent figures among the Venetian architects of the Renaissance.

The city, with its weather-stained façades, its many decaying edifices, and indolent existence, affects one with an indefinable but fascinating sadness and lethargy. It contains about 16,000 buildings on pile foundations. Over 150 canals curve among its houses and serve for streets and are spanned by some 400 bridges, nearly all of stone The famous black gondolas and small steamers take the place of horses and vehicles. But the city is also thoroughly penetrated by paved streets and tortuous, picturesque lanes, and abounds in small squares (campi). Venice mainly lies in a compact form, with the Grand Canal (q.v.) zigzagging magnificently through its centre from the railway station in the northwest to the Doge's Palace in the southeast. A large arm of the city extends east. Along the south side of the city, and separated by the wide Canale della Giudecca (nearly a quarter of a mile in breadth), is a long inhabited island called the Giudecca.

The great centre of interest is the far-famed Piazza of St. Mark (for illustration, see ST. MARK'S), with the cathedral and also the Doge's Palace occupying its eastern end. West of the Doge's Palace is the open space called the Piazzetta, an arm of the Piazza extending south to the water The long Procuratie Nuove (or, in its extended form, the royal palace) occupies the south side of the Piazza; along the north side extends the long Procuratie Vecchie, and the west end is closed by the Atrio, dating from 1810. This Piazza represents notably three distinct types of architecture, Byzantine (the cathedral), Italian Gothic (the Doge's Palace), and Renaissance (the Procuratie). The Procuratie were the residences of the nine Procurators, high dignitaries of the ancient city The old wing dates from 1496, the new from 1584. Along these two buildings and the Atrio (Nuova Fabbrica) runs a continuous arcade containing shops and cafés. At night the square is occupied by a picturesque throng of promenaders, and when the band plays and there is moonlight the whole seems like an enchanted dream. A feature of the Piazza by day is the immense flock of pigeons which throng about any one willing to feed them. The most conspicuous feature of the whole city from a distance is the famous Campanile of St. Mark, standing in the Piazza near the corner of the Library, a detached square bell tower, 322 feet high. It was begun in 874, completed in 1150, and remodeled in 1517. It suddenly fell in ruins July 14, 1902, but has since been reerected in its original completed form. Less conspicuous from a distance, but far more important artistically and historically, is the cathedral, commonly called the Basilica of St. Mark, the richest monument of Byzantine art next to Hagia Sophia at Constantinople, the shrine and centre of the devotion of Venice. This edifice, reputed to contain the body of St. Mark, brought to Venice in 828, was erected in 1047–71, enlarged and embellished repeatedly in later centuries. It is described under the title ST. MARK'S CHURCH (q.v.) Both externally and internally it is a notable museum of Mediæval and Renaissance art.

At the cathedral end of the Old Procuratie is a curious clock tower, built in 1496, and forming the portal over the entrance to the busy Merceria. On its top, in the open, are two bronze colossi which strike the hours on a large bell. The Royal Palace is interesting for the section which formerly contained the library, a superb edifice, facing the Piazzetta, the work of Giacopo Sansovino. It is distinguished by the magnificent handling of its arcaded orders, its sculptured spandrels, metopes, and, in the fine interior, the ceiling frescoes by Venetian masters. In front of the cathedral stand three Renaissance bronze bases, supporting masts which formerly bore the colors of the Republic. Adjacent, on the north side of St. Mark's, is the tomb, supported by lions, of Manin, President of the Republic of 1848. On the front gallery of St. Mark's stand the four beautiful gilded bronze horses ascribed to Nero's triumphal arch in Rome. They were carried off by Napoleon to Paris, but restored in 1815. On the south side of the cathedral, in the Piazzetta, are two ancient square pilasters with Greek inscriptions, which have stood here since the middle of the thirteenth century. The Pietra del Bando is near, a block of porphyry whence the decrees of the Republic were announced. At the opposite end of the Piazzetta rise the two granite columns brought from the Orient in 1180, surmounted by figures of St. Theodore on a crocodile and the Winged Lion of St. Mark.

The Doge's Palace (q.v.) holds many of the finest pictures in Venice. In the rear of the palace, and crossing a narrow canal from the third story, is the noted Bridge of Sighs (q.v.), connecting with the prison. The bridge was completed in 1605, and is architecturally attrac-

tive. The prison is used nowadays, but the horrible places of confinement under the palace ceased to exist in 1797 The mole separating the palace from the lagoon connects with the wide and busy Riva degli Schiavoni This marble quay, a favorite place of the Venetians, extends easterly some distance, lined by hotels, shops, etc, on one side, and the water on the other. Not far to the northeast of the cathedral is Santa Maria Formosa, famous for Palma Vecchio's masterpiece, "St Barbara"—an altar picture. The district abounds in palaces. Still farther north, near the lagoon and adjacent to the excellent municipal hospital, is the large and splendid church of Santi Giovanni e Paolo, of the fourteenth century, a domed and columned structure in Italian Gothic. It is one of the principal attractions of Venice. It was the funeral church of the doges, and holds a number of their imposing tombs. Some of these monuments are rare examples, the finest perhaps in the city being that of A. Vendramin. Northeast is the Scuola di San Marco, now a hospital, a fine structure of the early Venetian Renaissance. In the vicinity stands the lofty and splendid bronze equestrian statue of Bartolommeo Colleoni. This monument, by Andrea Verrocchio, shares with that of Gattamelata, in Padua, by Donatello, the honor of being unsurpassed in the world. To the east, towards the arsenal, is San Giorgio degli Schiavoni, with the Carpaccio paintings, which are elaborately described by Ruskin. In this eastern arm of Venice are the arsenal and the public gardens, the former dating from the beginning of the twelfth century. The arsenal, long the finest in the world, employs 6000 men, and has been extended and largely improved. Its museum is interesting for a model of the system of piling on which the city stands and for the model and slight remains of the famous Bucentaur—the sumptuous craft of state from which the Doge on Ascension day cast the ring into the waters, in the act of wedding the city to the sea. The public gardens are small but attractive. Adjacent is the church of San Pietro di Castello, which was the cathedral of Venice until 1807. Hence islands extend eastward in the direction of the fashionable sea resort of the Lido, one of the finest beaches in the world.

Following the course of the Grand Canal from the Royal Garden by the Piazzetta to the railway station, there may first be noted the imposing church of Santa Maria della Salute, begun in 1631 by Longhena (q.v.). It rises into a dome, with a smaller dome and two campanili, and contains good works by Titian. The adjacent Seminario Patriarcale includes in its small art collection one of the two (putative) Giorgiones left in Venice. Farther on comes the renowned Academy of Fine Arts. It presents a series of Venetian canvases from the earliest down to those of Tiepolo. The great masters of color are here seen to good advantage. Bellini is represented by his "Madonna of the Trees"; Titian by his masterpiece the "Assumption of the Virgin," and the "Presentation in the Temple"; Paul Veronese, with the "Supper in the House of Levi"; Tintoretto, with his "Miracle of St. Mark"; Paris Bordone, with his "Fisherman and the Doge"; and Carpaccio, with his remarkable series of "Scenes from the Story of St. Ursula and her Virgins." The Palazzo Rezzonico, with columned balconies, where Browning died; the Palazzo Mocenigo, where Byron lived; the splendid Palazzo Grimani, a Renaissance structure by Sammicheli, the Palazzo Loredan, whose praises were sung by Ruskin—are noted along the canal before reaching the celebrated Rialto Bridge

The Rialto (q.v.) is lined with shops, and is a scene of busy interest. The district is identified as the original site of the city Beyond, continuing the course of the Grand Canal, are seen the markets, the celebrated Ca' d' Oro; the Vendramin Palace, with an imposing façade, where Wagner died, and the Fondaco de' Turchi opposite, with the Municipal Museum, which contains specimens of the art industries of Venice, antiquities, some good pictures, etc Diagonally opposite the railway station is the small but pleasant Papadopoli garden. The baroque church of the Scalzi and the Labbie Palace with frescoes by Tiepolo are near the railway station. In the region to the north are found the old and new ghetto, the church of the Madonna dell' Orto, with admirable pictures, and the baroque Jesuit church, containing Titian's "Martyrdom of St Lawrence"

The district of the Merceria—the principal shopping street connecting the Piazza of St. Mark with the Rialto—is full of interest. To the north is the Renaissance church of San Giovanni Crisostomo containing good altarpieces by Bellini and Sebastiano del Piombo. To the southwest of the Merceria are the famous theatres, the classic Fenice, the Rossini, the Goldoni —the first seating 3000 persons, but open only between Christmas and Lent; and the fine domed church of San Salvatore, finished in 1534 and containing Titian's "Annunciation." Directly west of the Piazza of St. Mark is the Calle San Moisè, a lively shopping street.

In the large section of the city south and west of and beyond the edifices bordering the Grand Canal there may be mentioned the church of San Giovanni Elemosinario, with Titian's striking altarpiece of the same name, and the great and handsome Gothic church of the Frari, one of the wonders of Venice, begun in 1260 and reconstructed in 1330. It is noted especially for its fine altarpieces and for its monuments of many important personages, including Canova and Titian. The pictures include Titian's renowned "Madonna of the Pesaro Family" and Bellini's charming "Madonna and Saints." The monastery of the Frari holds the Venetian archives—a very rare collection, with several million documents, some dating from the close of the ninth century. Farther on is the attractive Scuola di San Rocco, dating from 1517, striking for its architecture and for its mural paintings by Tintoretto. His masterpiece, the "Crucifixion," is here.

Some distance to the south is Santa Maria del Carmine, and southwest, near the Canale della Giudecca, is San Sebastiano, notable for altarpieces by Paul Veronese, and for his tomb. To the southeast stretches the long and straight Fondamenta delle Zattere. The Giudecca district opposite has the island of San Giorgio Maggiore at its northeast end, opposite the Doge's Palace. On this island is the fine domed church of the same name, a creation of Palladio in the middle of the sixteenth century. Its beautiful campanile affords one of the best views to be had in Venice. On the island of the Giudecca is another noteworthy church by Palladio, the Redentore, of much interest to architects for special features. Interesting excursions can be made to the island

author of the *Veni Sancte Spiritus* is believed to be King Robert of France. Consult S A. W. Duffield, *Latin Hymn-Writers and their Hymns* (New York, 1886), Julian, *Dictionary of Hymnology* (2d ed, ib, 1907)

VENIRE FACIAS, vē-nī'rē fā'shī-ăs (Lat, cause to come). A common-law writ directed to a sheriff, commanding him to summon a certain number of acceptable citizens of his county to serve as jurors. Formerly the selection of persons legally qualified to serve as jurors was made by the sheriff in his discretion, but in England and most of the United States to-day the requisite number is drawn by lot from a list of persons competent to serve, and the sheriff thus summons the persons whose names are thus drawn. Where a sufficient number do not respond, or are excused from attendance, the above writ may still be used in a number of States to fill up the panel Where a trial was a nullity for some fatal defect or irregularity, the writ issued to summon a new jury was known as a *venire facias novo*. See JURY, TALESMEN

VENIZELOS, vā'nē-zā'lōs, ELEUTHERIOS (1864–). A Greek statesman and diplomat, born in the island of Crete. After studying in the schools of Canea and Athens, he entered the University of Athens, where he graduated in law in 1886. He returned to Crete, soon making a reputation as a brilliant lawyer. At 25 he was chosen a deputy to the Cretan legislature He rendered conspicuous service during the Cretan revolution of 1890–92, and in 1899 was appointed Minister of Justice, in which office he reorganized the laws of the island. Known for his consistent work for the political union of Crete and Greece, in 1908 he led the movement which aimed to accomplish this. In 1910 he was chosen Premier of Crete, but shortly afterward removed to Athens at the request of the Military League, which was leading a movement for constitutional reform in Greece. In the work of revising the constitution Venizelos had a prominent part. From 1910, when King George requested him to accept the premiership, he was the central figure in the stirring events in the Balkans. He was largely instrumental in organizing the Balkan League which waged war on Turkey in 1912 (see BALKAN WAR), and at the London Conference which closed the war he was the moving spirit among the Balkan delegates. At the outbreak of the second Balkan War he again led in the formation of the league against Bulgaria; at its close he was prominently identified with the drafting of the Treaty of Bucharest.

In 1914, at the beginning of the great war (see WAR IN EUROPE), Venizelos championed the cause of the Triple Entente allies and urged that Greece join them. With a view to reviving the old Balkan League he advocated a revision of the Treaty of Bucharest by which concessions of territory would be made by Greece and Servia to Bulgaria. This suggestion was vigorously opposed by King Constantine, and in March, 1915, Venizelos resigned, and declared his intention to retire from politics. Some months later, however, at the urgent request of his supporters, he resumed the leadership of the liberal party. In August, 1915, the King was again forced to call Venizelos to form a ministry, but the views of the King and his minister as to the wise policy for Greece to pursue were so divergent that it was evident that they could not work in harmony. When, in September of this year, the Bulgarian army was mobilized, the Premier, despite the opposition of the King, insisted upon the mobilization of the Greek forces, and finally, when Bulgaria declared war upon Servia, he demanded that Greece carry out her treaty agreement and join forces with Servia. Constantine having refused his sanction, in October Venizelos once more resigned, although he had the strong support of the deputies He criticized the King severely for opposing a ministerial policy which clearly had popular approval. In the elections to the new Chamber in December Venizelos requested his supporters to refrain from voting, with the result that only about one-third of the normal vote was cast. In May, 1916, he was elected deputy for Mytilene, receiving 98 per cent of the possible vote, but none of the Liberals then elected took their seats. Venizelos is to be ranked as one of the greatest European statesmen of his time Consult A. G Gardiner, *The War Lords* (New York, 1915), and G Kerofilos, *Eleutherios Venizelos, his Life and Work* (Eng trans., ib, 1916).

VENLO, vĕn-lō'. A town of the Netherlands, in the Province of Limburg, on the right bank of the Meuse, 41 miles by rail northeast of Maestricht (Map: Netherlands, E 3) The streets are narrow and irregular. The sightly town hall dates from the close of the sixteenth century. Manufacturing is active. Tobacco, tannery products, and swine are prominent shipments. Pop, 1899, 14,399, 1909, 16,556.

VENN, JOHN (1834–1923). An English logician and antiquary, born at Hull, Yorkshire, and educated at Caius College, Cambridge. He became fellow of Caius College, where in 1862 he was appointed lecturer in moral science and in 1903 president. In logic he wrote the valuable manuals, *Logic of Chance* (1866; 3d ed, 1888), *Symbolic Logic* (1880, 2d ed, 1894), and *Empirical Logic* (1889). His later literary activity was antiquarian, he is a fellow of the Society of Antiquaries, and edited the Parish Register of St. Michael's, Cambridge, for the period 1588–1837 (1891), and is author of a *Biographical History of Gonville and Caius College* (3 vols., 1897–1901). He published also *Hulsean Lectures* (1869) and *Early Collegiate Life* (1913).

VENOM. See SNAKE; TOXICOLOGY

VENOSTA, EMILIO, MARCHESE VISCONTI-. See VISCONTI-VENOSTA, MARCHESE

VENOUS BLEEDING. See BLEEDING.

VENTADOUR, vän'ta'dōōr', BERNART DE. A Provençal poet, born early in the twelfth century at Ventadour, in Limousin. He wandered to Normandy, perhaps even to England, and celebrated Eleanor of Aquitaine, the wife of Henry II. Afterward he is found at the court of Raimond V, Count of Toulouse. The collections of his songs by Raynouard and Mahn are the best Consult Bischoff, *Biographie des Troubadours Bernhard von Ventadour* (Berlin, 1873); Carducci, "Un poeta d'amore del secolo XII," in the *Nuova Antologia*, vols. xxv and xxvi.

VEN'TILA'TION. See HEATING AND VENTILATION; MINING.

VENTIMIGLIA, vĕn'tē-mēl'ya. A seaport and fortified frontier town in the Province of Porto Maurizio, Italy, 94 miles southwest of Genoa, on the Ligurian Sea. The Gothic cathedral occupies the site of a temple to Juno. The town hall has a collection of interesting relics. Viticulture and floriculture are important industries. Pop. (commune), 1901, 11,500; 1911, 14,086 (town, 3517).

VENTRE DE PARIS, vän'tr' de på'rē', Le (Fr., the belly of Paris) One of Zola's Rougon-Macquart novels (1873).

VEN'TRICLE. See Heart

VENTRICULITES, vĕn-trĭk'ū-lī'tēz (from Lat *ventriculus*, ventricle, stomach, dim of *venter*, stomach, womb). A fossil hexactinellid sponge of funnel or cup shape with wide central opening and thin convoluted walls, and the base pointed and provided with roots of siliceous fibres, common in the Middle and Upper Cretaceous rocks of Europe. See Sponge.

VENTRIL'OQUISM. See Voice.

VENTU'RA. A city and the county seat of Ventura Co., Cal., 80 miles by rail west-northwest of Los Angeles, on the Santa Barbara Channel; on the Southern Pacific Railroad and the Pacific Coast Steamship Company's line (Map: California, F 8). The mission, founded in 1782, is still in a good state of preservation. Pop., 1900, 2470; 1910, 2945.

VENTURI (vĕn-tōō'rē) **METER.** A form of water meter (q.v.). Its action is based on the fact that when there is a reduction in the cross-sectional area of a pipe containing flowing water, there occurs an increase in velocity and decrease in pressure.

VEN'UE (OF. *venue*, arrival, from Lat *venire*, to come; confused in meaning with OF. *visne*, from Lat. *vicinia*, neighborhood, vicinity). In its original and more restricted meaning, the place or locality where the acts or transactions out of which an action arises occur; but the term is more commonly employed to-day to denote the county or judicial district in which an action is to be tried and the jurors selected. For the purpose of determining the proper venue, actions are classified as local and transitory. A local action is one which, from its nature, could only have arisen in a certain district, as a trespass on land. Criminal prosecutions and practically all actions relating to real property are considered as local actions, and must be tried in the county in which the facts occur or the real estate is situated. Where a cause of action is based upon facts which might easily have happened in any jurisdiction, as a contract, it is said to be transitory, and usually may be tried in any county. The English Judicature Acts practically abolish the above distinction in that country, but it still obtains in many of the United States. In most jurisdictions the defendant may make a motion for a change of venue for the convenience of his witnesses, or because he believes there could not be a fair trial in the jurisdiction in which the action is brought. In some instances, as where neither of the parties reside in the county where the venue is laid, a change of venue if promptly applied for will be granted as a matter of right. Generally, however, the matter rests in the discretion of the court, but the fact that most of the witnesses reside in a distant county, and any other reasonable argument, will be considered in deciding the motion. In criminal cases the prejudice of the community against the defendant and the consequent difficulty of obtaining impartial jurors are frequently made the basis of a motion for change of venue. The whole matter is regulated by statute in most States. Where the objection is that the action is not brought in the proper court, or that for some other reason the court has no jurisdiction over the subject matter of the action, the proper practice is generally by way of demurrer or motion to dismiss the complaint or declaration rather than for a change of venue. Consult the authorities referred to under Pleading, Practice.

VE'NUS (Lat.; compare the common Latin noun *venus*, love, desire; connected with OHG. *wini*, friend, *wunna*, Ger. *Wonne*, joy, Goth. *wunan*, to enjoy, Skt. *van*, to hold dear, wish, win), or Aphrodite. In classical mythology, the goddess of love, in the widest sense. The Greek Aphrodite very probably represents a borrowed cult. The name is still unexplained, but the goddess is clearly the Eastern goddess of fertility and reproduction, the Phœnician Ashtoreth (or Astarte), Babylonian Ishtar, and Arabian Alilat, whose cult was prominent throughout the Semitic world. Her worship was orgiastic, and sacred prostitution was practiced at many of her temples. This goddess was especially honored at Cyprus by Greeks and Phœnicians, and thence Aphrodite seems to have come to the Greek world. Cyprus, especially Paphos, and Cythera, likewise an early Phœnician trading post, gave the goddess two of her common surnames, Cypria and Cytherea. In Greek legend, however, Aphrodite preserved little trace of her foreign origin. In Homer she is daughter of Zeus and Dione, and completely at home in the Olympian circle. In Hesiod is found the legend, which later became more popular, that she was sprung from the sea foam which gathered about the mutilated member of Uranus (q.v.). The new divinity landed on Cyprus, attended by nymphs and tritons. Under her feet flowers sprang to birth and all nature rejoiced. Other legends told of her love for the mortal Anchises, to whom she bore Æneas (q.v.), and of her amour with Ares (see Mars), which was detected and punished by Hephæstus, her husband. It should be said that there are many indications of a union of Ares and Aphrodite in cult, and in some places we hear of an Aphrodite Areia, Aphrodite Nicephoros (Bringer of Victory), and of armed statues of Aphrodite, though anything warlike is utterly removed from the ordinary conception. In general Aphrodite appears as the goddess of sexual love, the inspirer of passion, and the enemy of chastity, although the cult had a better side in which she was honored as a goddess of married life and chaste love, as at Sparta and near Athens. Plato and later writers sought to distinguish these two sides as the worship of the Aphrodite Urania (heavenly love) and Aphrodite Pandemus, but the distinction will not hold. Aphrodite appears also as a goddess of vegetation, especially of flowers. And this side appears in the festival connected with Adonis (q.v.), who, according to an eastern legend, was a youthful favorite of the goddess. From the East, too, seems to have come her worship in many towns, especially on the coast, as a goddess of sailors, who gives them fair weather and prosperous voyages. This seems merely a borrowing from the honor paid to their great goddess by Phœnician sailors. In art we find at a very early date primitive images of the eastern goddess, sometimes draped, but frequently nude. In the classical art the goddess was regularly clothed until the time of Praxiteles (q.v.), whose famous Cnidian statue first represented her as nude. This type became very popular later and developed into such works as the Capitoline and Medicean statues of Venus. A clothed type is seen in the so-called Venus Genetrix of the Louvre, which probably is derived

from the famous Aphrodite in the Garden of Alcamenes. Another famous statue was the Aphrodite Epitragia (Venus riding on a he-goat) of Scopas in Elis, known to us only from its appearance on coins.

In Rome Venus seems to have been originally a goddess of vegetation, especially of fruit and flowers, brought to Rome at an early date from Ardea, where she was a prominent divinity of the Latin league. Her name does not appear in the early calendars, but she was early identified with a very different goddess, Libitina (q.v.), whose name was now connected with *lubido* (lust). Later, the identification with Aphrodite was completely carried out by the introduction into Rome of the worship of Venus Erycina, from the great sanctuary on Mount Eryx in Sicily. Sulla especially honored Venus Felix as a goddess of good fortune, and her worship became prominent in his colony at Pompeii. Pompey built a temple to Venus Victrix, and a great increase in the honor of this goddess developed with the Empire, since the Julian family traced their descent to Ascanius, son of Æneas, and grandson of Aphrodite. In 46 B.C. Julius Cæsar dedicated a temple to Venus Genetrix in his new Forum, and her worship was connected with that of Mars, father of Romulus, in Augustus' temple of Mars Ultor, and with that of Roma in Hadrian's temple of Venus and Rome. Consult the articles "Aphrodite" and "Astarte," in W. H. Roscher, *Lexikon der griechischen und römischen Mythologie*, vol. i (Leipzig, 1884–90); the article "Aphrodite," in Pauly-Wissowa, *Real-Encyclopädie der classischen Altertumswissenschaft*, vol. i (Stuttgart, 1894); L. R. Farnell, *Cults of the Greek States*, vol. ii (Oxford, 1896); W. W. Fowler, *Roman Festivals* (London, 1899); Otto Gruppe, *Griechische Mythologie und Religionsgeschichte*, 2 vols. (Munich, 1906); A. Fairbanks, *A Handbook of Greek Religion* (New York, 1910); C. M. Gayley, *The Classic Myths in English Literature and in Art* (2d ed., Boston, 1911); Georg Wissowa, *Religion und Kultus der Römer* (2d ed., Munich, 1912); and the articles "Aphrodite" and "Venus," in Friedrich Lübker, *Reallexikon des klassischen Altertums* 2 vols. (8th ed., Leipzig, 1914).

VENUS. A planet whose orbit is between those of the earth and Mercury. Her mean distance from the sun is 67,200,000 miles. The eccentricity of her orbit is smaller than that of any other planet, being only 0.00682; and therefore her greatest and least distances from the sun differ by only about 940,000 miles. She performs her sidereal revolution in 224.7 days, in an orbit whose plane is inclined 3° 23½′ to that of the ecliptic, but her synodical revolution requires much more time, 584 days. Between inferior conjunctions and the next superior conjunction Venus is a morning star, and between superior conjunction and the next inferior conjunction she is an evening star. Her diameter is about 7700 miles; so that her volume is about 0.90 of that of the earth, and her mass is nearly 0.82 of that of the earth. In the telescope Venus presents phases similar to those of our moon, varying from a mere sickle of light to a complete circle. The brilliancy of the planet is at times very great, rendering her visible easily in daylight. The maximum brightness occurs 36 days on either side of inferior conjunction, the condition of maximum depending on the planet's phase and proximity to the earth.

The rotation period is still much in doubt, for the surface markings are inconspicuous, and it is only by showing these markings that we can fix the period. Some astronomers (Schiaparelli and Lowell) think the period is one of 225 days, the same as the orbital period, and that Venus, like our moon, always turns the same side towards the centre of the orbit. Other astronomers fix the period as approximately equal to that of the earth, viz., 24 hours. Venus probably has some sort of an atmosphere, but no satellites are known. See PLANETS; SOLAR SYSTEM; TRANSIT OF VENUS.

VENUS ANADYOMENE. See ANADYOMENE.

VENUS AND ADO'NIS. An early love poem in stanzas of six lines, by Shakespeare, licensed and published in 1593, but probably written as early as 1589. It was dedicated to Henry Wriothesley, Earl of Southampton, and in the dedication is described by the author as the "first heir of my invention."

VENUSBERG, vā'nŭs-bĕrk (Ger., mountain of Venus). A name given as early as 1337 (in the *Children of Limburg*) and often afterward to mountains in Swabia, elsewhere in Germany, and even in Italy. But it usually refers to the Horselberg near Eisenach. Here Venus was supposed to hold court, not inaccessible to favored mortals, who led with her a life of delight at the risk of eternal damnation. To warn them Eckhart sat at the entrance and, according to some legends, the torments of some visitants had already begun and their lamentations might on occasion be heard. This legend results from superimposing Christianity on German mythologic belief in the Earth Mother, known with various attributes as Hel, Hilda, Hulda, Holda, and Berchta. To her attendant train of elves, wise women (now become witches), and fallen heroes, Christian superstition added unbaptized infants. The tale was further modified by the needs of the homilist into an allegory against several of the deadly sins. The first mortal visitor to the Venusberg known to literature is Heinrich von Limburg in the already named Low German chronicle (about 1337); the most famous is Tannhäuser (q.v.).

VE'NUS CLAM (so called in allusion to the shape of the closed lunule). Any bivalve of the family Veneridæ, which consists of heavy, globose pelecypods, represented on all shores, and often beautifully colored and corrugated. The American hard clam (*Venus mercenaria*) (see Colored Plate of CLAMS) is a typical example. Some, when viewed in section, present an outline like that of the ace of hearts, and are called heart cockles.

VENUS' HAIR STONE. See ROCK CRYSTAL; RUTILE.

VENUS OF MEDICI. A celebrated statue in the Tribuna of the Uffizi (Florence), by Kleomenes, son of Apollodorus of Athens, a sculptor of the New Attic school, who probably lived in the time of Augustus. It represents the Greek goddess Aphrodite, entirely nude, as she arises from the foam of the sea. Both the face and form are of great youthful charm and beauty; but the motive is that of a maiden conscious of her charms almost to affectation. The hair was formerly gilded and the eyes were blue. The fine effect of the original is much impaired by the injudicious polishing of the marble's surface, and by a wretched modern

restoration of the arms and hand The statue is probably a free copy of the Cnidian Aphrodite by Praxiteles (q v). It was found at Rome in the sixteenth century and brought to Florence from the Villa Medici in 1678 During the transportation it was broken into 11 fragments, which, however, were perfectly fastened together.

VENUS OF MILO, mē′lō, or **ME′LOS.** The most celebrated and beautiful of surviving statues of the Greek goddess Aphrodite, and perhaps the most priceless treasure of the Louvre. It is named from the isle of Melos, in the Ægean Sea, where it was found by accident in 1820. Purchased by the Marquis de Rivière, French Ambassador to Constantinople, and presented to Louis XVIII, it was given by the latter to the Louvre. It has suffered much from time and rough treatment Both arms are gone, and the body, which is nude to the waist, and the draperies are much battered. But so chaste and noble is the ideal and so wonderful the technical execution, that the effect is incomparable to anything else in art. Moreover, the Venus is a woman of beauty and the majestic incarnation of all-powerful love.

The position of the goddess and the date of the origin of the statue are matters of dispute. The most likely explanation seems to be Furtwängler's that the advanced left foot rested upn a helmet and the goddess regarded herself ina shield supported on the left thigh. The statue belongs to the Hellenistic period, the last half of the second or the first century B. It is an adaptation of the Aphrodite by Scopas and the Melian Tyche, but under direct inspiration of the Phidian epoch. Numerous monographs and articles have been written on the subject; but the best discussion is by Adolf Furtwängler, *Masterpieces of Greek Sculpture;* English translation by Eugénie Sellers (London, 1894).

VENUS OF WILLENDORF. See PALEOLITHIC PERIOD.

VENUS'S-COMB. See CHERVIL.

VENUS'S-FLOWER-BASKET. Any of various vitreous sponges, which have a more or less fenestrated and urn-shaped form; especially one of the Oriental genus *Euplectella.*



VENUS'S-LOOKING-GLASS (*Specularia perfoliata*).

VENUS'S-FLYTRAP. See CARNIVOROUS PLANTS; DIONÆA.

VENUS'S-GIRDLE. See GIRDLE OF VENUS.

VENUS'S-LOOKING-GLASS (*Specularia*). A small genus of low annual herbs belonging to the family Campanulaceæ. The best-known species, the common Venus's-looking-glass (*Specularia speculum*), is a native of Europe and has long been a favorite in flower gardens on account of its brilliant purple or white blossoms. *Specularia perfoliata,* a native of North America, occurs as a weed on sterile and sandy ground, and is also cultivated. It produces purple-blue flowers from May to August. Specularias thrive in any garden soil and are readily propagated by seeds sown in the spring. They often reproduce themselves from self-sown seeds.

VÊPRES SICILIENNES, vâ′pr' sē′sē′lyĕn′ (Fr., Sicilian Vespers), LES. An opera by Verdi (q.v), first produced in Paris, June 13, 1855; in the United States, Nov. 7, 1859 (New York).

VERA, vā′ra, AUGUSTO (1813–85). An Italian philosopher, born at Amelia, in Umbria. He studied at first in Rome and then in Paris. Afterward he taught literature and filled various professorships of philosophy, notably at Strassburg and Paris In 1860 he received a professorship of philosophy in Milan, and the next year a similar post in Naples. He published several philosophical works in French, Italian, and English, and some translations from Hegel, whose philosophy he introduced into France and Italy. These include: *Problème de la certitude* (1845), *Aristotelis et Hegelii de Medio Termino Doctrina* (1845); *Introduction à la philosophie de Hegel* (1855); *L'Hégélianisme et la philosophie* (1861); *Philosophie de la nature de Hegel* (3 vols, 1863–65); *Philosophie de l'esprit de Hegel* (2 vols., 1867–69); *Problema dell' assoluto* (4 parts, 1872–82); *Strauss et l'ancienne et la nouvelle foi* (1873); *Cavour et l'église libre dans l'état libre* (1874); *An Introduction to Speculative Philosophy and Logic* (1875); *Platone e l'immortalità dell' anima* (1881); *Saggi filosofici* (1885).

VERACINI, vâ′rà-chē′nē, FRANCESCO MARIA (1685–1750). An Italian violinist and composer, born at Florence His first appearance in 1714 was attended with such phenomenal success that Tartini (q.v.), in order to maintain his reputation, retired for some time for the purpose of practicing. In the same year Veracini visited London, and for two seasons was engaged to play between the acts at the opera. From 1717 to 1722 he lived in Dresden as chamber virtuoso, and until 1736 in Prague. In that year he settled in London, where he wrote three operas. In the meantime, however, Geminiani (q.v.) had become the lion of the hour, and in 1745 Veracini returned to Italy. He died in rather reduced circumstances near Pisa. His compositions, showing a strong individuality, comprise 12 violin sonatas, several violin concertos, and symphonies for string orchestra.

VERA CRUZ, vĕr′à krōōz, *Mex. Sp. pron.* vā′rà krōōs. A Gulf state of Mexico (Map: Mexico, L 8). Area, 29,201 square miles. The narrow strip along the coast is, in general, flat and sandy, with a gradual rise towards the interior. The central portion is mostly mountainous, with an altitude of over 18,000 feet in the volcano of Orizaba, on the borders of Puebla. In the northern part of the state the interior retains the general character of the coast land, while in the south it is more mountainous. The coast is lined with numerous lagoons, including the navigable Tamiahua. The state is intersected by many short rivers, mostly unnavigable. The natural conditions are very favorable for agriculture. The products include ixtle, coffee, tobacco, cacao, cereals, cotton, sugar, and fruits. There is some stock raising, and manufactures are numerous, especially of textiles, in which industry the state ranks next to Puebla. Mining is undeveloped, but the petroleum fields are exploited. Pop., 1910, 1,124,368, of whom about one-half are mestizos. Capital, Jalapa (q.v.).

VERA CRUZ. The most important port of Mexico, in the State of Vera Cruz, situated 193 miles (by rail 263) east of the capital of the Republic, on the Bay of Campeche (Map: Mexico, L 8). The city extends in a semicircle along the coast for nearly a mile, facing the fortress of San Juan de Ulúa on a rocky islet ½ mile from the shore The harbor consists of a rather narrow channel with three openings, only two of which are available for vessels of ordinary draft. Improvements have given the harbor ample dock facilities and rendered it safe in all sorts of weather. The city is unhealthful, as it is surrounded by sand dunes and stagnant marshes. The climate is enervating at all seasons of the year, and because of the prevalence of yellow fever Vera Cruz is called the City of the Dead. Harbor improvements, new sewage and water systems, the reclaiming of waste lands, and modern pavements have done much, however, to remove this reputation. Architecturally the old walled city presents a pleasing appearance with regular streets and plazas, and houses generally of two stories, with variegated walls and a suggestion of Moorish style. The city is provided with an artillery school, a national school of seamanship, and a public library. The Hospital Gutiérrez Zamora is one of the finest in the country. In the Paseo de la Libertad there is a copy of the Bartholdi statue in New York harbor.

Fisheries and commerce employ the major portion of the inhabitants; in addition there are manufactures of cigars, preserved fruits, confectionery, furniture, brooms, and toys. The imports in 1912–13, consisting of textiles, machinery, iron and steel manufactures, coal and firearms, were valued at $40,896,390, and the exports, including ores, coffee, chicle gum, tobacco, sugar, rubber, hides, and dyewoods, amounted to $42,287,370. Pop, 1900, 29,164; 1910, 40,000.

In 1519 Cortés established the municipality of Villa Nueva de la Vera Cruz. In 1599 the settlement was transferred to its present site, where during the period of Spanish rule Vera Cruz remained the only gulf port of New Spain. The Castle of San Juan de Ulúa was begun in 1582 and completed at a cost of 40,000,000 pesos. The city was sacked by buccaneers in 1653 and 1712 Previous to 1810 it was a centre of revolutionary activity, and later occupied a prominent position in the various civil wars that desolated Mexico. Because of its vigorous but unsuccessful defense against the French in 1838 and in 1862, and against the Americans in 1847, it gained the title "Thrice Heroic." During the war between Mexico and the United States, General Scott, with an army of about 12,000, landed in the vicinity of Vera Cruz on March 9, 1847, and immediately invested the city, which, together with the Castle of San Juan de Ulúa, contained a garrison of about 4500. The city was subjected to a terrific bombardment by the fleet (March 22–25) and the Mexicans surrendered on the 29th. From Vera Cruz, in 1859, Benito Juárez promulgated his laws of reform, which made possible a free church within a free state. In 1914 the city was seized by the United States forces and held for several months (see MEXICO, *History*).

VERAGUA, vā-rä'gwä, DUKES OF. The title borne by the successors of Columbus, bestowed originally upon Luís Colón (Columbus), the grandson of the discoverer. The male line became extinct in 1578 on the death of Diego, son of Luís, and the succession was settled on the descendants of Luís's sister, and in 1733 on those of Diego's sister. Cristóbal Colón de la Cerda, the Duke of Veragua at this time, was received with great honor in the United States on the occasion of the World's Columbian Exposition, 1893.

VERAN'DA (either from OSp., OPortug *varanda*, balcony, railing, from *vara*, Lat *vara*, rod, stick, from *varus*, bent, stretched, knock-kneed, awry). An exterior balcony, gallery, or platform sheltered by a roof borne on light columns or posts; a piazza, in the American sense The veranda originating in the necessities of a warm climate, especially in the Mediterranean countries of Europe and the West Indies, has been developed into one of the most characteristic features of American suburban and rural domestic architecture, of which it forms a picturesque as well as convenient element. In European practice it is usually of light construction, narrower than the American piazza, furnished with a painted metal roof and apron or lambrequin, and considered in adjunct rather than an essential feature of the building. The term is not generally applied to the entrance porch unless this is of considerable extent.

VERANDRYE, vā'ran'drē', PIERRE GAULTIER DE VARENNES DE LA (1685–1749). A Canadian explorer, born at Three Rivers, Quebec. After military service in France he returned to Canada and became distinguished as a pioneer. He built Fort St Pierre, west of Lake Superior, in 1731, erected Fort St. Charles on the Lake of the Woods in 1732, and in 1733 established Fort de la Reine on the site of Portage La Prairie, near Lake Winnipeg. His subsequent expeditions extended as far west as the Rocky Mountains and as far north as the Forks of the Saskatchewan River, where he built Fort Dauphin in 1749.

VERATRINE, vē-rā'trĭn *or* -trēn. See ALKALOIDS.

VERA'TRUM. See HELLEBORE.

VERAZZANO. See VERRAZANO.

VERB (Lat. *verbum*, word; connected with Lith. *wardas*, name, OPruss *wirds*, word, Ger. *Wort*, AS., Eng. *word*). In grammar, a word denoting an assertion or declaration. In most languages, especially in those of the Indo-Germanic and Semitic groups, the verb is sharply distinguished from the noun not only by its function, but by its inflection (q.v.). On the other hand, the verb possesses certain affinities with the noun and the adjective, particularly in the infinitives and participles, which are nouns and adjective respectively in form, but verbs in force. In many languages, as in ancient Egyptian and the Vei of the Mande Negro group, there is no distinction in inflection between the noun and the verb, as Egyptian *meh-u*, I fill; *meh ten*, ye fill; *pera-a*, my house; *per-ten*, your house; Vei *i-ro*, thou sayest; *mu-ro*, we say. Certain remnants of this identity seem to survive even in Indo-Germanic, as Latin *amamini*, to be loved, a participle (compare the Greek passive participle in *-μενος* and the Sanskrit in *-māna*), and the occasional occurrence even in Latin of a direct object of a noun, as the Plautine *quid tibi hanc tactiost*, why do you touch her? In the American Indian languages the verb tends to absorb within itself the objects and the pronouns, as in the

Tarascan *hopo-ni*, to wash; *hopo-ku-ni*, to wash the hands, *hopo-ndu-ni*, to wash the feet; *hopo-ngari*, to wash the face. The verb is normally inflected for mood, tense, voice, person, and number, and in some language groups, as in Semitic, for gender. The number of all these categories may vary greatly in different languages, and numerous subconjugations, as causative, reflective, negative, and passive, are also found. In English, as in the other languages of the Indo-Germanic group, verbs are conventionally divided into transitive and intransitive, the former class requiring an object, and the verbal force of the latter being complete in itself. The mood of a verb denotes the degree of certainty of its action, while the tense expresses the time of action. If a verb forms its tenses according to one of the usual systems in a language, it is said to be regular, as in English *love, loved*, but otherwise it is called irregular, as *swim, swam, swum*. A verb is said to be active, passive, or middle (reflexive, deponent) in voice if the subject is an actor, or is the recipient of an action by another, or performs an act which affects himself. Person denotes whether the subject is the person or persons speaking, or spoken to, or spoken of, and number shows whether the subject is one, or more than one. Auxiliary verbs are those necessary to complete the meaning of other verbs, especially in the formation of periphrastic tenses and moods, and impersonal verbs are those which, apparently at least, have no subject. See GRAMMAR; INDO-GERMANIC LANGUAGES; LANGUAGE; PHILOLOGY; SEMITIC LANGUAGES; ETC.

Consult: Von der Gabelentz, *Sprachwissenschaft* (2d ed., Leipzig, 1901); Brugmann, *Vergleichende Grammatik der indogermanischen Sprachen*, vol ii (2d ed., Strassburg, 1897–1913); Delbrück, *Vergleichende Syntax der indogermanischen Sprachen*, vol. ii (ib., 1897); Zimmern, *Vergleichende Grammatik der semitischen Sprachen* (Berlin, 1897); W. D. Whitney, *Life and Growth of Language* (2d ed., New York, 1902); Paul, *Prinzipien der Sprachgeschichte* (4th ed., Halle, 1909); W. D. Whitney, *Language and the Study of Language* (7th ed., New York, 1910); Meillet, *Introduction à l'étude des langues indo-européennes* (3d ed., Paris, 1913); Grasserie, *Du verbe comme générateur des autres parties du discours* (ib., 1914); L. Bloomfield, *Introduction to the Study of Language* (New York, 1914); Sandfeld-Jensen, *Die Sprachwissenschaft* (Leipzig, 1915).

VERBECK, vĕr-bĕk', GUIDO FRIDOLIN (1830–98). An American missionary to Japan. He was born in Zeist, Holland, was educated there in the Moravian Seminary, at the Utrecht Polytechnic, and after going to New York, in 1852, at Auburn Theological Seminary, where he graduated in 1859. In the same year he went as a missionary of the (Dutch) Reformed church in America to Nagasaki, Japan, whence he was transferred in 1868 to Tokyo. There he was superintendent of teachers and instruction in the Imperial University in 1869–73. He returned to missionary work in 1879, was prominent in the translation of the Bible into Japanese, taught (1891–98) in the Meiji Gakuin, and was a very successful and tactful missionary. He made many important translations, mostly legal, in behalf of the Japanese government, and wrote a *History of Protestant Missions in Japan* (1883). Consult W. E. Griffis, *Verbeck of Japan* (New York, 1900).

VERBE'NA, VER'VAIN (Lat., foliage, herbage, sacred bough, plant used as a cooling remedy). A genus of about 75 species of annual or perennial herbs or shrubs of the family Verbenaceæ, mostly natives of tropical and subtropical America. A number of native species are distributed through the United States, growing as weeds in waste or cultivated ground. The flowers, borne in terminal spikes, may be seen during nearly the whole summer. The cultivated varieties, which are derived from several species and their hybrids, have creeping or spreading stems and dense spikes of large and showy flowers. They vary greatly when grown from seed and represent a wide range of color. The European verbena (*Verbena officinalis*) is a common weed, native of Europe, but has become naturalized in North America. It is an annual with small purplish blossoms in slender panicled spikes. *Verbena teucrioides*, a species cultivated in gardens for its large pinkish white flowers, sweet scented at night, is a native of Brazil.



A CULTIVATED VARIETY OF VERBENA.

Verbena venosa, also from Brazil, produces lilac flowers from June to October, and is frequently grown in beds or groups with other plants. Verbenas flourish in light garden soil, especially when fertilized with well-rotted manure. They are commonly propagated by seeds. The hard seeds of some species are steeped in warm water for an hour or two before sowing to cause a more rapid germination. The stems pegged down to the soil produce shoots from the axils of the leaves.

VER'BENA'CEÆ (Neo-Lat. nom. pl., from Lat. *verbena*, foliage, herbage, sacred bough, plant used as a cooling remedy). A family comprising about 75 genera and 1300 species of herbs, shrubs, and some tropical trees, widely distributed in temperate and warm regions. Some of the best-known genera in cultivation are *Verbena* and *Lantana*, while *Tectona* yields the well-known Indian teak. The common genera of the North American flora are *Verbena* (vervains), with about 25 species; and *Lippia* (fog-fruits), with about 10 species. Both genera are characteristically American, but chiefly represented in tropical and subtropical America.

VERBITSKAYA, vĕr'bĭt-skä'yȧ, ANASTASIA ALEXEIEVNA (1861–). A Russian writer.

From 1883 she figured prominently in magazines In book form the following collections have appeared: *Life's Dreams* (1899), *Emancipated* (1902), *The Crime of Maria Ivanovna* (1902), and *Happiness* (1905). Among her novels *The Story of a Life* and *The Keys of Happiness* were most popular. Her dramas include *The Spirit of the Age*, dealing with the revolutionary days of 1905, and *Useless Sacrifices* A summer idyl, *Elena Pavlovna and Seriozha*, appeared in 1915. Feminism and the economic independence of woman constitute the dominant themes of her work, especially her novels.

VERBOECKHOVEN, vĕr'book-hō'ven, EUGÈNE JOSEPH (1799–1881). A Belgian animal painter and etcher. He was born at Warneton, West Flanders, was the son and pupil of the sculptor, Barthélemy Verboeckhoven (1759–1840), and also studied under Ommeganck. He visited England, Germany, France, and Italy, and settled at Brussels, where he painted numerous animal pieces, chiefly sheep, to be seen in Amsterdam, Berlin, Munich, and various other galleries of Europe and America. They were very popular in his day, and are correctly drawn and smoothly executed, but lack realism, force, and variety. He also published numerous etchings and lithographs of animals and landscapes.

VERCELLI, vĕr-chĕl'lē An episcopal city in the Province of Novara, Italy, situated in a low fertile plain, on the Sesia, 44 miles by rail west-southwest of Milan (Map: Italy, B 2). It is a thriving manufacturing and commercial town. It has retained its narrow, winding streets, but its ancient walls have given place to boulevards, those on the northwest commanding magnificent views of the Alps The seventeenth-century cathedral has a library containing a collection of valuable manuscripts. (See VERCELLI BOOK.) The thirteenth-century Romanesque-Gothic San Andrea, and the San Cristoforo, with a fine altarpiece by Gaudenzio Ferrari, are worthy of note. There are manufactures of silk, machinery, matches, silverware, and surgical instruments. The flour and rice mills are important and Vercelli is one of the chief export centres in Italy for rice and other cereals. Vercelli was the scene of Marius's victory over the Cimbri in 101 B.C. After having been ruled by the Visconti of Milan, it passed to Savoy in 1429. Pop (commune), 1901, 31,154, 1911, 31,903 (town, 17,936).

VERCELLI BOOK, or CODEX VERCELLENSIS. The name given to a valuable collection of Old English or Anglo-Saxon sermons and poems preserved in the library of the cathedral at Vercelli, Italy. This manuscript book was discovered in 1822. How it reached Italy is uncertain. It may have been taken out of England by Cardinal Guala, who in the reign of Henry III was prior to St. Andrew's, Chester. On his return to Italy the Cardinal built the Monastery of St. Andrew, in Vercelli. It is to be noted that the longest poem in the manuscript is *Andreas, or the Legend of St. Andrew*, one of the best of the Old English religious epics. Consult the facsimile copy of the *Codex Vercellensis*, by R. Wülker (Leipzig, 1894); and see EXETER BOOK.

VER'CINGET'ORIX. The most famous of the Gallic chieftains who fought against Cæsar. He was the leader of the Arverni tribe and carried on war against Cæsar with great ability in 52 B.C. He fell into Cæsar's hands at the fall of Alesia and was taken to Rome, where he was put to death after participating in his conqueror's triumph. The seventh book of Cæsar's *Commentaries on the Gallic War* treats of the war against Vercingetorix.

VERDANT GREEN, THE ADVENTURES OF MR. A college story by Cuthbert Bede (Rev. Edward Bradley), published, with illustrations by the author, in 1853. It was continued in *Tales of College Life* (1856) and *Mr. Verdant Green Married and Done For* (1856).

VERDE, vĕrd, CAPE See CAPE VERDE.

VERDE ANTIQUE, vĕrd ăn-tēk' (OF. *verd antique*, Fr. *vert antique*, It *verde antico*, ancient green, abbrev. from *porfido verde antico*, green antique porphyry). A variety of augite-andesite porphyry (see ANDESITE), quarried in ancient times at Marathonisi, on the Gulf of Kolokythia, in Greece, and much employed as an ornamental stone. It has a dark green base, or ground mass, in which are lighter green porphyritic feldspar crystals, their color due to alteration processes. The name is also given to serpentine marble, a mixture of serpentine and calcite, used for indoor ornamental work and sometimes called ophiolite or ophicalcite.

VERDEN, fär'den. A town in the Prussian Province of Hanover, 21 miles southeast of Bremen, on the Aller and on the Hanover-Bremen line of the Prussian State Railway (Map: Germany, C 2). Its manufactures include especially agricultural machinery, cigars, and soap. Pop., 1910, 10,064. At this place 4500 Saxons were executed by Charlemagne. Verden became a Swedish duchy in 1648, in 1719 was joined with Hanover, and in 1866 annexed to Prussia.

VERDI, vĕr'dē, GIUSEPPE (1813–1901). The greatest Italian composer of the nineteenth century. He was born at Roncole, a small town in the Duchy of Parma, Oct 9, 1813. At seven he received instruction from Baistrocchi, the organist of the village church. The boy's progress was rapid, and (about 1823) his father decided to give him a liberal education, sending him to the academy at Busseto. Two years later, upon completion of the course, he was apprenticed to Antonio Barezzi, president of the Philharmonic Society of Busseto. Provesi, the conductor of the society, instructed him in composition and orchestration. When Provesi retired Verdi was unanimously chosen his successor. When Verdi had reached his sixteenth year Barezzi and Provesi sent him to the conservatory at Milan. The director, Francesco Basili, rejected him for lack of musical ability, but the young man applied to Vincenzo Lavigna, then conductor at La Scala. Lavigna detected his talent and confined his instruction chiefly to the practical side of operatic composition. Of the pieces written at this time none has been published, although Verdi used some in his earliest operas.

When Provesi died in 1833 Barezzi asked Verdi to come back to Busseto as conductor of the Philharmonic Society. Verdi returned, and bound himself for three years at a salary of 300 francs. On the expiration of this he went back to Milan. There Verdi met a young poet, Solera, who wrote for him the text of his first opera, *Oberto, Conte di San Bonifacio*, which was produced with a splendid cast on Nov. 17, 1839. Ricordi offered the young composer 2000 lire for the score of *Oberto*, and guaranteed 4000 lire for each of three operas to be written at intervals of eight months. Verdi at once

began work on a book furnished by Merelli, *Un Giorno di Regno*, a comic opera. But the death of his children and his wife in succession so affected him that the opera was a failure Reluctantly, Merelli released him. After two years' retirement, Verdi brought out a new opera, *Nabuccodonosor* (1842). Its success made him a celebrity. In the following year *I Lombardi* appeared, and thereafter Verdi was regarded as the foremost composer of Italy. In 1844 *Ernani* was produced at Venice, and proved a great success.

Verdi's genius seemed now to suffer an eclipse, for of the operas written between 1844 and 1851 none rises above mediocrity; some were failures. These works are: *I due Foscari* (1844), *Giovanna d'Arco* and *Alzira* (1845), *Attila* (1846), *Macbeth* and *I Masnadieri* (1847), *Il Corsaro* (1848), *La Battaglia di Legnano* and *Luisa Miller* (1849), *Stiffelio* (1850). With the *Stiffelio* closes the first period of Verdi's career.

In 1849 Verdi married the famous prima donna Giuseppina Strepponi, who had appeared in several of his operas. His second period began with *Rigoletto* (1851), followed at the end of 1852 by *Il Trovatore*, and only a few weeks later by *La Traviata*. The success of each of these was phenomenal and carried his name over the civilized world. For the Paris Exposition of 1855 Verdi was commissioned to write a festival opera. This was *Les Vêpres Siciliennes*, produced with moderate success at the Grand Opéra. Still more coolly the next work, *Simone Boccanegra* (1857), was received. *Un Ballo in Maschera* (1859) once more was an emphatic success, whereas *La Forza del Destino* (1862) was received with less favor. The next five years Verdi revised and partly rewrote older operas. Another French opera, *Don Carlos*, was written for and produced during the Paris Exposition of 1867. The score of this is carefully written and there is less evidence of Verdi's chief faults. These operas constitute the composer's second period. All of them show the influence of the style of the Paris Grand Opéra, but instead of being influenced by the grace and esprit of this school, Verdi seems to have been attracted chiefly by its worst qualities, as shown in its violent contrasts, commonplace melodies, distorted rhythms, and an instrumentation which is either overloaded or too meagre. But in spite of these faults the works of this period are full of passages which show Verdi's great creative genius.

Although he wrote little between 1860 and 1870, he was not idle, for he devoted his time to study of the great Italian masters, perfecting his own technic and educating and refining his artistic taste. Close upon the age of threescore Verdi turned his back upon the style that had made him famous and wealthy. *Aida* (1871), written for the Khedive of Egypt, was the first opera produced in accordance with his newly acquired artistic convictions. The success of this new work was most emphatic. Verdi had a still greater surprise in store for the musical world when he came out with the *Manzoni Requiem* (1874). Verdi was now silent for 13 years, but in 1887 *Otello* appeared, a work which surpasses all his previous efforts and which is a real drama. On the same lines is constructed his last and perhaps greatest work, *Falstaff* (1893). It is remarkable that Verdi, whose only comic opera had been a signal failure, should close his career with the greatest musical comedy which the world possesses, with the single exception of Wagner's *Meistersinger* The list of Verdi's works is completed by the mention of a dramatic cantata *Inno delle Nazioni* (1862), a string quartet (1873), several romances, a *notturno* for three voices with flute obligato, and his last composition, *Quattro Pezzi Sacri* (1898).

In 1874 Verdi was made Senator. In 1898 he donated the sum of 2,000,000 lire to the city of Milan for the purpose of erecting a home for old and invalid musicians of both sexes. The last years of his life were spent in retirement at his villa, Sant' Agata near Busseto. He died in Milan, Jan. 27, 1901. Consult: F. Crowest, *Verdi, Man and Musician* (New York, 1897); C. Perinello, *Giuseppe Verdi* (Berlin, 1899); A. Soffredini, *Le opere di Verdi* (Milan, 1901); F. Garibaldi, *Giuseppe Verdi nella vita e nella arte* (Florence, 1904); A. Visetti, *Verdi* (New York, 1905); C. Bellaigne, *Verdi, biographie critique* (Paris, 1911); G. Roncaglia, *Giuseppe Verdi* (Naples, 1914). See MUSIC, HISTORY OF, *XXXI*; OPERA, *Modern Tendencies, Italy*.

VERDICT. The finding of a jury upon the issues tried before it It is the function of the jury to determine from the conflicting evidence and testimony before them what facts they consider to have been established and to make a proper application of the law relating thereto as charged by the court. Where a court wishes to reserve the application of the law to itself, it may direct the jury to find the facts only, and such a finding is known as a special verdict. A verdict must be the result of the fair and unbiased consideration of all the jurors, and if it is arrived at in any other way it may be set aside. For example, if the jurors differ as to the amount of damages to be awarded to a plaintiff, and in order to reach an agreement add together the various sums contended for by each, and divide the total by 12, such a quotient or compromise verdict may be set aside. A verdict which is the result of chance or lot is also illegal and void. In civil proceedings, if the verdict is against the weight of evidence or illegal for any reason, it may be set aside. In criminal proceedings a verdict of acquittal is conclusive, but in case of a disagreement the accused may be tried again A verdict must be unanimous, and it has been held that in trials for felony the accused cannot waive the right to the verdict of 12 jurors. Thus, even if the defendant expressly consents to be tried by 11 jurors the verdict will be a nullity. The courts in many States may receive a verdict on Sunday. An accused person has the right to be present in court when the verdict is rendered, and in many of the States he is required to be present or the proceedings will be illegal. If it is not convenient for a judge to receive a verdict at the hour the jurors arrive at their conclusion, he may authorize them to write it out, affix their signatures to the paper, seal it up securely, and deliver it to a court officer for custody until they assemble again in court to announce it. Such a verdict is known as a sealed verdict. This is often done where the verdict is determined upon late at night, especially on the eve of a holiday. There is no fixed rule as to the time allotted within which the jury must either agree or pronounce a disagreement. The court

has a discretionary right to send the jury back for further deliberations until it is satisfied that it is highly improbable that a verdict will be agreed upon. The verdict of a jury is announced by its foreman and must be in a proper form to answer the issues presented For example, a general verdict is for the plaintiff or for the defendant, specifying the amount of recovery, and in criminal cases, guilty or not guilty. In Scotland the peculiar and unsatisfactory form of verdict not proven is permitted in criminal cases. This does not exonerate the prisoner, but is a bar to a second trial Consult Sir J. F. Stephen, *Commentaries on the Law of England* (14th ed, London, 1903); *New York Code of Civil Procedure;* and the authorities referred to under PLEADING. See JURY; SPECIAL VERDICT.

VERDIGRIS, vĕr'dĭ-grēs (OF *verd de gris, vert de gris,* Fr. *vert-de-gris,* verdigris, green of the Greeks). A green pigment consisting of basic copper acetates in varying proportions. It was known to the ancient Romans, and is prepared by exposing thin sheets or strips of copper to the action of acetic acid developed in the marcs or residues from wine factories, and is produced largely in the wine districts of France. After a few weeks, the surface of the copper becomes coated with a crust of verdigris, which is then detached and levigated A better process of production consists in interposing cloths saturated with acetic acid between copper plates. Verdigris finds its chief use as a pigment, especially when mixed with white lead. It is also used in dyeing and calico printing, and for the preparation of Schweinfurt green and other copper paints Verdigris has long been employed in medicine in the form of an ointment or liniment, chiefly as a caustic application to warts. Taken internally it is an irritant poison, and the free administration of the white of eggs and milk is its best antidote.

VER'DIN. A bird. See GOLDTIT.

VERDUN, vâr'dĕN' (officially *Verdun-sur-Meuse*) A fortified town of the first class, capital of an arrondissement in the Department of Meuse, France, on the right bank of the Meuse, 43 miles by rail west of Metz (Map: France, N., L 3) The river separates here into five branches. Since the Franco-Prussian War it has been made the strongest town of east France. The forts on the right bank are connected with a series of forts reaching to Toul. Among the noteworthy buildings is the cathedral, built in the eleventh and twelfth centuries, and altered in the fourteenth and seventeenth. Other features are the Hôtel de Ville, the Palais de Justice, the new college, and the Bishop's Palace. There is a valuable public library. Hardware, rope, leather, liqueurs, and famous confectionery (dragées de Verdun) are manufactures. Verdun, the Roman Verodunum, was included in the Kingdom of Austrasia. In the ninth century it became part of Lorraine and remained a German town till the Reformation, rising to the position of a free Imperial city The surrounding district was ruled by the bishops of Verdun, with whom the citizens had to wage long struggles. In 1552 Henry II of France seized the town and the bishopric, which were formally relinquished by the German Empire in the Peace of Westphalia (1648). In 1870 Verdun surrendered to the Prussians after a severe bombardment. Pop., 1901, 21,360; 1911, 21,701. See VERDUN, TREATY OF.

In the War of 1914 it served as the right flank of the allied armies in the battle of the Marne, then forming the eastern limit of the gap (Paris-Verdun) into which the Germans were compelled to pass in order to reach the allies As such, it was an advanced point thrust into the entire German mass from Alsace to Paris, and thus became the centre of most desperate fighting. Taught a lesson by the fall of Liége, Namur, and Maubeuge respectively, the French authorities, there is reason to believe, altered its characteristics from that of fortress pure and simple to that of fortress in relation with a defending army in the field, and thus enabled it, in 1916, to offer the most pertinacious resistance to the most tremendous effort yet made by the enemy to win a decision at some point in the adversary's line. See WAR IN EUROPE

VERDUN. A town in Jacques Cartier Co, Quebec, Canada, and a residential suburb of Montreal. Pop., 1901, 1898; 1911, 11,629.

VERDUN, TREATY OF The peace concluded on Aug. 10, 843, by Louis the German, Charles the Bald, and the Emperor Lothair, the three sons of Louis the Pious, by which the Frankish Empire was divided among them By the terms of the treaty Lothair retained the honorary title of Emperor, with Italy and the country between the Rhine on the east, and the Rhone, Saône, Meuse, and Scheldt on the west; Aix-la-Chapelle was given to him as his capital Louis received the countries east of the Aar and the Rhine, also the gaus of Speier, Worms, and Mainz. Charles received the countries west of the Rhine, including Neustria and Aquitaine, with western Burgundy and the Spanish March. See CAROLINGIANS.

VERDY DU VERNOIS, vâr'dē' dü vâr'nwä', JULIUS VON (1832–1910). A German strategist. He entered the Prussian infantry in 1850, served on the staff of the Second Army in the war against Austria in 1866, and as one of Moltke's chief assistants served on the general staff during the Franco-Prussian War in 1870–71. After the war he continued in the office of the general staff, and was promoted to major general in 1876, lieutenant general in 1881, and general of infantry in 1888. He became Governor of Strassburg in 1887, and Minister of War in 1889, but retired in 1890. His writings include: *Teilnahme der zweiten Armee am Feldzuge, 1866* (1866); *Ueber praktische Felddienstaufgaben* (6th ed., 1890); *Studien über Truppenfuhrung* (1870; new ed., 1892; Eng trans., 1906); *Studien über den Krieg auf Grundlage des deutsch-franzosischen Krieges* (1892–96); *Im grossen Hauptquartier, 1870–71* (1895; Eng. trans., 1897); *Im Hauptquartier der zweiten Armee, 1866* (1900); *Studien uber den Krieg* (1901–06).

VERE, vā'rē. See VEERE.

VERE, vēr, SIR AUBREY DE and AUBREY THOMAS DE. See DE VERE.

VERESAEV, vyĕ'rĕ-sä'ĕf, VIKENTY (1867–). A Russian writer, born at Tula, his real name being Vikenty Smidovitch. He practiced medicine before devoting himself to literature; hence several of his works, notably *The Memoirs of a Physician* (Eng. trans, New York, 1916), deal with incidents connected with his medical experiences. Besides this work, he wrote *Astray,* an ultra-revolutionist novel; *At the Front,* a grim picture and psychological study of war; and *The End of Andrei Ivanovitch,* dealing with the transformation of peasantry into

dwellers of the city. His *New Life*, a study of Tolstoy and Dostoyevsky, drew attention to Veresaev as a literary critic. His collected writings were published at St Petersburg (4 vols, 1913) Consult S Persky, *Contemporary Russian Novelists* (Boston, 1913)

VERESHTCHAGIN, vĕ'rĕsh-chä'gĕn, Vassili (1842–1904). A Russian military painter. He was born at Tcherepovets, Government of Novgorod, and studied at the St Petersburg Academy, and later removed to Paris, where in 1864 he began his work with Gérôme at the Ecole des Beaux-Arts. In 1867 he joined the expedition against Samarkand, and after a sojourn in Paris went in 1869 to Siberia. Later he spent two years in Munich. For four years he traveled in China and India. In 1877 he left Paris, whither he had gone to live, to join the Russian army in the Russo-Turkish War Afterward he abandoned war, and became its severest denouncer He gathered his material at first hand, and while on such a mission he lost his life, going down on the Russian battleship *Petropavlovsk*, in the harbor of Port Arthur, April 13, 1904. Striving to teach his detestation of war by depicting its horrors, he recoiled from no realism of subject. Technically, his pictures, which are mostly of colossal size, are crude in color, but they are filled with figures, contributing much to the history of the subject. Among the most striking are "The Pyramid of Skulls," "Forgotten," "The Road after Plevna," "Skobelev in the Shipka Pass," "The Emir of Samarkand Visiting the Trophies" His war pictures are in cycles, among which are an Indian series, a series representing Napoleon's campaign in Russia, and another on the Spanish-American War. He held repeated exhibitions in the United States, where a number of his works are in public and private possession, including three in the Brooklyn Museum. He is best represented in the Tretyakov collection, Moscow, by Indian and Central Asiatic subjects and his best-known battle pieces. Selections from his memoirs have been published in English under the title *Vereshtchagin, Painter, Soldier, Traveler* (New York, 1888); as has also been his *Napoleon I in Russia* (London, 1899).

VERGA, vĕr'gä, Giovanni (1840–1922). An Italian novelist and dramatist, born at Catania, Sicily His greatest works are *I Malavoglia* (1881) and *Mastro Don Gesnaldo* (1889), the latter of which has been favorably compared to the *Madame Bovary* of Flaubert. Of Verga's numberless tales *Cavalleria rusticana* is most famous as the libretto of Mascagni's opera. One of the greatest interpreters of Italian regional life Verga shares with Capuana the leadership of the Sicilian *veristi*. Consult B. Croce, "G. Verga," in *Critica*, vol. i (Bari, 1903), which contains a bibliography.

VERGE BOARD. See Bargeboard.

VERGENNES, vĕr'zhĕn', Charles Gravier, Count de (1717–87). A French statesman, born at Dijon. After serving for nearly a quarter of a century in various diplomatic capacities, first as Minister to Treves, then as Ambassador to Turkey, and finally as Ambassador to Sweden, he was made Minister of Foreign Affairs by Louis XVI in 1774. He arranged an alliance with the Swiss Confederation; and the negotiations that brought France into alliance with the new United States of America were conducted by him. Largely as a result of negotiations conducted by him, also, Spain joined in the war against Great Britain in 1779. Consult Bonneville de Marsangy, *Le chevalier de Vergennes* (Paris, 1894–98).

VERGENNES, Claire Elisabeth Jeanne Gravier de. See Remusat, Countess de.

VERGIL, vĕr'jĭl, Polydore (?1470–?1555). An English ecclesiastic and historian, of Italian origin, born at Urbino, Italy. He studied at Bologna and Padua, at the latter became secretary to the Duke of Urbino, and there wrote *Proverbiorum Libellus* and *De Inventoribus Rerum*, two books which went through several editions and translations, and established his fame He was appointed chamberlain to Pope Alexander VI, and about 1501 was sent to England as collector of Peter's pence (the last holder of this office). He became naturalized, and excepting three visits to the Continent, remained in England almost to his death. He received successively the rectorship of Church-Langton, the archdeaconry of Wells, and prebends in the cathedrals of Hereford, Lincoln, and St. Paul's, London. On a charge of libeling Wolsey he was imprisoned in 1515, but was soon released. After nearly 50 years in England, he returned to end his days in his native land, with permission to hold his archdeaconry, and his Hereford prebend His principal work, written at the instigation of Henry VII, is *Polydori Vergilii Urbinatis Anglicæ Historicæ Libri XXVI* (1534), which comprises a history of England from the earliest times to the end of the reign of Henry VII; it went through numerous editions, and in 1844–46 an Old English translation of the first eight books was edited and published for the Camden Society. His *De Inventoribus Rerum*, translated by John Langley and edited by W. A. Hammond, with an "Account of the Author and his Works," was published for the Agathynian Club of New York in 1868.

VERGIL (Publius Vergilius Maro) (70–19 B.C.). One of the most celebrated of Roman poets. The orthography Vergilius is established beyond question by the evidence of inscriptions, as well as by the earlier manuscripts and the Greek transliterations Ουεργιλιος and Βεργιλιος, and is now generally employed. The form Virgilius appears for the first time in the fifth century, and became current during the Middle Ages. It was due to popular etymology, which connected the name with *virga*, wand, on account of the association of Vergil with magic rites (see below), and perhaps also through association with *virgo*, either on account of the purity of his character, or because of the belief in later times that he was born of a virgin. Donatus (Suetonius) tells us that he was called in ancient times Parthenias because of the purity of his life; this name suggests the Greek word παρθένος, maiden (cf. Parthenon, the temple of the maiden goddess Athena). Among modern nations the spelling varies between Vergil and Virgil. The former is, strictly speaking, correct, but conservatism has preserved the latter in many cases, especially in England and America.

Unlike his friend and contemporary Horace (q.v.), Vergil gives us but little information about himself in his own writings. Our knowledge of his life is derived from casual allusions in other Roman writers, and from various ancient biographies, of which the best is that ascribed to Ælius Donatus, a grammarian of the fourth century of our era. The account of Donatus is doubtless based on the *De Viris Illustribus* of

Suetonius, and derived from good sources, but it has been amplified and distorted in many particulars. Some few details may, however, be regarded as authentic. For the ancient biographies of Vergil, consult H Nettleship, *Ancient Lives of Vergil* (Oxford, 1879), E Diel, *Die Vitæ Vergilianæ und ihre antiken Quellen* (Bonn, 1911); J. Brummer, *Vitæ Vergilianæ* (Teubner, 1912).

Like nearly all, if not all, the great Roman writers, Vergil was not a native of Rome, and he was not even a Roman citizen by birth; yet no Latin writer is more intensely patriotic or more thoroughly Roman in spirit than he. He was born in Cisalpine Gaul, near Mantua, in the District of Andes (Andes appears to have been the name of a people rather than that of a town). He was thus a fellow countryman of Catullus (q.v.), for whom he had a warm admiration, of Cornelius Gallus (q.v.), and of Nepos (q.v.); the same region afterward produced Livy, the Plinys, and perhaps Tacitus His parentage was humble and obscure His father was said by some to have been a potter, by others the hired laborer of a certain Magius, whose daughter, Magia Polla, he took to wife. In any event, Vergil's father became an independent landholder, and he acquired a competency from farming and bee keeping. He certainly gave his son a thorough education in the usual curriculum of grammar, rhetoric, and philosophy. Vergil studied first at home and in the neighboring town of Cremona. On his sixteenth birthday he assumed the manly gown (*toga virilis*), and went to Mediolanum (Milan) for further instruction. He continued his studies at Naples under Parthenius, who taught him Greek, and finally, in the year 53 B.C., he went to Rome, where he studied rhetoric and philosophy. Here the teacher who had the most influence on him seems to have been the Epicurean Siro. Through him, probably, Vergil became acquainted with the work of Lucretius (q.v.), by which he was strongly influenced He also acquired a love of philosophical study which lasted throughout his life and helped to give him that psychological insight which characterizes all his work. At Rome he seems to have busied himself also with the study of mathematics, natural philosophy, and medicine. At this period in his life we lose sight of Vergil for about 10 years. Being of a delicate constitution and a retiring disposition, he did not follow the usual military or political career, but appears to have returned to his native place, where he devoted himself to the management of his paternal estate and to study Throughout his life he was a diligent student, and read widely in Greek literature, as well as in that of his own country. After the battle of Philippi (42 B.C.) Vergil's property was included in the proscriptions which were made in Cisalpine Gaul for the benefit of the veterans of Antony and Octavian. The details of the affair, as reported by ancient authorities, are somewhat confused and uncertain. According to one view, the influence of C. Asinius Pollio, who held an important military command in that region, and took a friendly interest in the gifted young man, saved the estate for a while. After Pollio was succeeded by Alfenus Varus, although the latter was also a friend of Vergil's, the poet was driven from his home, and he is said to have had a narrow escape from death at the hands of one of the soldiers. He did not recover his property, but he received another estate by way of compensation, perhaps the one which he is known to have possessed near Nola in Campania For another view, see below, the paragraph on the *Eclogues* On the question of Vergil's experiences with respect to his paternal estate, consult the Conington-Nettleship edition of Vergil, vol. i, 108, 109 (4th ed., London, 1881). At the advice of his friend Cornelius Gallus, Vergil moved to Rome, where he made the acquaintance of Mæcenas and of Octavian He soon became a member of the former's circle of literary friends, into which he afterward introduced Horace. The patronage of Mæcenas relieved him of financial cares and allowed him to devote himself wholly to literary pursuits and to study. In 19 B.C. Vergil set out on a journey to Greece and Asia, with the intention of spending three years in a revision of the *Æneid*, which he had already completed substantially in the form in which it is known to us, and of then devoting the rest of his life to philosophical studies. In Athens he met Augustus, who prevailed on him to accompany him on his return to Italy. When he embarked, Vergil was ill with a fever caused by a visit to Megara on an intensely hot day, and, shortly after landing at Brundisium, in Italy, he died. He was buried near Naples, where his tomb is said to have been marked with the following epitaph, which briefly sums up his life and works·

Mantua me genuit· Calabri rapuere tenet nunc
Parthenope· cecini pascua, rura, duces.

These lines, however, cannot be regarded as having been written by Vergil himself, to whom tradition ascribed them, and the exact location of his place of burial is unknown.

Vergil's life was singularly quiet and uneventful. He suffered much from ill health, particularly dyspepsia and headache, but in all other respects he was fortunate. He counted among his friends the most distinguished men of his day, both in literature and in political life; his own position in the world of letters was generally and cordially recognized during his own lifetime. He accumulated a considerable fortune from the generosity of his patrons, and he possessed several country places as well as a house on the Esquiline Hill at Rome. On account of ill health he spent the greater part of his time in Campania and in Sicily He never married. He left his property to his half brother, Valerius Proculus, and to his literary executors, Varius and Tucca, with legacies to Mæcenas (q.v.) and to Augustus.

In appearance he is described by Donatus (Suetonius) as of a large frame, a dark complexion, and a rustic air. No bust of the poet which can be regarded as genuine has been preserved, and the numerous portraits which appear in the editions of his works have little or no claim to authenticity, with the exception of some miniatures which are found in the earlier manuscripts, and two mosaics, one discovered at Treves in 1884, the other at Susa, in Africa, in 1896. The latter, which seems to belong to the first century of our era, and probably gives us our best representation of the poet, shows him seated between the muses of tragedy and of history, holding in his hands a scroll, partly unrolled, on which are the words:

Musa, mihi causas memora, quo numine læso
Quidve. . . . (*Æn.*, i, 8.)

The face and figure, while less attractive than

those shown in some of the spurious portraits, agree much more closely with the description of Donatus than the portraits do Vergil's most marked characteristics seem to have been modesty and gentleness The prominence which came to him early in life was a genuine cause of distress to him, and he is said to have taken refuge in the nearest shop or doorway to avoid what Horace glories in, being pointed out by the finger of the passer-by.

Like nearly all the poets of the Augustan age except Horace, Vergil was strongly influenced by the Alexandrian school of Greek writers. (See ALEXANDRIAN AGE; ALEXANDRIAN LIBRARY; ALEXANDRIAN SCHOOL. See, too, below, the paragraph on the *Georgics*.) His acquaintance with them doubtless began at the time of his studies at Naples under Parthenius. This influence gave his works their cosmopolitan and modern tone, which with their pathos, that note of brooding pity, as Mackail happily expresses it, makes them mark a new era in the history of Roman literature. To these characteristics also their general and lasting popularity is in a great measure due. But, though a master in his treatment of the passion of love, he does not belong to the followers of Alexandria on whom Horace vents his scorn As Cicero in oratory avoided the extremes of the Asiatic and of the Attic schools, and developed a characteristic style of his own, so Vergil combined the best features of the Alexandrian poets with those of what we may term the national school of Roman writers. During his early life Vergil is said to have written some short poems, which he appears afterward to have suppressed; these will be considered later. His first serious work was in a field as yet untried by Roman poets, that of pastoral poetry. He is said to have taken this up at the suggestion of Asinius Pollio, although his fondness for country life and his love of nature made the task a thoroughly congenial one. The 10 poems which have come down to us, the *Eclogues* or *Bucolics* (*Eclogæ, Bucolica*), were written between the years 43 and 37; they were published at first separately, but afterward in a body. The arrangement, which is not strictly chronological, is doubtless that of the poet himself. They fall into two general classes—the purely pastoral poems, in which he sings of the life and the loves of shepherds, and those in which Vergil himself and his contemporaries appear in the guise of country folk. To the former class belong the second, third, fifth, seventh, and eighth Eclogues. The second Eclogue sings of the hopeless love of Corydon for Alexis, his master's favorite. The others all represent contests in song between shepherds: in the third and the seventh the singers are rivals who contend before a judge for a prize; in the fifth two shepherds meet and sing in turn the praises of Daphnis, the ideal shepherd, with many compliments to each other; and in the eighth two friends sing of unrequited love. Of the other class the first and ninth have to do with Vergil's loss of his paternal estate, and present not a few difficulties of chronology and of interpretation. The ninth, which seems to be the earlier, refers to his expulsion from his property and is supposed to have been designed to secure the aid of Alfenus Varus in recovering it; the first represents the poet as restored to his home and sings the praises of his benefactor, Octavian. The famous fourth Eclogue celebrates the birth of a child, whom it seems impossible to identify, who is to bring back the Golden age. The child is variously supposed to be the unborn child of Octavian and Scribonia, the offspring of Antony and Octavia, and Asinius Gallus, the son of C. Asinius Pollio. The first view seems on the whole the most probable, although the last is supported by such high authority as Ribbeck and Sellar. On this Eclogue consult J. E Church, "The Identity of the Child in Vergil's Pollio," in *University of Nevada Studies*, vol II (Reno, 1911); id., "The Identity of the Child in Vergil's Pollio: An Afterword," ib., vol. III (ib., 1911); id., "Sex Prophesying among the Ancients: Its Basis," ib., vol. III (ib., 1911). In Christian times this Eclogue was regarded as containing a prophecy of the coming of the Messiah. In the sixth two shepherds capture Silenus by a clever stratagem, and compel him to sing to them. It is supposed to have the object of justifying a refusal to celebrate the exploits of his friend Alfenus Varo on the plea that Apollo bids him devote himself to the humble field of pastoral poetry. The tenth condoles with his friend Cornelius Gallus for the faithlessness of his mistress. It represents Gallus as dying of love and singing of his woes to the Arcadian shepherds

The *Eclogues* are modeled closely on the *Idylls* of Theocritus (q.v.). The names of the personages who figure in the poems are taken from the Greek poet; and the scenery is in part Sicilian, in part Italian. Yet Vergil succeeded in giving to the *Eclogues* a national character, and the pathos which is characteristic of all his work appears in the feeling descriptions of the miseries caused by the civil wars. The interpretation of the poems of the first of the two classes mentioned above, which follow Theocritus most closely, presents no special difficulty. The allegorical poems, on the other hand, are full of puzzling contradictions and inconsistencies. In spite of their highly imitative character, the *Eclogues* take a high rank in the history of Roman literature.

The seven years which followed the publication of the *Eclogues* were spent by Vergil in the composition of a poem on agriculture, the *Georgics* (*Georgica*). This, published in 29 B.C, represents the perfection of Vergil's work from the point of view of finish. The subject is said to have been suggested by Mæcenas and Augustus, with the purpose of arousing a greater interest in rural life, in the hope that, if agriculture should be made more attractive to the Roman people, the farms which had been abandoned and laid waste during the civil wars would be restored to cultivation. Here again, however, the task was a congenial one, and the subject was one in which the poet was deeply interested and which he was thoroughly competent, through personal experience and knowledge, to handle. Although Vergil was the first Roman writer to compose a poem on agriculture, the topic was at all times a popular one, and he had an abundance of material at hand in his native language, the translation of the treatise of the Carthaginian Mago (q.v.), the works of Cato the Censor (q.v.), and of Varro (q.v.), and probably those of Hyginus (q.v.), besides an abundance of Greek sources. Vergil styles himself the Roman Hesiod (q.v), but there is little in common between the *Works and Days* of Hesiod and the *Georgics;* Vergil owes much more to the Alexandrian poets, especially Nicander and

Aratus. Though strictly speaking a didactic poem, the *Georgics* are not a complete treatise on agriculture, but handle selected topics. The first book deals with the management of fields, the second with the culture of trees, the third with the rearing of horses and cattle, and the fourth with bee keeping, concluding with the episode of Aristæus (q.v.). Ancient authorities declare that the last book contained originally a panegyric of Cornelius Gallus (q.v.), which was stricken out at the request of Augustus after the downfall of Gallus in 27 B.C., in its stead the Aristæus episode was inserted. The poem was composed slowly and deliberately, and refined and polished to the highest degree There is nothing in it of the dryness of a didactic work; even the most commonplace details are presented in an attractive form. There are numerous highly poetic digressions, such as the praise of spring and of Italy, and each book closes with such a digression. It has justly been called the most finished poem in the Latin language, and Addison termed it the most finished of all poems. As in the case of the *Eclogues*, Vergil undoubtedly followed his Greek and Roman sources closely, but he nevertheless stamped the work with his own individuality.

In spite of the literary perfection of the *Georgics* and the unfinished state in which Vergil left the *Æneid*, the latter has always rightly been regarded as the greatest of Vergil's works. The idea of writing a great national epic is one which he seems to have formed early in life, but he had postponed the undertaking until he should feel himself competent for it. He was doubtless hastened somewhat in carrying out his plan by requests for such a work from authority which it was impossible to resist In this field Vergil was not a pioneer, for the works of Nævius (q.v.) and Ennius (q.v.) had already connected the destiny of Rome with that of Troy and had outlined a plan for a national epic from which it would have been difficult to depart in any radical way Vergil undoubtedly made much use of the work of his predecessors, so far as contents were concerned, but the *Æneid* was so far superior to them in every way that it entirely supplanted them, and at once took a position as the national epic, from which it was never displaced. Besides the Roman writers, Vergil had at his command an abundance of Greek models, the *Iliad* and the *Odyssey*, the Cyclic Poets (q.v.), and Apollonius Rhodius (q.v.), and on these and others he drew with a freedom which would today be called plagiarism. In order to form a fair estimate of the rank of the *Æneid* as an epic poem, it must be borne in mind that it is an epic of a different type from the Homeric poems and hence cannot fairly be compared with them The *Iliad* and the *Odyssey* are the greatest of primitive epics, and as such defy imitation. But the *Æneid* is an historical epic, written with a definite purpose, the glorification of Rome and of the Julian line In its own class it must hold a high rank, if not the highest. In the *Æneid* the stories of the gods and goddesses and many of the mythological details are of the nature of epic machinery, though Vergil himself appears to have had a deeply religious nature; and, though his philosophical studies probably prevented him from accepting the ancient belief in its entirety, a desire to effect a revival of the old Roman reverence for the gods doubtless formed part of his plan, and was thoroughly in accord with the wishes and the policy of Augustus. The task which Vergil had undertaken was a great one, and he never completed it to his own satisfaction, although, as Mackail says, it is easy to see within what limits any changes or improvements would have been made, and the poem is substantially complete. Donatus (Suetonius) tells us that Vergil first wrote a version in prose and then turned this into poetic form, taking up the various topics and parts of the work, in no special order Such a method of composition would account for various inconsistencies that are found in the poem, which would doubtless have been removed in the final revision which Vergil had in mind, though strict consistency is not demanded of a poet. So dissatisfied was Vergil himself with the *Æneid*, says Donatus (Suetonius), that on his deathbed he gave directions that it should be destroyed, but by the command of Augustus it was published, with only such revision as was absolutely necessary, by Varius and Tucca.

The fact that Vergil was engaged on a national epic soon became known, and the appearance of the *Æneid* was awaited with great expectancy, to which Propertius gives expression in the well-known lines (II, 34, 65–66):

Cedite Romani Scriptores, cedite Grai,
Nescio quid maius nascitur Iliade.

In 26 Augustus, who was absent in Spain, wrote asking to see a first draft of the poem or some part of it; but Vergil was not yet ready and spoke of himself as having been mad to undertake such a task. A few years later, however, he read three books to Augustus, including the sixth, in which he inserted lines 860–886 in memory of the young Marcellus (q.v.). When the poet, who is said to have been a very effective reader, finished the beautiful lines, Octavia, mother of Marcellus, who was present, swooned, and on her recovery presented Vergil with 10,000 sesterces (about $500) for each line of the tribute.

The outline of the *Æneid* is in brief as follows. The poem begins with the voyage of Æneas from Sicily to Italy in the sixth year after the fall of Troy. Juno (q.v.), the relentless foe of the Trojans, persuades Æolus, king of the winds, to raise a great storm, which destroys one ship of the fleet and scatters the rest far and wide over the sea. Æneas (q.v.) with seven ships takes refuge in a harbor on the African coast within the territory ruled by Dido (q.v.), Queen of Carthage. His mother, Venus (q.v.), who has appealed to Jupiter and has received from him assurance of her son's great mission and its fulfillment, appears to Æneas in the guise of a huntress and advises him to seek the protection of Dido. He does so, and on reaching her palace finds messengers from the rest of his ships, which have all been saved but one. Venus meanwhile induces Cupid to inspire Dido with a passion for Æneas. Dido receives the Trojans kindly and entertains them at a magnificent banquet. Here Æneas tells the story of the capture of Troy by the stratagem of the wooden horse, of the sack of the city and his escape (Book ii). He tells of his attempts to found a city in Thrace and in Crete, and of the oracles and portents which pointed to Italy as his destined goal, of his meeting with Helenus and Andromache in Epirus, of his adventure with the Cyclops, and of his final arrival in

Drepanum, where he lost his father, Anchises, by death (Book iii). Then the story goes on from the night of the banquet. Æneas lingers for some time in Carthage, forgetful of his mission, beguiled by Dido's love. At last by the command of Jupiter he sets sail for Italy Dido kills herself and as she dies prays that there may be everlasting hatred between the Carthaginians and the descendants of Æneas (Book iv). He is driven by contrary winds to Sicily, where he is welcomed by his countryman Acestes, and celebrates funeral games on the anniversary of his father's death During the games the Trojan women, weary of their apparently endless wanderings, set fire to the ships, but the flames are extinguished by rain sent in answer to the prayers of Æneas. After leaving with Acestes those of his companions who wish to remain behind, Æneas sails to Cumæ (Book v). By the aid of the Sibyl he gains access to the lower world, and consults his father Anchises (q.v.), who tells him the glorious destiny of the race which he is to found (Book vi). Æneas then proceeds to the mouth of the Tiber, where Latinus, King of that region, receives him hospitably, forms an alliance with the Trojans, and promises to their leader Æneas his daughter Lavinia in marriage. Juno now makes a last attempt to prevent Æneas from carrying out his purpose. She involves the Trojans in a quarrel with the people of Latinus, while at the same time Turnus (q.v.), King of the Rutuli, one of Lavinia's disappointed suitors, prepares to make war on them. The result is that Turnus forms a coalition against the Trojans, who are aided by Evander, an Arcadian king who has founded a city called Pallanteum on the site afterward occupied by Rome. A long struggle follows with varying fortunes. The Trojans are finally victorious and Turnus is slain in single combat by Æneas (Books vii–xii).

The *Æneid* is unequal in its execution and in its interest for the general reader. Certain episodes stand out prominently from the rest of the work. The last six books, in which the numerous battle scenes demanded by literary tradition are somewhat tedious, are less generally known than the rest of the poem. They are, however, full of beautiful episodes (such as the Nisus-Euryalus episode, ix, 314–449), and the greatness of Vergil's achievement can be fully appreciated only when the *Æneid* is carefully studied as a complete work of art. Æneas, the hero of the poem, is throughout the man of destiny, with whom everything else is subordinated to his mission of founding a mighty empire. The episode of the unhappy Dido, which has most strongly appealed to the readers of all times, has many of the elements of a Greek tragedy. She, too, has her great task to perform, and love forms no part of her plans, but to save Æneas she is made the victim of the wiles of Venus. Although she knows from Æneas' story of his wanderings that the gods have willed that he should fulfill his destiny on Italian soil, she attempts to turn him aside from his purpose, not of her own will, but through the influence of a mighty power. His desertion of her is, according to ancient thought, justified and even praiseworthy, since it is the result of submission to the command of the king of gods and men. Further, the episode furnishes a tragic motive for the Punic Wars, that titanic struggle for the mastery of the world which took so strong a hold on the imagination of the successors of the victors. On this episode consult N De Witt, *The Dido Episode in the Æneid of Vergil* (Toronto, 1907); E. K Rand, "Vergil and the Drama," in *The Classical Journal*, vol. iv (Chicago, 1908); H. H Yeames, "On Teaching Vergil," in *The School Review*, vol. xx (Chicago, 1912). Æneas typifies the old Roman virtues, which Horace celebrates in the first six odes of his third book of Odes, and his escape from the wiles of the enchantress must have recalled to the Romans of the Augustan age, by contrast, the yielding of Antony to the charms of Cleopatra. The struggle for supremacy in Italy was that of the higher civilization against semibarbarism. The antitype of Æneas is the violent and godless Turnus, allied with Mezentius, the *contemptor divorum*, and other such men. So far as the outward form of the poem is concerned, it is generally agreed that in the *Æneid* Vergil brought the hexameter, "the stateliest measure ever molded by the lips of man," to the highest degree of perfection of which it was capable. Even in his earliest works he surpassed his predecessors, Ennius, Lucretius, and Catullus, in the handling of the hexameter, and his progress in the mastery of his chosen verse was constant, reaching its culmination in the last six books of the *Æneid*. He is particularly successful in adapting sound to sense; the swing of the Cyclops' hammers, the trampling of horses and the like are imitated, not only in single lines, but in longer passages. A recent critic says: "He has been perhaps more successful than any other poet in fusing together the expressed and the suggested emotion; he has discovered the hidden music which can give to every shade of feeling its distinction, its permanence, and its charm."

The *Æneid* was hailed with acclamation immediately on its publication, and its author was regarded as the inspired bard of his native land, the Roman Homer. A few feeble voices were raised in opposition to the general chorus of praise, but without effect. The influence of the poem was widespread and lasting, not only on the later Roman poetry, but on prose as well, and strongly affected even such writers as Livy and Tacitus. No later Roman poet ventured to handle the same theme, but the later epic writers for the most part drew heavily on Vergil for inspiration and material, and fully acknowledged his preëminence. His works became textbooks in the Roman schools at an early period, and lines from the *Æneid* have come to light which were scribbled by schoolboys on the walls of Pompeii. No Latin works were more extensively quoted. They came to be regarded as canons of grammatical and stylistic usage; they are extensively cited and discussed by such writers as Gellius, Nonius Marcellus, and Macrobius, and numerous commentaries were written on them. That of Servius (q.v.), which embodies much of the work of his predecessors, has come down to us. In the estimation of the Christians Vergil held a position unique among the pagan writers of Rome St. Augustine, e.g., vividly describes the charm which the *Æneid* had for him. Vergil was even thought to have received some measure of divine inspiration, and a meaning was read into his works which was entirely foreign to them. The writers of the decline, not content with imitating Vergil, busied themselves with the composition

of *centos*, composed of lines and half lines taken from his works and arranged in such a way as to give in many instances a sense very different from that which they had in their context. (See CENTO.) With diabolical ingenuity some grossly obscene poems were constructed in this way from lines which had no suggestion of impropriety, such as parts of the *Epithalamium* of Ausonius (q.v.). The writing of Vergilian centos became a regular form of literary production, and there were even those who improvised them.

With the revival of learning Vergil's influence became very great in most of the countries of Europe, and from that time until the present day the greatest poets have nearly all shown traces of his inspiration. Dante, Ariosto, and Tasso, Chaucer, Spenser, Milton, Dryden, and Tennyson may be mentioned as striking examples. His works have been translated into most of the languages of Europe. It was not until early in the nineteenth century that Vergil's claims to greatness began to be questioned, especially in Germany. Since then he has been criticized and defended with equal lack of discrimination by many of his opponents and champions. The most common charges brought against him are lack of originality and the inferiority of the *Æneid* to the Homeric poems. The latter point has already been discussed. The former criticism is in a sense justified, so far as material and even phraseology are concerned, but there can be no doubt that Vergil had in common with many other great poets the power of making what he borrowed his own, as is shown by the fact that he was able to inspire imitation as well as to imitate. A fair estimate must rank him among the greatest poets of ancient times, and among the great poets of the world's history.

At an early period a series of mythological legends began to be associated with the name of Vergil. The ancient biographies assert that his birth was attended with prodigies prophetic of his future greatness, and the reputation for vast learning, which he gradually acquired, and the belief in his prophetic powers, increased the veneration in which he was held and the mystic atmosphere which surrounded him. As early as the second century the custom of consulting the *sortes Vergilianæ* became current, i.e., the *Æneid* was opened at random, and an omen was drawn from the words of the first passage on which the eye fell. This custom, which the *Æneid* shares only with the Bible and the Homeric poems, lasted for many centuries. Charles the First of England is said to have consulted the *sortes Vergilianæ* and to have opened the *Æneid* at iv. 615–621. Still earlier Silius Italicus, as the Younger Pliny tells us, used to make an annual pilgrimage to Vergil's tomb, which he approached with as much reverence as if it were a temple, and this practice also became a current one. By the Middle Ages we find in legend and literature a mythical Vergil, a seer and a man profoundly acquainted with the secrets of nature. Among the common people of Naples he came to be regarded as a necromancer or wizard, and the most grotesque legends were associated with his name, in which chronology was entirely disregarded. He was said to have made a bronze fly which kept all other flies away from the city, a butcher's block on which meat kept fresh for six weeks, as well as other marvelous and curious things, and his name was associated with numerous adventures of a more or less disreputable character. These tales were carried by travelers to other countries and found their way into the romantic literature of the day and even into Latin works of a learned character.

Besides the works which are known to be Vergil's a number of minor poems have come down to us under his name, which are included in many editions. Three of these, the *Culex*, *Ciris*, and *Moretum*, belong to the class of the *epyllion*, or "little epic." In the first, which is a poem of about 400 hexameter lines, a gnat (*culex*) stings a sleeping shepherd and thus saves his life from a serpent. The shepherd as he awakens kills his preserver. The ghost of the gnat comes from the lower world, of which a full description is given, and reproaches his murderer with his untimely fate. The second, of about 500 hexameters, tells the story of Scylla (q.v.) and Nisus, and takes its name from the bird into which the former is changed. The third, a charming little poem of 124 hexameters, describes a farmer preparing his breakfast, which consists of bread, which he prepares and bakes, and a rustic salad (*moretum*). Besides these there is a poem of 38 lines in the elegiac distich, the *Copa*, "Mine Hostess," which represents a Syrian woman dancing in the doorway of her wayside inn and inviting the wayfarer to enter, and a collection of 14 shorter pieces in various metres called *Catalepton* (Ποιήματα Κατὰ Λεπτόν, "Minor Poems"). The authorship of these poems has been much discussed. Donatus and Servius attribute a number of minor poems to Vergil. Both enumerate among these *Culex*, *Diræ*, *Ætna*, *Ciris*, *Catalepton*, *Priapeia*, and *Epigrammata;* Servius adds a *Copa*. An *Ætna* and *Diræ* have also been preserved, but it is the general consensus of scholars that they cannot have been written by Vergil. The rest of the list corresponds exactly with the poems which have come down to us as youthful works of Vergil, for the *Priapeia* and *Epigrammata* are both represented among the *Catalepton;* but we have only to assume that the poems were collected and ascribed to Vergil in the time of Nero, a belief which is held by some scholars, to make the testimony of Donatus and Servius, and even that of Statius and Martial, who refer to a *Culex* by Vergil, seem to have very little weight.

The testimony of Lucan to a Vergilian *Culex* is more difficult to dispose of. On the other hand, the contrary evidence is not very convincing. Much has been made of certain metrical features of the poems, but these, which were really the only strong argument against a Vergilian authorship, have recently been declared by F. Skutsch to be of no great weight, at least in the case of the *Culex* and the *Ciris*. The latter has been generally regarded as the work of an unknown poet belonging to the circle of M. Valerius Messala, the patron of Tibullus, but Skutsch claims the poem for Cornelius Gallus, and regards the lines which the *Ciris* has in common with Vergil's works as original with the former. There is little to show that the *Culex* may not have been a youthful work of Vergil's. Chronologically it belongs to that period, and with reference to the triviality of the theme and the inferiority of the poem to Vergil's later productions, which are offered as arguments against its genuineness, one may recall the words of Lucan, when com-

paring his early efforts with those of Vergil, which are quoted by Suetonius

et quantum mihi restat
Ad Culicem?

There is still less ground for skepticism in the case of the *Moretum*, and the only reason for rejecting the *Copa* is its entire unlikeness to Vergil's manner, which, as Mackail says, might tempt one into the paradox of its authenticity. The question is a very difficult one and cannot be regarded as settled, nor is it likely, without more evidence than is at present available, that unanimity of opinion will ever be reached. The majority of scholars regard the whole collection as spurious, with the possible exception of some of the *Catalepton*, though most express this opinion more decidedly in the case of some of the poems than of others The brilliant work of Skutsch, though not very convincing in its main thesis, rather increases the probability that the poems are the work of Vergil by disposing of the metrical arguments and some of the chronological difficulties. If the objection of unlikeness to the Vergilian manner is a valid one, it applies with more or less force to the entire collection The whole question is comparatively unimportant, so far as Vergil's position in literature is concerned, but it is of great interest as regards the development of his genius. On the general subject consult: F. Skutsch, *Aus Vergils Frühzeit* (2 vols, Leipzig, 1901–06); J W. Mackail, "Vergil and Vergilianism," in *The Classical Review*, vol xxii (London, 1908); T. Birt, *Jugendvers und Heimatpoesie Vergils* (Leipzig, 1910); S. E. Jackson, "The Authorship of the Culex," in *The Classical Quarterly*, vol. v (London, 1911); J. W. Mackail, *Lectures on Poetry* (ib., 1911); *The Classical Weekly*, vol. vi, 110 (New York, 1913); W. G. D. Butcher, in *The Classical Quarterly*, vol. viii (London, 1914). Of great importance, too, in this connection, as affording a sound basis for the study of Vergil's language, is M. N. Wetmore, *Index Verborum Vergilianus* (New Haven, 1911), reviewed by C Knapp, in *The Classical Weekly*, vol. vi (New York, 1913).

Vergil's popularity during the time of the Roman Empire and throughout the Middle Ages led to the preservation of his works in an unusual number of old and good manuscripts. Of these not less than four, together with three sets of fragments, are written in capitals or uncials and may be assigned to the fourth or fifth century. These are among the oldest manuscripts of Latin writers which have come down to us. The *editio princeps* was published at Rome about the year 1469. The standard critical edition is that of Ribbeck (Leipzig, 1859–68), containing his famous *Prolegomena*. There is a later edition, without the *Prolegomena* (ib., 1894–95). The best English edition is that of Conington and Nettleship (3 vols., 4th ed, London, 1881–83). There are numerous good editions published in America and abroad, of which the following may be mentioned: Forbiger (4th ed., Leipzig, 1872–75); Kappes (5th ed., ib., 1893); Benoist (2d ed., Paris, 1876); Papillon and Haigh (Oxford, 1892); Sidgwick (Cambridge, 1894–97); Greenough-Kittredge (Boston, 1899); and Knapp (Chicago, 1902). Especially valuable is the edition of *Æneid*, Book vi, by E. Norden (Leipzig, 1903). There is also an edition of Servius' commentary by Thilo and Hagen (Leipzig, 1881–87). The translations of Vergil into English are very numerous The earliest is that of Dryden The *Æneid* has been translated by Conington into prose (London, 1872) and into verse (ib., 1873), as well as by William Morris, Cranch, Kennedy, Mackail, Rhodes Williams, and others. The *Georgics* have been translated by Rhodes, Blackmore, and Williams, and the *Eclogues* by Calverley, Palmer, and Williams Consult also: C A. Sainte-Beuve, *Etude sur Virgile* (2d ed, Paris, 1870); Henry Nettleship, *Ancient Lives of Vergil* (Oxford, 1879); id, *Lectures and Essays* (ib., 1885); R. Y. Tyrrell, *Latin Poetry* (New York, 1895); J W Mackail, *Latin Literature* (ib., 1895), D. Comparetti, *Virgil in the Middle Ages* (Eng. trans by E. F. M. Benecke, London, 1895); Gaston Boissier, *The Country of Horace and Vergil* (New York, 1896); W. T. Sellar, *Roman Poets of the Augustan Age: Vergil* (3d ed., Oxford, 1897); C. G. Leland, *Legends of Virgil* (New York, 1900); Miller and Nelson, *Dido: An Epic Tragedy* (Chicago, 1900); F. W. H. Myers, *Essays—Classical* (new ed. New York, 1908); T. R Glover, *Studies in Virgil* (2d ed., ib., 1912); Heinze, *Vergils epische Technik* (3d ed., Leipzig, 1915); E. Norden, *Ennius und Vergilius* (ib., 1915). See also general works, such as W. S. Teuffel, *History of Latin Literature* (Eng. trans of 5th ed., by G. C. W. Warr, London, 1891), J. W Duff, *A Literary History of Rome* (ib., 1909); Martin Schanz, *Geschichte der romischen Litteratur*, vol. ii, part i (3d ed., Munich, 1911); the article "Vergilius, 2," in Friedrich Lübker, *Reallexikon des klassischen Altertums*, vol. ii (8th ed, Leipzig, 1914).

VERGNIAUD, vâr'nyō', PIERRE VICTURNIEN (1753–93). An orator of the French Revolution, born at Limoges. He studied law and practiced his profession at Bordeaux. In 1789 he was a member of the general council of the Department of the Gironde, and in 1791 he was sent as a deputy from Bordeaux to the Legislative Assembly and was recognized as a leader of the Girondists. He voted for the condemnation of the King and it was his duty as President of the Convention to announce the verdict and the sentence. He, however, steadily opposed Robespierre and the Mountain, and when the latter became supreme and undertook to do away with opposition Vergniaud shared in the fall of the Girondists (June 2, 1793). After remaining in concealment for some days he was seized, brought to trial, condemned, and guillotined Oct. 31, 1793, with 20 of his fellow Girondists. Consult Vatel, *Vergniaud: Manuscrits, lettres et papiers* (2 vols., Paris, 1875), and Touchard-Lafosse, *Histoire parlementaire et vie intime de Vergniaud* (Paris, 1848).

VERHAEREN, vĕr-hä'rĕn, EMILE (1855–1916). A Belgian poet, born at St Amand, near Antwerp. He studied at Ghent and later at the University of Louvain. He was admitted to the bar in 1881, but gave up law to devote his time to the two reviews *La Jeune Belgique* and *L'Art Moderne*. Verhaeren came to be known as the national poet of Belgium, and particularly of Flemish Belgium. Although he began as one of the Parnassians (q.v.), he belongs really to no school, and might be called an impressionist rather than a symbolist. In wealth of imagery, breadth of conception, and magnificence of language he has been compared

with Victor Hugo. Identified with the *jeune Belgique* (Young Belgium) group of writers, to which belonged Maeterlinck and Rodenbach (qq v.) and to which the Belgian literary revival is to be credited, Verhaeren first published *Les flamandes* (1883) This was received with a storm of protest because of its boldness of expression. Some critics, however, recognized genius in the new poet and encouraged him. There followed *Les moines* (1886) and a famous trilogy, written mostly in England, and giving vent to the author's suffering and despair when suffering from a disease that he thought would affect his mind—*Les soirs* (1887), *Les débâcles* (1888), and *Les flambeaux noirs* (1890) Afterward he wrote *Au bord de la route* (1890); *Les apparus dans mes chemins* (1891), *Campagnes hallucinées* (1893), *Villages illusoires* (1894): *Les villes tentaculaires* (1895), *Les heures claires* (1896); *Les visages de la vie* (1899); *Les petites légendes* (1900); *Les forces tumultueuses* (1902). In 1904 he began the series, *Toute la Flandre* (All Flanders), in which he voices his affection for his native country The series comprises: *Les tendresses premières* (1904), *La guirlande des dunes* (1907); *Les héros* (1908); *Les villes à pignons* (1909); *Les plaines* (1911) In 1912 and 1913 appeared *Les blés mouvants*. Verhaeren wrote in drama: *Les aubes* (1898); *Le cloître* (1900); *Philippe II* (1901); and *Hélène de Sparte* (1912). His *La Belgique sanglante* (1914; Eng. trans., *Belgium's Agony*, 1915) deals with the German invasion at the beginning of the European War. His *Œuvres* were published by the *Mercure de France* in two series (1912 and 1914). Most of Verhaeren's work has been translated into English, a list being available in Stefan Zweig, *Emile Verhaeren* (Boston, 1914). Consult also: L. Bazalgette, *Emile Verhaeren* (Paris, 1907); H. B Samuel, *Modernities* (London, 1913); Amy Lowell, *Six French Poets* (New York, 1915).

VER'IFICA'TION (from Lat *verificare*, to verify, make true, from *verus*, true + *facere*, to do, make). Under the common-law system of pleading, an averment in an answering pleading containing new matter, to the effect that the pleader is ready to establish the truth of the facts pleaded therein Where the new matter is merely negative a verification is not necessary The common form of such a verification is: *"And this the said A. B. is ready to verify."* In code pleading, the verification is an affidavit generally annexed to the pleading itself that the facts alleged in the pleading are true except as to the statements alleged on information and belief and that as to these the deponent believes them to be true. The verification is genrally made by the party, but in special instances, such as the absence of the party, may be made by the attorney. Its function under modern codes is to attest the good faith of the action or defense. See PLEADING.

VERKAUFTE BRAUT, fĕr-kouf'te brout', DIE (Ger., The Bartered Bride). An opera by Smetana (q v.), first produced in Prague, May 30, 1866; in the United States, Feb. 19, 1909 (New York).

VERLAINE, vâr'lăn', PAUL (1844–96). A French poet, born at Metz. Little is known of his early life. Before the Franco-Prussian War he had published *Poèmes saturniens* (1865); *Les fêtes galantes* (1869); *La bonne chanson* (1870). After 1870 Verlaine, who had led the traditional Bohemian life in Paris, disappeared for 11 years. In 1881 he reappeared in the public eye as a quasi-Catholic with his *Sagesse*, perhaps his best-known volume It is a remarkable product of a devout religious mysticism

From this time to his death in Paris in 1896, Verlaine remained, with the exception of sojourns in England, Belgium, and Holland, among the cafés of the Latin Quarter, drinking absinthe, carousing, and writing verse and journalistic articles The disordered habits of this modern Villon often led to serious misdemeanors which occasioned his imprisonment, or to long illnesses which confined him in hospitals—experiences which he characteristically described in *Mes prisons* (1893) and *Mes hôpitaux* (1891). During this period he published several volumes of verse, all of them rather small and containing only short poems; *Jadis et naguère* (1885), *Romances sans paroles* (1887); *Amour* (1888); *Bonheur* (1891), *Parallèlement* (1889); *Chansons pour elle* (1891); *Chair: dernières poésies* (1896). In prose he put forth *Les poètes maudits* (1884)—interesting sketches of his literary companions of the new school, notably Mallarmé and Rimbaud, also *Confessions* and *Les hommes d'aujourd'hui*

Verlaine is classed with the Symbolists (q v.). In his mystic worship of God and of the flesh he appeared by turns avowedly orthodox and hopelessly sensual. As for ideas and the gifts of a concrete imagination, he had none, but he was an exquisite master of verse He found new nuances, and new variations, and his pages exhibit a suffusing mobility of which French poetry had scarcely been thought capable. He usually wrote impeccably according to the strictest forms; but, like a Symbolist, he indulged at times in lines of 11 and 13 feet, ignored the interlacement of rhymes, etc. Altogether Verlaine is by far the greatest French poet Symbolism has yet to claim

Bibliography. Jules Lemaître, *Les contemporains*, vol iv (Paris, 1889); Delille, in *Fortnightly Review* (London, 1891), George Moore, *Impressions and Opinions* (ib, 1891); Max Nordau, *Degeneration* (New York, 1893), Ferdinand Brunetière, *L'évolution de la poésie lyrique en France*, vol. ii (Paris, 1894); Wilfrid Thorley, *Paul Verlaine* (London, 1914); Frank Harris, *Contemporary Portraits* (New York, 1915) Verlaine's *Works* are collected in five volumes (Paris, 1900).

VERLAT, vâr'la', MICHEL CHARLES (1824–90). A Belgian historical, animal, and portrait painter. He was born in Antwerp and studied at the academy there and under De Keyser. From 1850 to 1869 he lived in Paris, where he was influenced by Courbet, and from 1870 to 1874 was director of the academy at Weimar. He was known as a versatile painter of portraits, animals, and historical and genre scenes, when in 1875 he visited Palestine, and on his return painted a series of religious pictures which by their brutal, primitive realism stimulated the hitherto conventional Belgian artists to turn to the study of nature and character. Verlat had no eye for landscape and his color is glaring. Good examples of his work are in the Antwerp and Brussels galleries.

VER MACAQUE, vâr mă'kăk' (Cayenne name). The larva of a botfly (*Dermatobia noxialis*), which attacks human beings in South America. The back and shoulders are especially subject to attack. The adult fly lays its eggs or

larva on the skin, and the young grub penetrates and causes at first a swelling It grows rapidly, and unless destroyed will cause a large lump with an apical orifice Painful ulcers frequently result On reaching full growth the larva issues and falls to the ground to transform See BOT, OR BOTFLY.

VERMEER, vĕr-mār′ (VAN DELFT), JAN (JOHANNES) (1632–75) One of the foremost of Dutch genre and landscape painters. He was born at Delft in October, 1632, and spent the whole of his life there. He studied painting with Karel Fabritius, and in 1653 entered the guild of St. Luke, of which he was four times a warden. By his wife Catherina Bolnes he had eight children, and although both at different times inherited property, they lived in humble circumstances, and at the time of his death Vermeer was insolvent He worked deliberately, selling few pictures, for which he obtained prices equal only to those paid Gerard Dou. Thirty-three of these paintings survive, nearly all genre of small size, and most of them single figures He is the most modern of Dutch genre painters, and consequently the most appreciated at the present time Unlike other Dutchmen, he attained tone by a subtle adjustment of color values, instead of subordinating local color to a prevailing hue. He used cool colors over a blue or green ground, instead of the usual warm hues, and excelled especially in a marvelous treatment of light and atmosphere, which play about his figures with finest plastic effect But two of his rare landscapes survive a "View of Delft" (The Hague Gallery) and a "Street Scene in Delft" (Six collection, Amsterdam). They are unique in Dutch art, and the first has had no little influence on the landscape painting of modern Holland. Both belong to his early period as do also the two subjects, one religious and one mythological, "Mary and Martha" (Scamarole Castle, Scotland) and "Diana at Her Toilet" (The Hague), and also the life size "Procuress" at Dresden. Among other important paintings are· "Young Woman Writing a Letter" and "A Maid Servant Pouring out Milk" in the Rijks-Museum, Amsterdam, which possesses three of his works; "Young Lady with a Pearl Necklace," Berlin Museum (2); "The Coquette," Brunswick; "Lady Reading a Letter," Dresden; "The Astronomer," Frankfort; two versions of a "Lady at the Spinet," National Gallery, London; "The Lace Maker" and "The Astronomer" in the Louvre; "The Painter in his Study," a late work, Czernin collection, Vienna; and portraits of women at The Hague, Brussels, and Budapest. In the United States he is represented by "Young Girl Asleep," the very fine "Woman at a Casement," and "Lady Writing" (J. P Morgan), all in the Metropolitan Museum, New York; in the Frick collection by two examples; and by others in the Gardner collection, Boston, and the Johnson and Widener collections, Philadelphia.

Bibliography. The best monograph is a large folio, with excellent illustrations of all his works and text by C. Hofstede de Groot, *Jan Vermeer van Delft en Carel Fabritius* (Amsterdam, 1909). Consult also *Masters in Art*, vol. v (Boston, 1904), containing a bibliography; monographs by Gustave Vanzype (Brussels, 1908), Eduard Pliezsch (Leipzig, 1911), and P. L. Hale (Boston, 1913).

VERMEER VAN HAARLEM. See VAN DER MEER.

VERMEJO, vĕr-mā′hō See BERMEJO.

VERMES, vĕr-mēz (Lat, worms). The name, now practically discarded, given by Linnæus to one of the classes in his zoological system, in which he included all the invertebrate animals except Insecta, whether of wormlike form or not. Since Linnæus's time the name has been more or less widely used, but in an ever-narrowing and more restrictive sense. At the present time it comprises all nonchordate (see CHORDATA) animals which are not unicellular (see PROTOZOA), are not provided with jointed appendages (see ARTHROPODA), are not radially symmetrical, and have a well-marked body cavity, and have no mantle, shell, or creeping foot. The Vermes, excluding the group Platodes, are by a late authority (R Hertwig) divided into two phyla, i e., Rotifera and Cælhelminthes, the latter embracing six classes: Chætognathi, Nematelminthes, Annulata, Polyzoa, Phorinda, Brachiopoda - See WORM.

VER′MICEL′LI. See MACARONI

VERMIC′ULAR ACTION. See PERISTALTIC MOTION.

VER′MIFORM APPEN′DIX (from Lat. *vermis*, worm + *forma*, shape). A long, narrow, worm-shaped portion of gut about the diameter of a quill, or larger, and varying in length from 3 to 6 inches. It springs from the posterior and inner aspect of the head of the colon, near its lower end It is the rudiment of a lengthened cæcum found in all mammals excepting some of the higher apes and the wombat. In structure it resembles closely that of the large gut. It is hollow to its tip, and its cavity communicates with that of the large bowel. It is entirely covered by the peritoneum, being frequently attached by a fold of this membrane to the back of the large intestine. Rarely it has its own mesentery. Its functions are probably unimportant. Situated in the right side of the abdominal cavity, in the right iliac region, it hangs suspended from the large gut. Its blood supply in the male is a twig from the mesenteric arterial system In the female, besides the mesenteric supply a branch of the right ovarian artery is distributed to its distal extremity

Appendicitis. The appendix is not uncommonly the seat of processes accompanied by inflammation, perforation, and abscess. Attacks of this kind are termed "appendicitis." The exciting causes are mechanical or chemical irritation and bacteria. The disease is most common in individuals between 10 and 30 years of age, though it has been seen in an infant under one year and in patients over 70. About 80 per cent of the cases occur in males, because of their greater exposure to weather and injury, and because the female appendix has a greater arterial supply. The varieties of this ailment are: Acute appendicitis, including catarrhal, intestinal, ulcerative, and gangrenous forms; and chronic appendicitis, including catarrhal, interstitial, and obliterating forms. In most varieties the appendix is larger, longer, and firmer than normal, œdematous and filled with fluid or semifluid secretion, the lumen opening into the cæcum being closed. In the interstitial form there is a dense cellular infiltration of the retiform tissue of the mucous membrane, pathological alterations involving also the submucous, muscular, and subserous coats, and dilation of the blood vessels existing. Abscesses may develop in the submucous and subserous layers. The lymphoid follicles are the seat of serous

infiltration, and new lymphoid cells develop in small collections, afterward becoming necrotic. In the severer forms the final process is ulcerative, following extensive distention and necrosis, and the purulent contents of the appendix are discharged into the peritoneal cavity, together with fæcal material in many cases In the chronic forms ulceration does not take place. Attacks may recur from time to time and be unrecognized One-third of all adult bodies reveal diseased appendices at autopsy.

The three principal symptoms are pain, tenderness, and rigidity of the lower part of the abdominal wall on the right side The pain resembles that of colic and is generally referred to the neighborhood of the umbilicus, yet it may be felt in any part of the abdomen. A special diagnostic corroborative sign for the physician is tenderness on pressure at McBurney's point, midway between the anterior superior spine of the ilium and the navel. There are also gastrointestinal disturbances, elevation of temperature, increased rapidity of pulse and of respiration, vomiting, nausea, distention of the abdomen, and muscular rigidity A blood count shows a moderate leucocytoses, i.e, increase in the proportion of white cells to red. The physician can sometimes find the appendix by palpation. Ulceration and perforation with peritonitis may occur in three or four days, or may occur on the first day upon which any symptoms have been noticed by the patient. An interval of comparatively good health may elapse, and then a recurrence take place. In the chronic forms the most constant symptom is pain in the right iliac fossa, moderate at times, frequently recurring, and at times of great severity. The danger in these cases lies in the possibility of a sudden acute exacerbation going on to ulceration, gangrene, and fatal peritonitis. Various other disorders present similar symptoms and conditions to those of appendicitis, and the diagnosis is often difficult

The treatment is determined by the fact that it is a surgical affection from the start. Removal of the appendix is the only conservative, safe, and justifiable treatment. The medical treatment of the case is confined to the periods before and after the operative procedure, and includes attention to diet, local applications, laxatives, rest, and stimulation Early and active purgation in suspected appendicitis is imperative, whether diarrhœa be present or not. Opium should never be given under any circumstances.

It was formerly thought that appendicitis was due to the lodgment in the appendix of foreign bodies, such as seeds, fecal concretions, and the like. These may indeed be occasionally present, but the inflammation is always due to bacteria reaching it either from the intestine or through the blood. In the latter case it has been shown that bacteria from the pus pockets about the teeth or in diseased tonsils may obtain entrance to the blood stream and set up appendiceal inflammation, as well as infection in other parts of the bowel. Consult: McBurney, "Indications for Early Operation for Appendicitis," in *Annals of Surgery*, xiii (1891); Deaver, *A Treatise on Appendicitis* (Philadelphia, 1900); G. E. Brewer, *A Textbook of Surgery* (New York, 1915).

VER'MIFUGE. See ANTHELMINTIC.

VERMIGLI, vĕr-mē'lyē, PIETRO MARTIRE (PETER MARTYR) (1500–62). A Protestant Reformer He was born in Florence; became an Augustinian monk at Fiesole in 1516, and rose to be visitor-general of the order (1541), but adopted the views of the reformers. Having avowed his conversion at Lucca, he was compelled to flee to Switzerland, whence he passed to Strassburg, and became professor of theology there (1542). Invited by Cranmer to England, he was, in 1547, appointed by Edward VI regius professor of divinity at Oxford. Driven from England under Queen Mary, he resumed his chair at Strassburg (1553), where he taught till 1556, when he became professor of Hebrew at Zurich. Many of his numerous publications, which are in Latin, were translated into English. To his *Commonplaces* (London, 1583) is prefixed the original *Life* by Josias Muler. For Latin biographies consult C. Schmidt (Elberfeld, 1858). He shared in the preparation of the *English Book of Common Prayer*, issued in 1552

VERMILION, vĕr-mĭl'yŭn (OF., Fr. *vermillion*, from *vermeil*, bright red, from Lat. *vermiculus*, little worm, kermes insect, from which crimson or carmine was obtained, dim. of *vermis*, worm) A name applied to cinnabar, or native mercuric sulphide, but more generally to the artificial sulphide used as a pigment. the mineral not being of sufficient purity to be used directly as a pigment By the Dutch process the vermilion of commerce is prepared by heating together mercury and sulphur in an iron pan with constant stirring. This results in the formation of the black sulphide, which is afterward sublimed in clay retorts yielding the bright red pigment. A more modern process, known as the wet process, consists in agitating a mixture of mercury, sulphur, and aqueous potassium hydroxide together with iron balls in a revolving drum and heating to about 46° C. (115° F), when the mixture gradually assumes a red color. It is said that about 85 pounds of mercury are required to produce 100 pounds of vermilion. Vermilion is a permanent pigment, and may be used with water or oil, but cannot be used in enamel, as it volatilizes at a red heat. It possesses great body, weight, and opacity. Numerous red pigments known as vermilionettes consisting of coal-tar colors thrown on a lead body, such as the oxide or carbonate, have largely taken the place of the true vermilion as a pigment, as they have a permanent red color, stand exposure well, and change to a lighter color with age instead of darker, as is the case with vermilion. Chinese vermilion is made by the Dutch process and English vermilion largely with the wet process. American vermilion is not a mercury compound, but basic lead chromate prepared by boiling white lead with a solution of neutral lead chromate.

VERMILION. A city and the county seat of Clay Co., S. Dak., about 70 miles (direct) south of Sioux Falls, on the Missouri and Vermilion rivers, and on the Chicago, Milwaukee, and St Paul Railroad (Map: South Dakota, H 5). It is the seat of the University of South Dakota. Pop., 1900, 2183; 1910, 2187.

VERMILION FLYCATCHER. A very beautiful flycatcher (*Pyrocephalus rubineus mexicanus*) of the southeastern United States and Mexico, grayish brown above and with brilliant scarlet crown and underparts. It places a nest of delicate materials in a low tree, and lays eggs marked as shown on the Plate of EGGS OF SONGBIRDS.

VERMONT, vĕr-mŏnt' (Fr., green mountain).

A North Atlantic State of the United States, belonging to the New England group. It lies between lat. 42° 44′ and 45° 0′ 43″ N. and long. 71° 33′ and 73° 25′ W. The entire eastern boundary is formed by the Connecticut River, and more than half of the western boundary by Lake Champlain, most of the islands in that lake, including Grand Isle, North Hero, and Isle La Motte, and the Alburg peninsula, projecting southward from Canada, belonging to Vermont. The State measures 158 miles from north to south and 41 to 90 miles from east to west Its area is 9564 square miles, including 440 square miles of water In size it ranks forty-second among the States.

Topography. The Green Mountains, entering the State from Canada and trending southwest, divide Vermont into two portions. On the north there are two ranges, but near the forty-fourth parallel they unite and continue through New England as a single range. Much of the surface of the State is irregular and the scenery romantic and beautiful. The entire State is well above sea level, while large areas have an elevation of 1000 feet or more There are 21 peaks over 3500 feet high. Mount Mansfield, the loftiest, is 4389 feet in height.

Hydrography. These mountains form a continuous watershed between the tributaries of the Connecticut River on the east and those of the Hudson and Lake Champlain on the west. The chief branches of the Connecticut are the West and the White rivers. Four streams of considerable size enter Lake Champlain (the Missisquoi, Lamoille, Winooski, and Otter), and a fifth (the Poultney) forms part of the State boundary. The Hudson receives two small streams from the southwestern corner of the State, while the Black River in the north flows into Lake Memphremagog, a portion of which extends south of the boundary line. There are no large lakes within the State, but ponds are numerous in all parts of the State.

Climate. The climate of Vermont is rigorous, but healthful and bracing. The summers are cool and generally pleasant. The winters are severe and prolonged, with a heavy snowfall. Lake Champlain is generally frozen during February, though the climate on the lake shore is milder than in the rest of the State. At Burlington the normal mean temperature for January is 18° and for July 70.4°. At Northfield, in the centre of the State, the mean is 15.5° for January and 66° for July. The maximum rarely exceeds 90° and is generally about 80°, but at times is as high as 98°; the minimum is generally —15°, but in the mountains may fall more than 30° below zero. The average rainfall ranges between 40 inches in the north and south to 33 inches in the west-central portion.

Geology. Throughout the mountain region and over a considerable part of the State the rocks are metamorphic, gneiss, schist, and slate, though there are here and there beds of siliceous limestone and quartzite. In the Champlain valley unaltered stratified beds occur, and all the headlands of the lake are of these rocks. They are Cambrian and Ordovician schists, sandstones, and limestones and have yielded many fossils. These rocks have in many places been greatly folded, faulted, and cut by dikes. Resting directly upon these paleozoic beds are heavy deposits of drift, and most of the exposed ledges are scored by glacial action.

Soil and Vegetation. Much of the soil is sandy and stony, but in the valleys and near the lake there is abundance of rich land. The hills and valley slopes, as well as the summits of most of the mountains, are covered with rich herbage, and there are large forests of pine and hemlock, with spruce and fir on the higher slopes. On the lower lands are also forests of deciduous trees, the sugar maple being one of the most common trees.

Mineral Products. In 1914 Vermont ranked thirty-third among the States of the Union in the production of minerals. The total value of the output of stone was $6,635,477. The value of the marble output of that year was put at $3,490,971, or 42 98 per cent of the value of the total output of the United States. The quarrying of granite is one of the chief sources of income, and in the production of this mineral Vermont ranks first among the States, producing over 15 per cent of the total output of the United States. The output of granite in 1914 was valued at $3,120,457. A considerable amount of slate is also produced, the output of which in 1914 was $1,414,247 Other minerals of importance are talc and soapstone, of which the output was valued at $363,465, and lime, which was produced to the value of $142,034 in that year. The total value of the mineral production in 1914 was $8,665,867.

Agriculture. The total land area is approximately 5,839,360 acres. The area in farms in 1910 was 4,663,577 acres, of which 1,633,965 was improved The total value of farm property, including land, buildings, implements, and machinery, domestic animals, poultry, and bees, was $145,399,728. The number of farms was 32,709, the average number of acres per farm 42.6, the value of all property per farm $4445, and the average value of farm land per acre $12.52. Of the total number of farms 28,701 were operated by owners and managers. Of the total number of farm operators 28,968 were native whites, 3721 foreign-born white, and 20 negro and other non-whites. Of the foreign-born white farmers 2463 were born in Canada.

The following table shows the acreage, production, and value of the principal crops in 1915 as estimated by the United States Department of Agriculture.

CROPS	Acreage	Prod bu	Value
Corn	47,000	2,256,000	$1,895,000
Wheat	1,000	30,000	32,000
Oats	81,000	3,483,000	1,846,000
Potatoes	24,000	2,592,000	2,100,000
Hay	970,000	*1,310,000	20,305,000
Barley	12,000	420,000	315,000
Tobacco	100	†130,000	14,000
Buckwheat	8,000	216,000	177,000

* Tons. † Pounds.

The leading crops in the order of their importance in 1909 were hay and forage, oats, corn, barley, and buckwheat. In 1909 hay and forage had an acreage of 1,030,618 and a production of 1,502,730 tons, valued at $16,335,530; oats, an acreage of 71,510 and a production of 2,141,357 bushels, valued at $1,169,223; corn, an acreage of 42,887 and a production of 1,715,133, valued at $1,102,222; barley, an acreage of 10,586 and a production of 285,008 bushels, valued at $225,803; buckwheat, an acreage of 7659 and a production of 174,394

bushels, valued at $122,050; dry edible beans, an acreage of 2390 and a production of 26,395 bushels, valued at $72,873 The total acreage of potatoes and other vegetables was 35,408 and the value of such products $2,615,000 Excluding potatoes, the acreage given to vegetables was 8548 and the value of the products $872,000

Strawberries, by far the most important of the small fruits grown in Vermont, had a total acreage of 276, and the production amounted to 615,820 quarts, valued at $68,690. The total acreage of small fruits in that year was 469

123,164 M feet, hemlock 62,345 M feet, and white pine 43,274 M feet B M Of the hard woods, birch represented 33,450 M feet, maple 27,533 M feet, and oak 11,463 M feet B. M In addition to the above there were produced on the farms forest products valued at $3,638,537.

Manufactures. Vermont in 1909 ranked thirty-eighth with regard to the total value of manufactured products. The total value per capita of such products was $192. The following table gives the more important figures with regard to the manufactures as a whole and with regard to the five leading industries.

SUMMARY OF MANUFACTURES FOR 1914, 1909, AND 1904

THE STATE — FIVE LEADING INDUSTRIES

INDUSTRY	Census	Number of establishments	PERSONS ENGAGED IN INDUSTRY: Total	PERSONS ENGAGED IN INDUSTRY: Wage earners (average number)	Capital	Wages	Value of products	Value added by manufacture
					Expressed in thousands			
All industries ..	1914	1,772	37,217	32,704	$79,811	$18,617	$76,811	$34,256
	1909	1,958	38,580	33,788	73,470	17,272	68,310	33,487
	1904	1,699	37,015	33,106	62,659	15,221	63,084	30,654
Marble and stone work .. .	1909	342	11,545	10,411	17,243	6,404	12,395	9,877
	1904	229	8,839	8,097	14,467	4,455	9,570	7,560
Lumber and timber products	1909	593	5.720	4,790	8,989	2,013	8,598	4,467
	1904	493	6,392	5,614	7,845	2,343	9,477	4,821
Butter, cheese, and condensed milk .	1909	186	699	519	1,795	292	8,112	1,056
	1904	220	658	419	1,053	223	6,416	600
Woolen, worsted, and felt goods and wool hats	1909	17	2,371	2,294	6,906	1,043	4,497	1,618
	1904	17	2,350	2,235	5,660	923	4,698	1,904
Flour-mill and gristmill products	1909	133	350	156	1,552	76	4,133	605
	1904	109	338	185	1,320	91	3,206	334

and the production 826,122 quarts, valued at $92,030. Considerable attention is given to the raising of orchard fruits, especially apples. There were 1,492,299 bushels of orchard fruits, valued at $801,365, produced in 1909. The production of maple sugar and sirup is important. The combined value of these products in 1909 was $1,086,933.

Live Stock and Dairy Products.—The total value of live stock on farms in 1909 was $21,990,630. On Jan 1, 1916, the number of horses on the farms was estimated by the United States Department of Agriculture to be 89,000 and their value $11,570,000; the milch cows, 273,000, valued at $14,742,000; the cattle other than milch cows, 170,000, valued at $3,961,000; the sheep, 100,000, valued at $590,000; the swine, 113,000, valued at $1,164,000.

The value of the milk, cream, and butter fat sold and butter and cheese made on farms in 1909 was $12,128,365. There were sold in the same year 33,998,934 gallons of milk, valued at $4,108,228, and there were made 15,165,692 pounds of butter, valued at $4,185,028. The total number of fowl of all kinds in 1910 was 938,524, valued at $607,787.

Forest Products. Measured by number of establishments, the lumber industry is the most important in the State In average number of wage earners employed and in value of products it is second only to the marble and stone work industry. The production of rough lumber was, in 1909, 351,571 M feet B. M., of shingles 24,001, and of laths 7249. Of the total timber cut the soft woods represented 242,930 M feet and the hard woods represented 108,641 M feet B. M. Of all the soft woods cut spruce constituted

Of marble and granite Vermont has an almost unlimited supply. The State has for years ranked first in output of marble and now ranks first in the production of granite. (For details regarding the lumber industry, see *Forest Products*) In value of dairy products Vermont ranks tenth in the Union. Butter furnishes about three-fourths of the value of these products. The most important flour and grist mill products are corn meal and corn flour, which together constitute over one-half of the total output. The most important woolen and worsted goods are the all-wool woven goods, the cotton woven goods, and the cotton-mixed woven goods, each of these products being about of the same importance.

Of the total number of wage earners in 1909, 38,788 were males over 16 years of age The wage earners under 16 years of age numbered only 211. For the great majority the hours of labor varied from 54 to 60 hours per week.

The three cities with a population of 10,000 or more—Burlington, Barre, and Rutland—contained, in 1910, 18 8 per cent of the average number of wage earners and produced 19.5 per cent of the total value of the manufactures. Burlington, the most important manufacturing centre, gave employment in 1909 to 2371 wage earners and turned out products valued at $6,800,400. Barre in the same year gave employment to 2340 wage earners and turned out products valued at $3,852,177. The marble and stone work contributed about nine-tenths of the value of all its manufactured products. Rutland in the same year gave employment to 1636 wage earners and turned out products valued at $2,679,528. See articles on these cities.

Transportation. There are few rivers on which navigation is feasible, the only water transportation being confined practically to Lake Champlain The railroad facilities, however, are quite adequate, and in 1914 the mileage of steam roads was 1073. The most important roads are the Rutland, the Central Vermont, and the Boston and Maine.

Banks. The opposition to banks was so strong in Vermont at the end of the eighteenth and the beginning of the nineteenth century that there were no banks until 1806 In that year a State bank was established, which was owned and managed by the State. The conditions imposed upon it were so stringent that it had little success, and a law was passed to wind up its affairs in 1812, but the final settlement came only in 1845. In 1817 the first private State bank was chartered, and by 1827 there were 10 of them. The Act of 1831 introduced a safety-fund system for the purpose of guaranteeing the circulation. A free banking Act was passed in 1851, allowing note issue only on deposits of reliable State securities. All these measures put the banks on a very sound foundation, and Vermont did not suffer any serious bank calamities The introduction of the national banking system gradually reduced the number of State banks, and none were known to exist after 1890. In 1915 there were 48 national banks, with capital, $4,985,000; surplus, $2,039,000; cash, etc., $1,157,000; deposits, $21,735,000; and loans, $20,009,000. There were 20 mutual savings banks, with total deposits amounting to $53,559,000.

Government. The constitution of the State as it now stands is the original constitution adopted on July 9, 1793, as amended in 1828, 1836, 1850, 1870, 1883, and 1913. Every tenth year dating from 1910 the Senate may by a vote of two-thirds of its members make proposals of amendment to the constitution. If agreed to by a majority of the members of the House of Representatives, they are referred to the next following General Assembly. If they are accepted by a majority of this body, they are then referred to the people, and if approved become a part of the constitution.

Legislative—The Senate and House of Representatives form the General Assembly of the State of Vermont. The Assembly meets biennially on the first Wednesday after the first Monday of January dating from 1915. Representatives must have resided in the State for two years. Every town is entitled to one representative in the Assembly. The Senate is composed of 30 members who are elected and have attained the age of 30 years. Senators are apportioned to the several cities according to the population, and a new apportionment is made following every census of the United States.

Executive.—The supreme executive power is vested in the Governor. The Governor and Lieutenant Governor must have resided in the State for four years preceding the day of their election. Other executive officers are the Treasurer, Secretary of State, and Auditor of Accounts. They are all elected for terms of two years.

Judiciary.—The judicial system includes the supreme court, superior court, county courts, probate courts, and city and municipal courts. The supreme court consists of five justices, elected biennially. The superior court consists of six justices. Judges of probate are elected by the voters of their respective probate districts. Justices of the peace are also elected.

Suffrage and Elections.—Every male citizen of the United States of the age of 21 years who has resided in the State for one year prior to the election of Representatives is entitled to vote. The Australian system of voting is employed except in municipal elections The Legislature of 1915 passed, amongst other election legislation, a measure providing for the election of United States Senators.

Local and Municipal Government—The units of local government are the town and county. In each county is a county court, and in the cities, municipal courts. Towns are governed by annual town meetings at which selectmen and other officials are chosen.

Miscellaneous Constitutional and Statutory Provisions—There is a workmen's compensation law and a State railway commission The State is under local option for the regulation of the sale of liquor.

Finances. Income in the early history of the State was derived mainly from a general tax on property and partly from the sale of public property. In 1841 this brought in $68,000 out of a total budget of $85,000. The Civil War and the expenses resulting from it forced an issue of bonds, amounting in all to $1,650,000. These were very rapidly redeemed, and by 1870 there were only $841,000 of bonds outstanding. By 1880 the total funded debt did not exceed $140,000, almost all of which the treasury owed to its own college fund. There is a small direct tax laid annually for school purposes and another for highways. Other sources of income are corporation and inheritance taxes, licenses, fees, etc. The satisfactory condition of the State finances is in no small degree due to the fact that there were never undertaken any considerable public improvements. The receipts for the fiscal year ending July 12, 1915, amounted to $1,876,652; the balance on July 12, 1914, was $252,721, and the disbursements for the year $1,916,680, leaving a balance in the treasury of $212,693.

Militia. The males of militia age in the State in 1910 numbered 73,685. The organized militia on Jan. 1, 1915, was composed of 776 enlisted men and 76 officers. It included a regiment of infantry, a squadron of cavalry, and a detachment of sanitary troops.

Population. The population at each Federal census was as follows: 1790, 85,425; 1800, 154,465; 1810, 217,895; 1820, 234,981; 1830, 280,652; 1840, 291,948; 1850, 314,120; 1860, 315,098; 1870, 330,551; 1880, 332,286; 1890, 332,422; 1900, 343,641; 1910, 355,956; 1915 (est.), 362,452; 1920, 352,428. The average number of people to the square mile in 1910 was 39. Along with other New England States, Vermont has lost rather heavily by emigration to the West. Foreign immigration in recent years has to some extent offset the outflow. The urban population, i.e., that in towns of 2500 or more, was 168,943; the rural population, 187,013. Of the total population, 229,382 were native whites of native parents. The native whites of foreign or mixed parentage numbered 75,055, the foreign-born whites 49,861, and the negroes 1621. More than one-half (52.3 per cent) of the foreign born come from Canada. By sex the population was divided into 173,388 females and 182,568 males. The males of voting age numbered 113,506. There were in 1910 three cities of over 8000. These with their population for 1910 and 1915 (est.) follow: Burlington, 20,468 and 21,432;

Rutland, 13,546 and 14,624; Barre, 10,734 and 11,973.

Education. Vermont in 1910 enjoyed the lowest rate of illiteracy among all of the New England States. There were in that year 10,806 persons of 10 years of age or over, who were unable to read or write, 3.7 per cent of the entire population. Among persons of native parentage the percentage in 1900 was 1.2, and among foreign-born whites 13.1. There were, in 1910, 94,701 persons of school age (ages, 6 to 20), of which 66,845 attended school The total enrollment in the public schools in 1915 was 65,095 The total number of teachers was 3018. The total school expenditures in that year amounted to $2,325,214.

In 1912, on recommendation of Governor Fletcher, an educational commission was appointed, with a duty of inquiring into public education in the State. This commission carried on investigations for two years and made many important recommendations in its report rendered Oct 5, 1914

On June 20, 1914, there were 57 high schools of the first class. The total number of students in all schools of the secondary class was 8068. Medical inspection is in operation in several cities There are normal schools at Castleton and Johnson. The institutions of collegiate rank in the State are the University of Vermont and State Agricultural College at Burlington, Middlebury College at Middlebury, and Norwich University at Northfield. The first two are coeducational, the last is for men only.

Charities and Corrections. The charitable and correctional institutions include the State Prison at Windsor, the House of Correction at Rutland, the State Asylum for the Insane at Waterbury, the Soldier's Home at Bennington, the State Industrial School at Vergennes, the State Sanatorium at Pittsford, and the State Institution for Feebleminded at Brandon. There are in addition 10 hospitals under State control. There is no board or commission of State charities having general supervision over these institutions. There is a State Board of Penal Institutions.

Religion. Somewhat more than one-half (82,272) of the reported church members were Roman Catholics. The membership of the Protestant denominations combined numbered 63,895. Some of the principal denominations in order of numerical strength are Congregationalists (22,109), Methodists (17,471), and Baptists (8450)

History. The first explorer of this region was Champlain (q.v.), who in 1609 sailed up the lake which bears his name. The country was said to be inhabited by the Iroquois, but this is doubtful. No settlements were made until 1665, when the French built Fort St. Anne on Isle la Motte. Frequent French incursions were made through "the Wilderness" against New England and New York, and in 1696 seigniories were granted. Massachusetts built Fort Dummer in 1724 on the site of Brattleboro, and in 1728 a trading house was opened here. French forts were built at Chimney Point and Crown Point in 1730–31, and much loss was inflicted on the English settlers by roving bands who used these posts as headquarters English blockhouses were built and many battles were fought after 1744. The French abandoned all posts in 1757 except Isle aux Noix, and this was taken the next year. In 1732 Col. John Henry Lydius bought of the Mohawks a tract of land corresponding nearly to the present counties of Addison and Rutland, and this purchase was confirmed by Governor Shirley, of Massachusetts, in 1744. New Hampshire claimed the territory to a line drawn 20 miles east of the Hudson River, i.e, as far as the border of the Massachusetts territory, and after 1749 Governor Wentworth, of New Hampshire, made lavish grants, and small settlements sprang up everywhere. New York, though she had acquiesced in the Massachusetts boundary, claimed this territory to the Connecticut River Proclamations and counterproclamations were issued, but in 1764 a royal order was issued declaring the Connecticut the boundary between New Hampshire and New York. The New York government considered this to mean that the New Hampshire Grants were annulled, and ordered the settlers to repurchase from New York. This was generally refused, and the settlers secured in 1767 another royal order forbidding the granting of disputed lands until further instructions. New York continued, however, to grant the lands not previously sold. A convention of settlers was held at Bennington, and they determined to resist by force any processes of the New York courts. The grand jury at Albany in 1770 indicted some of them as rioters, and several were arrested in 1771. Committees of safety were organized in the several towns, and it was decreed that no New York officer should take any one out of the district without consent of the committee. To enforce these rules the Green Mountain Boys were organized under Ethan Allen (q.v.) and others, and they prepared to resist a reported expedition under Governor Tryon, who, however, ordered all prosecutions stopped until the matter might be submitted to the King. Nevertheless some grantees were dispossessed. The New York Assembly offered a reward of £100 for Ethan Allen or Remember Baker in 1774, but to no effect. At Westminster in the east a contest between a sheriff's posse and citizens resulted in the Westminster Massacre on March 13, 1775. In April a convention met there and proclaimed the territory independent of New York, but declared itself willing to await the King's pleasure as to whether it should become a separate province or be annexed to some other province.

During the Revolution the colonists waged practically a separate war against the British and Indians. The capture of Ticonderoga, May 10, 1775, was almost entirely the work of the Green Mountain Boys. In January, 1776, a convention at Dorset sent a commission to Congress, which, however, would not consider the proposition of making a new State. On Jan. 15, 1777, another convention met at Westminster, declared the territory an independent State with the name New Connecticut, and asked for admission The present name was substituted in June, at the advice of Dr Thomas Young, of Philadelphia, and a constitution similar to that of Pennsylvania was adopted, but with a clause prohibiting slavery. The government went into effect March 12, 1778, and 16 towns east of the Connecticut River were united to the State in June, but the union was dissolved the next year, because of the resentment of New Hampshire, which now began to press its claim to the territory. New York also renewed its claims. No action was taken by Congress, and in retaliation Vermont extended its jurisdiction over the

New Hampshire towns and over New York east of the Hudson, but, owing to the advice of Washington, the claim was given up Feb 22, 1781. After the close of the Revolution a gradual change in feeling took place in New York, and on July 15, 1789, a commission to treat with Vermont was appointed In October, 1790, it was agreed that New York should cease opposition to the admission of Vermont to the Union on payment of $30,000 for disputed land claims. This was soon paid, and the State became a member of the Union March 4, 1791, the first State admitted under the Constitution.

The State was more democratic from the beginning than any other of the New England States. There were no rich and no aristocracy. The capital was laid out at Montpelier, the geographical centre of the State, in 1808. The University of Vermont was incorporated in 1791 and the first class graduated in 1804. There was considerable emigration after 1825, but there has been a gradual settlement of French Canadians to replace those departing The State furnished more than its quota during the Civil War. Some Southern sympathizers from Canada invaded the town of St. Albans in October, 1864, and this was made a point in the Geneva Arbitration. The Fenian operations against Canada, in 1866 and 1870, had their base in this town. The State adopted a prohibitory amendment to the constitution in 1852, but abandoned the policy of prohibition in 1902, when the voters of the State declared for high license. This measure, amounting to local-option regulation, became law in 1903.

In 1792, 1796, and 1800 the State was carried for Federalist electors, but was Democratic-Republican thereafter to 1824. In that year, and again in 1828, the Adams Republicans were successful. In 1832 the vote was cast for the Antimasonic candidate. After that time it was steadfastly Whig to 1852 and has been Republican ever since.

In the presidential election in 1908 Taft received 39,552 votes and Bryan 11,496. George H. Prouty, Republican, was elected Governor In 1909 there was a notable celebration of the tercentenary of the discovery of Lake Champlain. President Taft, ambassadors from Great Britain and France, and other notable persons took part in this celebration. In 1910 John A. Mead, Republican candidate, was elected Governor. For President in 1912 Taft received 23,305 votes, Roosevelt 22,070, and Wilson 15,350 Vermont was one of the two States carried by Mr. Taft in this election. Allen N Fletcher, Republican, was elected Governor in 1912. Charles W. Gates, Republican, was elected in 1914.

GOVERNORS OF VERMONT

BEFORE ADMISSION TO THE UNION

Thomas Chittenden		1778–89
Moses Robinson		1789–90
Thomas Chittenden		1790–91

AFTER ADMISSION

Thomas Chittenden		1791–97
Isaac Tichenor	Federalist	1797–1807
Israel Smith	Democrat-Republican	1807–08
Isaac Tichenor	Federalist	1808–09
Jonas Galusha	Democrat-Republican	1809–13
Martin Chittenden	Federalist	1813–15
Jonas Galusha	Democrat-Republican	1815–20
Richard Skinner	" "	1820–23
Cornelius P. Van Ness	" "	1823–26
Ezra Butler	Adams Republican	1826–28
Samuel C Crafts	" "	1828–31
William A. Palmer	Fusion	1831–35
Silas A. Jenison	Whig	1835–41
Charles Paine	"	1841–43
John Mattocks	Whig	1843–44
William Slade	"	1844–46
Horace Eaton	"	1846–49
Carlos Coolidge	"	1849–50
Charles K Williams	"	1850–52
Erastus Fairbanks	"	1852–53
John S Robinson	"	1853–54
Stephen Royce	Republican	1854–56
Ryland Fletcher	"	1856–58
Hiland Hall	"	1858–60
Erastus Fairbanks	"	1860–61
Frederick Holbrook	"	1861–63
John G Smith	"	1863–65
Paul Dillingham	"	1865–67
John B. Page	"	1867–69
Peter T Washburn	"	1869–70
John W Stewart	"	1870–72
Julius Converse	"	1872–74
Asahel Peck	"	1874–76
Horace Fairbanks	"	1876–78
Redfield Proctor	"	1878–80
Roswell Farnham	"	1880–82
John L Barstow	"	1882–84
Samuel E Pingree	"	1884–86
E J. Ormsbee	"	1886–88
W P Dillingham	"	1888–90
Carroll S Page	"	1890–92
Levi K Fuller	"	1892–94
Urban A Woodbury	"	1894–96
Josiah Grout	"	1896–98
Edward C Smith	"	1898–1900
William W Stickney	"	1900–02
J G McCullough	"	1902–04
Charles J Bell	"	1904–06
F D Proctor	"	1906–08
George H Prouty	"	1908–10
John A Mead	"	1910–12
Allen N Fletcher	"	1912–14
Charles W Gates	"	1914–16
Horace F Graham	"	1916–18
Percival W Clement	"	1918–20
James Hartness	"	1920–

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VERMONT, UNIVERSITY OF. A coeducational institution of learning at Burlington, Vt., founded in 1791. The Vermont Agricultural College, chartered in 1862, was incorporated in 1865 with the university, under the title of the University of Vermont and State Agricultural College. The work of instruction is organized in four colleges as follows: first, the college of arts and science, with a classical course leading to the degree of A.B, a literary scientific course leading to the degree of Ph.B., and courses in general science, chemistry, commerce, and economics and education, all leading to the degree of B.S.; second, college of engineering, with courses in civil, mechanical, and electrical engineering all leading to the degree of B.S. third, college of agriculture with courses lead

ing to the degree of B.S. in agriculture; fourth, the college of medicine granting the degree of M.D. as an institution in Class A of the American Medical Association rating. Certificates from approved preparatory schools are accepted for admission. The curricula are partially elective. Military theory and drill are required of all male students. The university offers a number of scholarships and prizes and maintains a loan fund for the benefit of needy students who are residents of Vermont. The attendance in all departments in 1915–16 was 594. The faculty numbered 118. The endowment is about $935,000, and the annual income about $200,000. The university conducts a summer school. The library has about 95,000 volumes. The president in 1916 was Guy Potter Benton, D.D.

VER'NAL GRASS (Lat. *vernalis*, relating to the spring, from *ver*, Gk. ἔαρ, *ear*, ἦρ, *ēr*, spring), SWEET (*Anthoxanthum odoratum*). A sweet-scented grass common in meadows, woods, and pastures throughout Europe and the Western Hemisphere. It is about a foot high, with a spiked oblong panicle. It has little value, as stock do not eat it readily, and in some countries it has become a pest. See Plate of GRASSES.

VERNA'TION. The arrangement of leaves in the bud (q.v.).

VERNE, vârn, JULES (1828–1905). A French novelist, born at Nantes. His novels, in the original, and in translations in various languages, delighted an immense audience, especially of young people. Stories of extraordinary voyages—to the heavenly bodies, under the sea, etc.—were his specialty, and their fantastic improbabilities or impossibilities he based upon explanations which he would have his readers accept as scientific, and which gave his fiction an air of plausibility. After studying law, Verne turned to a literary career, and wrote repeatedly for the stage, but without success. In 1863 he made an attempt in fiction with his *Five Weeks in a Balloon*, in which he struck for the first time the vein which he was later to work to his own abounding profit and the applause of the public. His novels, most of which are available in English translations, include, in addition to his first success, above mentioned: *A Voyage to the Centre of the Earth* (1864); *From the Earth to the Moon* (1865); *Twenty Thousand Leagues under the Sea* (1870); *The Mysterious Island* (1870); *Around the World in Eighty Days* (1872); *The Green Ray* (1882); *Christopher Columbus* (1883); *The Southern Star* (1884); and *The Carpathian Château* (1892). *Around the World in Eighty Days* and *Michael Strogoff* (1876) were dramatized, and produced and reproduced in France and abroad with a success that paralleled the success of his best novels; and *Dr. Ox* (1874) was turned into an opera. The interest of Verne's stories depends chiefly on incident; the character drawing in them is insignificant; their style is rapid and marked by picturesqueness and verve. Despite the extravagance of his inventions, his imagination anticipated startling discoveries in the fields of aërial and submarine navigation. He was not without influence upon English fiction, as certain novels of H. G. Wells and Rider Haggard sufficiently attest. His translated *Works* in 15 volumes were published in New York in 1911.

VERNER, vĕr'nĕr, KARL ADOLF (1846–96). A Danish philologist. He was born at Aarhus, and was educated at the University of Copenhagen. After a visit to Russia in 1871–72 he returned to his old home, where he developed the law of Indo-Germanic accent that bears his name. In 1876 he was appointed an assistant in the university library at Halle, where he remained until 1883, when he became docent in Slavic languages at the University of Copenhagen, being made professor in 1888. The Berlin Academy awarded him the Bopp Prize, and Heidelberg University made him Ph.D. (1887). He published little besides the famous article on his law (see VERNER'S LAW). Consult Holgar Pedersen, "K. A. Verner," in *Indogerman Forschungen Anzeiger*, vol. viii (Strassburg, 1897), and *Afhandlinger og Breve udgivne af Selskab for germansk Filologi, med Biografi ved Marius Vibæk* (Copenhagen, 1903).

VERNER'S LAW. A phonetic law of the Germanic group of the Indo-Germanic languages, which was enunciated in 1875 by Karl Adolf Verner (q.v.). It was the result of an investigation begun to explain certain apparent irregularities in the operation of Grimm's law, and was not only important in itself, but established the principle of phonetic laws on a scientific basis, thus marking an epoch in the development of philology. The law may be stated as follows. The surd Germanic spirants, *þ*, *f*, *h*, *hw*, and *s*, which represent Indo-Germanic *t*, *p*, *k* (or *q*), *qu̯*, and *s* respectively, became the sonant spirants, *d*, *b*, *g*, *gu̯*, and *r*, when the vowel immediately preceding them did not, according to the original Indo-Germanic accent system, bear the primary accent of the word. The sonant spirants, excepting *z*, thus arising, are subject to the same changes in the various Germanic dialects as those which represent Indo-Germanic *dh*, *bh*, and *gh*. The sonant *z*, however, is represented in German and Icelandic by *r*, while the sound groups *sp*, *st*, *sk*, *ss*, *ft*, *fs*, *hs*, and *ht* throughout the Germanic group were exempt from the operation of the law. The following examples of Verner's law from Gothic and Old High German may be cited, together with the corresponding changes according to Grimm's law: Skt. *pitár*, Gk. πατήρ, Goth. *fadar*, OHG. *fatar*, father, but Skt. *bhrātar*, Gk. φράτηρ, Goth. *brōþar* OHG. *bruoder*, brother; Skt. *saptá*, Gk. ἑπτά, Goth. and OHG. *sibun*, seven, but Gk. κλέπτειν, Goth. *hlifan*, to steal, Skt. *nápāt*, OHG. *nefo*, grandson; Skt. *daśát*, Gk. δεκάς, Goth. *tigus*, OHG. *-zug*, decade, but Skt. *dáśa*, Gk. δέκα, Goth. *taihun*, OHG. *zehan*, ten; Pre-Ger. **segu̯nis* (cf. Skt. *agni*, fire, *vṛṣṇí*, ram), Goth. *siuns*, appearance, but Gk. λείπειν, to leave, Goth. *leihwan*, OHG. *lihan*, to lend; Skt. *marṣáyāmi*, Goth. *marzja*, OHG. *merr(i)u*, I disturb, but Skt. *násatē*, unite, Goth. *ganisan*, OHG. *ginesan*, to be healed. Verner's law seems to have been operative after the completion of the first Germanic sound shifting, probably between 250 B.C. and 400 A.D. The uniformity of its action has been greatly disturbed by analogy (q.v.), but enough traces of it survive to justify the important deduction that as late as the beginning of the Christian era the Germanic languages retained the Indo-Germanic system of free accent, according to which the primary accent might fall, as in Vedic Sanskrit, Greek, Lithuanian, and Russian, on any syllable of the word, in contrast to the Germanic accent law established long before the earliest literary records, which confines the main accent to the root syllable. A possible analogue has been sought in the change of Indo-Germanic *s* to *r* in

Latin and Umbrian, but to *z* in Oscan (see ITALIC LANGUAGES), as Latin *dearum*, of goddesses, Umbrian *urnasiaru*, of urn feasts, but Oscan *egmazum*, of things. Consult Verner, "Eine Ausnahme der ersten Lautverschiebung," in Kuhn, *Zeitschrift fur vergleichende Sprachforschung*, vol. xxiii (Berlin, 1875), and Conway, *Verner's Law in Italy* (London, 1887). See GRIMM'S LAW, PHILOLOGY; PHONETIC LAW; TEUTONIC LANGUAGES.

VERNES, vârn, MAURICE LOUIS (1845–1923) A French biblical scholar, born at Nauroy (Aisne). He studied theology at Montauban and Strassburg, and went to the Sorbonne in 1877 as lecturer on philosophy in the Protestant faculty of theology. In 1886 he became director of the department of religious sciences in the Ecole Pratique des Hautes Etudes He devoted himself particularly to the comparative study of religion, and published: *Le peuple d'Israel et ses espérances* (1872); *Histoire des idées messianiques depuis Alexandre jusqu'à l'empereur Adrien* (1874); *Histoire du peuple israélitique* (1881); *L'histoire des religions: son esprit, sa méthode et ses divisions* (1887); *Du prétendu polythéisme des Hébreux* (1891); *Essais bibliques* (1894); *Histoire sociale des religions* (1911); *Les emprunts de la Bible hébraïque au grec et au latin* (1914).

VERNET, vâr'nâ. A celebrated family of French painters. The earliest member to attain prominence, JOSEPH (1714–89), a marine and landscape painter, was born at Avignon and was a pupil of his father, ANTOINE VERNET (1689–1753), a decorative painter, and then studied in Italy under Fergioni and Manglard. He combined landscape and marine, and excelled in depicting storms and moonlight and sunset effects, excellent examples of all of which are in the Louvre. His best-known work is a series of 15 paintings of the ports of France (1754–65) commissioned by Louis XV, now in the Musée de la Marine (Louvre). Though in the classic style of the school of Claude Lorraine, his works are more animated and show a simpler and truer observation of nature than those of most contemporaries. His son and pupil, ANTOINE CHARLES HORACE (1758–1836), usually called CARLE VERNET, was born in Bordeaux and studied also under Lépicié. He was best in genre works, usually comic in character, though he also painted Napoleonic battle pieces, portraits, and hunting scenes, and made good designs for lithography; he is, indeed, one of the founders of French caricature. Though weak in color, his paintings are skillful in design He is represented in the Louvre and the Metropolitan Museum, New York.

Carle's son, HORACE VERNET (1789–1863), battle painter, the most celebrated member of the family, was born in Paris. A pupil first of his father, then of Moreau and Vincent, he worked as a youth with facility with crayon, burin, or brush. He was popular at the court of Napoleon and in 1814 he helped defend the Barrière de Clichy, receiving as a reward the Cross of the Legion of Honor from the Emperor. The incident was later pictured by Vernet and is now in the Louvre. During the Restoration he helped to popularize the Napoleonic legend by numerous engravings, lithographs, and paintings, which were refused by the Salon. He subsequently won the favor of Charles X, for whom he painted the battles of Bouvine and Fontenoy (Versailles). In 1826 he was elected to the Institute, and from 1828 to 1833 was director of the French Academy at Rome. Louis Philippe commissioned him to paint pictures of the battlefields of Friedland, Jena, and Wagram for the great gallery of battle pieces at Versailles, and later he produced, from sketches made in Algiers, a series of pictures celebrating the conquest of that country, to decorate the Salle de Constantine, the "Smalah d'Abd el Kader" being the best Scenes of soldiery or battle appealed most strongly to him, though he executed historical subjects, landscapes, and portraits, among his sitters being the painter Isabey (Louvre), Napoleon I, Louis Philippe, Emperor Nicholas, Napoleon III, and many of the marshals of France. His immense productiveness resulted in over 800 canvases His works display facility of invention, faithful representation, and fiery energy; but their execution is hasty, and they are without depth of feeling and are deficient in color Consult the works on *Les Vernets* by Charles Blanc (Paris, 1845), Lagrange (ib., 1864), Durande (ib., 1865), Clément (ib., 1876), and Dayot (ib., 1898); also Lagrange, *Joseph Vernet et la peinture au XVIIIème siècle* (ib., 1861); Bertholon and Lhoto, *Horace Vernet à Versailles, au Luxembourg et au Louvre* (ib., 1863); Salvator, "Joseph Vernet," in *French Art from Watteau to Prud'hon* (London, 1906).

VERNHEUIL, vĕr'nē'y', ARISTIDE AUGUSTE STANISLAS (1823–95). A French surgeon. He was born and educated in Paris, where he became connected with several hospitals, in 1868 being appointed professor of pathology at the Pitié and in 1872 professor of surgery. In 1888 he became a member of the Institute. His principal work is *Mémoires de chirurgie* (1877–88). In 1881 he founded with others the *Revue de Chirurgie* (Paris), of which he was the editor.

VERNIER, vĕr'nĭ-ēr. A scale invented by the French geometrician Pierre Vernier (q.v.), by which linear or angular magnitude can be read with a much greater degree of accuracy than is possible by mere mechanical division and sub-

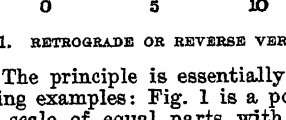


FIG. 1. RETROGRADE OR REVERSE VERNIER

division. The principle is essentially shown by the following examples: Fig. 1 is a portion of a graduated scale of equal parts with a vernier below, which is made to slide along the edge of the scale, and is so divided that 10 of its subdivisions are equal to 11 of the smallest divisions of the scale; then each division of the vernier is equivalent to 1.1 of a scale division; and consequently if the zero point of the vernier (Fig. 1) be opposite 11 on the scale, the 1 on the vernier is at 9.9 (1.1 to the left of 11), 2 on the vernier is at 8.8 (2.2 to the left of 11), etc. Also, if the vernier be moved along so that 1 on it coincides with a division on the scale, then 0 on the vernier is one-tenth to the left of the next division of the scale; if 4 on the vernier coincides with a division on the scale, the 0 is four-tenths to the left of a division as in Fig. 2. The vernier is applied to instruments by being carried at the extremity of the index limb, the zero on the vernier being taken as the index point; and when the reading is to be performed, the position of the zero point, with reference to the

divisions of the scale, gives the result as correctly as the mechanical graduation permits, and the number of the division of the vernier which coincides with a division of the scale supplements this result by the addition of a fractional part of the smallest subdivision of the scale. Thus

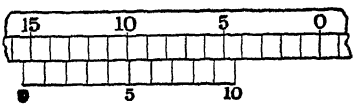


FIG. 2. RETROGRADE VERNIER SHOWING METHOD OF READING.

in Fig. 2 suppose the scale divisions to be degrees, then the reading by the graduation alone gives a result between 15° and 16°, but as the fourth division of the vernier coincides with a graduation on the scale, it follows that the zero point of the vernier is 0.4 of a division to the left of 15°, and that the correct reading is 15.4°. It will be seen that by merely increasing the length of the vernier, as, e.g., making 20 divisions of it coincide with 21 on the scale, the latter may be read to twentieths; and a still greater increase in the length of the vernier would secure further accuracy. Verniers like the above in which the number of its divisions is less than the corresponding number on the scale are called retrograde or reverse verniers. But some instruments are provided with direct verniers, i.e., those in which the number of divisions exceeds the corresponding number on the scale. The principle of operation is the same as in the retro-

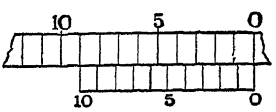


FIG. 3. DIRECT VERNIER.

grade vernier, except that one must look forward along the vernier to find the coinciding line. Fig. 3 shows a direct vernier, and the principle of its construction is the same as for reverse

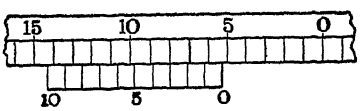


FIG. 4. DIRECT VERNIER SHOWING METHOD OF READING.

verniers, only the vernier division is greater by a tenth of a scale division instead of being smaller. Fig. 4 shows a direct vernier where the coincidence comes at 3, giving a reading of 5.3. In general, if v is the length of a vernier division, s the length of a scale part, and n the number of divisions on the vernier, then $nv = (n-1)\,s$ for the direct vernier and $nv = (n+1)\,s$ for the reverse vernier. Therefore $s - v = \frac{1}{n} \cdot s$, $v - s = \frac{1}{n} \cdot s$ respectively, which shows the comparative size of the divisions of the two scales and to what fraction of a division any vernier will read. For example, we wish a direct vernier, attached to a scale graduated to read half degrees, to read minutes: what must be the relation between a vernier and a scale division? Here $s = 30'$, and, since the vernier is to read mintues, $s - v = 1'$ and $v = 29'$. $s - v = \frac{1}{n} \cdot s = 1'$ and $n = 30$. Therefore, a space equal to 29 scale divisions is to be subdivided on the vernier into 30 equal parts.

Of the various methods for subdivision which were in use before the introduction of the vernier, the most important were the diagonal scale (q.v.) and the nonius. The latter is so called from its inventor, Petrus Nonius (Pedro Nunes), a Portuguese mathematician (1492–1577), who described it in a treatise *De Crepusculis Liber Unus* (Lisbon, 1542). It consists of 45 concentric circles described on the limb, and divided into quadrants by two diameters intersecting at right angles. The outermost of these quadrants was divided into 90, the next into 89, the third into 88, etc., and the last into 46 equal parts, giving, on the whole, a quadrantal division into 2532 separate and unequal parts (amounting on an average to about 2′ intervals) The edge of the bar which carried the sights passed. when produced, through the centre, and served as an index limb, and whichever of the 45 circles it crossed at a graduation, on that circle was the angle read; i.e., if it cut the seventh circle from the outside as its forty-third graduation, the angle was read as $\frac{43}{88}$ of 90°, or 46° 4′ 17$\frac{1}{11}$″. Consult Ludlow, "Subscales, Including Verniers," in Van Nostrand's *Engineering Magazine* (New York, 1882).

VERNIER, vâr'nyā', PIERRE (1580–1637). A French geometer, born at Ornans, in Burgundy. His father was a mathematician and director general of currency to the Count de Bourgogne. Vernier was commandant of the castle in his native town and director of the mint. His chief work was *La construction, l'usage et les propriétés du quadrant nouveau de mathématiques* (1631), which contains the description of the instrument bearing his name. See VERNIER.

VERNIS-MARTIN (Martin's varnish). The French name for the imitations of Chinese and Japanese lacquer, brought to perfection by the four brothers Martin in the reign of Louis XV, and quite as popular then as Boulé work had been in the reign of Louis XIV. See LACQUER.

VERNOIS, JULIUS VON VERDY DU See VERDY DU VERNOIS.

VERNON. A city and the capital of the Okanagan District, British Columbia, Canada, on the Canadian Pacific Railway, 5 miles from Lake Okanagan (Map: British Columbia, E 4). It is in a rich fruit-growing district, much of which is irrigated. Pop., 1901, 802; 1911, 2671.

VERNON. A town and the county seat of Wilbarger Co., Tex., 163 miles northwest of Fort Worth, on Pease River, and on the Fort Worth and Denver City and the St. Louis and San Francisco railroads. There are flour and oil mills, a cotton compress, and extensive grain and live-stock interests. Vernon has adopted the commission form of government. Pop., 1900, 1993; 1910, 3195.

VERNON, DIANA. A beautiful and talented girl in Scott's *Rob Roy*, trained to vie with men in their sports.

VERNON, EDWARD (1684–1757). An English admiral. He was born in Westminster; was educated at Westminster School, and in 1701 entered the navy, and saw much active service during the War of the Spanish Succession. In 1739, as commander of six ships, and with the rank of vice admiral, he captured Porto Bello, with a loss of only seven men. Owing to the inefficiency of the military support, he was repulsed from Cartagena in 1741, and lost heavily by sickness. This action has been described in *Roderick Random* by Smollett, who was serving in the expedition as assistant surgeon. Law-

rence, the eldest brother of George Washington, was also a member of the expedition, and his estate Mount Vernon was named in honor of the admiral. Vernon returned to England in 1742, was several times reelected to Parliament; in 1745 was promoted to be admiral, and during the expected invasion by the Pretender commanded on the Kent and Sussex coasts. For criticizing the Admiralty in two pamphlets, he was removed from his command in 1746, but continued a member of Parliament until his death

VERNON GALLERY. A collection of English paintings, formerly the property of Robert Vernon, now forming part of the National Gallery, London, to which it was given in 1847.

VERNON-HARCOURT. See HARCOURT, SIR WILLIAM G. G. V. VERNON; HARCOURT, WILLIAM VERNON.

VERON, FRANÇOIS, SIEUR DE FORBONNAIS. See FORBONNAIS

VERONA, vā-rō'nȧ. A city of Italy, the capital of the Province of Verona, 71 miles by rail west of Venice (Map: Italy, C 2). The swift Adige traverses the city in a zigzag. It is crossed by seven bridges. Verona is a fortress of the first class and holds the key to Tirol. It is, with the exception of Venice, the most famous and attractive city of Venetia, and is both prosperous and progressive.

Its numerous weather-stained white marble palaces, richly sculptured, with evidences of having been painted, and often standing below the grade of the modern streets, give it an air of sumptuous decay, which effect is offset, however, by the abundant signs of its modern thrift. Its walls are pierced by several handsome gates. By far the larger part of the town is on the right bank of the Adige, where, in the centre, on the large and impressive Piazza Vittorio Emanuele, rises the celebrated Roman amphitheatre. This splendid ruin, dating from the reign of Diocletian, is 168 yards long and 106 feet high, and could accommodate over 20,000 persons. Almost all of the external arcades, with three tiers of arches, have disappeared, but the interior has often been restored, and the amphitheatre is still used. On the Piazza and in the immediate vicinity are to be seen the Municipio; fragments of the old Roman wall; an ancient Franciscan monastery, now closed, but containing the mediocre sarcophagus known to disillusioned sight-seers as the tomb of Juliet; and the Museo Lapidario, with classic inscriptions and antique marbles. From the Piazza extends southward the spacious and splendid Corso of the same name, and to the southeast stretches the likewise spacious Via Pallone—the latter reaching the river where, on the opposite side, lies the cemetery.

The Piazza is connected with the important Piazza del Erbe, on the northeast, by the busy Via Nuova Lastricata and Via Nuova, which together form the busiest thoroughfare of the city, especially at night. In the vicinity is the marble tablet marking the portal of an old and uninspiring house locally said to have been Juliet's home. A high tower affording a fine view of city and country, a very ancient fountain bearing the statue of Verona, a marble column surmounted by a copy of the Venetian Lion of St. Mark, and proud palaces with frescoed façades, here add interest to the scene. Adjacent on the northeast is the Piazza dei Signori, beautified by archways (with portraits) which span the entrances It is surrounded by palaces dating from the time of the Scaligers, and contains the famous statue of Dante by Zannoni. Of these palaces the Palazzo del Consiglio is the most conspicuous. The superb structure (1476–92) in early Renaissance is probably a creation of Fra Giocondo, and is adorned with statues of the ancient Romans who were born in Verona—among them Catullus, Cornelius Nepos (probably), Pliny the Younger, and Vitruvius. Near by is the far-famed tomb of the Scaligers, rising in a small paved square. The grave Gothic outlines of the monument appear behind lofty railings in which are to be seen recurring ladders—the family emblem. Farther north, and in the extreme bend of the Adige, stands the uninteresting Gothic cathedral (consecrated 1187). It contains, however, a fine "Assumption" by Titian.

Northwest of the Roman Amphitheatre, and on the river bank, stands the battlemented Castel Vecchio (1355), from which a venerable pinnacled bridge stretches to the northern shore. Thence, to the northeast, extends the spacious and imposing Corso Cavour, bordered by fine palaces. It is a prominent thoroughfare It leads northeast towards the Porta de' Borsari—a triumphal arch constructed 265 A.D. On the southwest it connects, near the Castel Vecchio, with the broad fine street leading southwest to the attractive Porta del Palio. In the extreme western corner of the city, and near the river, rises the church of San Zeno Maggiore, dating from 1139. It ranks among the finest Romanesque churches in Italy and is notable for its symmetries. It contains a valued painting by Mantegna, and the fine bronze tomb of the saint

By the Ponte Navi, on the opposite side of the city, stands the mediæval church of San Fermo Maggiore, with a striking façade. The narrow, curving, and extended section of the city on the left bank, with the cemetery on the south, is called Veronetta. The municipal museum and the picture gallery are situated here by the Ponte Navi, in the majestic Palazzo Pompei, overlooking the river. The edifice was constructed by Sammicheli and now belongs to the city. The paintings are nearly all of the Veronese school. Farther north looms the commanding Castel San Pietro, where a fortress of Theodoric the Great stood. It is now used as barracks. The ancient church of Santo Stefano, restored by Theodoric, and the San Giorgio in Braida are near. Mention should be made of the Dominican church of Sant' Anastasia (1261–1422), remarkable for its decoration and early paintings and sculptures.

Verona has a royal seminary, an industrial school, and a deaf and dumb institution. The Biblioteca Capitolare contains valuable palimpsests, among them the *Institutes* of Gaius. The municipal library was established in 1860. The city is provided with numerous hospitals, including a military hospital, an asylum for the aged, and one for paupers and beggars, public dormitories, and three associations for the care of poor children. There are cotton, paper, and flour mills, an immense nail factory, and piano and organ factories. Silk, soap, sugar, and candles also are manufactured There are, besides, the new arsenal and extensive artillery establishments. Verona is important in the Italian traffic with Switzerland, Austria, and Germany. It deals in wines, fruits, rice, and marble. At the head of the municipal governmen

is a syndic. Pop (commune), 1901, 74,271; 1911, 81,909.

Verona was conspicuous in its architecture already in mediæval times, and with the Renaissance came Fra Giocondo and its military architect Sammicheli. Verona had an early and distinct school of painting, which, like that of Venice, excelled in coloring. The great master Paul Veronese came from here. Verona also contributed worthily to sculpture

History. Verona was anciently a Gallic town From the Celts it passed under Roman rule as a colony in 89 B C., and was wealthy and important. Theodoric the Great made it a royal seat. It fell to the Lombards, whose King, Alboin, met his death at Verona. From the rule of the Lombards Verona passed under that of the Frankish King Pepin. It shared in the terrible struggles between Guelph and Ghibelline. It came under the power of the great Ghibelline Scala or Scaliger family in the middle of the thirteenth century, its rulers being called podestàs. This celebrated family made of it a sumptuous and famous city. Dante found a refuge with Can Grande della Scala after being driven from Florence. Early in the fourteenth century Verona extended its sway and brought Padua and Vicenza under its control, and also Brescia, Parma, and even the distant Lucca. It became subject to Milan in 1387 and to Venice in 1405. It was powerfully fortified by Sammicheli in 1527 It passed to Austria on the extinction of the Venetian Republic in 1797. The Austrians strongly fortified it after 1814, and made it a pivot of their famous Quadrilateral. In the winter of 1822 it was the meeting place of a congress of European monarchs and diplomats which under the guidance of Metternich (q.v.) determined upon the intervention of the Holy Alliance (q.v.) for the suppression of the Spanish Revolution. Verona became a part of the Kingdom of Italy in 1866. It was bombarded from the air by the Austrians in the war which began in 1914. See WAR IN EUROPE. Consult· Allen and Williamson, "Verona," in *Cities of Northern Italy*, vol ii (Boston, 1906); Wiel, *The Story of Verona*, in "Mediæval Towns Series" (London, 1902); R. R. Peyré, *Padua et Vérone* (Paris, 1907); A. M. Allen, *History of Verona* (New York, 1910)

VERONA. A borough in Allegheny Co, Pa., on the Allegheny River, and on the Pennsylvania Railroad. Among the industrial establishments are railroad shops, tool works. lumber yards, steel-casting works, structural iron works, and a chemical plant. Pop., 1900, 1904; 1910, 2849.

VERONA, GUARINO DA. See GUARINO DA VERONA.

VERONAL. A hypnotic, chemically diethylbarbituric acid. It is a white, crystalline powder, soluble in boiling, practically insoluble in cold water. It acts on the central nervous system, especially on the cerebrum. Eruptions and poisoning have occurred in a few cases. A habit may be contracted. Veronal sodium, chemically sodium diethyl-barbiturate, is a similar drug, having practically identical sedative effects, but, being more soluble, it acts more quickly.

VERONESE, vā'rō-nā'zā, GIUSEPPE (1854–). An Italian mathematician, born at Chioggia, Venice. He was educated at Venice, Zurich, Rome, and Leipzig, was an assistant in mathematics at Rome in 1877–80, and served as professor of mathematics at the Royal University at Padua after 1881. Veronese was also a deputy from 1897 to 1900, and a Senator of the Kingdom after 1904. His publications include many treatises, especially on geometry. In English appeared *Notions of Intuitive Geometry* (1900–15). *Complements of Algebra and Geometry* (1915)

VERONESE, PAOLO (PAUL) (properly PAOLO CALIARI or CAGLIARI) (1528–88). A painter of the Veronese school, who became one of the chief masters of the Venetian Renaissance. He was born at Verona, the son of Gabriele Caliari, a stonemason, and studied painting first with Antonio Badile, but was more influenced by Domenico Brusacorsi. His earliest known work, dating from 1551, was a commission from the architect Sammicheli to fresco Villa Soranza, near Castelfranco, and soon afterward he decorated Villa Emo (now Fanzolo) in the same vicinity. Fragments of the former frescoes are preserved in the sacristy of the cathedral of Castelfranco and in England, but the latter remain in situ, though in a damaged condition They represent scenes from ancient history, classic myths, and contemporary life In both of these commissions he was associated with Battista Zelotti. In 1552 he and three other Veronese painters received a commission to paint an altarpiece each for the cathedral of Mantua, Paolo's panel, "The Temptation of St. Anthony," is now in the Museum of Caen.

Veronese's early works are in the silver-gray tone peculiar to Veronese art, and the decoration just mentioned already contained the characteristic qualities of his fully developed style. On Jan. 14, 1555, he was resident in Venice, where he had probably come sometime earlier. In 1555 he received from his countryman, the prior of San Sebastiano, the commissions which have made this little church a museum of his works He began (1555) the decoration of the ceiling of the sacristy with the "Coronation of the Virgin," and in the pendentives the "Four Evangelists"; in 1556 he finished the three panels of the ceiling of the nave with subjects from the "Life of Esther"; and in 1558 the altarpiece, a "Madonna in Glory, with Four Saints," and the walls of the church with scenes from the "Life of St. Sebastian," etc. In 1560 he completed the paintings on the doors of the organ, the "Pool of Bethesda," the "Purification of Mary," and a "Nativity"; he also modeled the ornament of the organ. For several years following he was engaged in other work, and not until 1565 did he complete the splendid paintings of the choir walls, "The Martyrdom of St. Sebastian" and "Sts. Mark and Macellinus Going to their Execution." Besides these decorations, he painted some fine altarpieces in the church. In competition with the great Venetian masters he greatly improved his work, both as to color, which became richer and more harmonious, and as to form, which became nobler.

In 1556 Veronese visited his native city, where he portrayed Pace Guarienti in full armor (Pinacoteca, Verona), and painted the "Deposition from the Cross" in Santa Maria della Vittoria. A visit to Rome in the retinue of Cardinal Grimani was without influence on his art. A second visit to Verona in 1566 was the occasion of his marriage to the daughter of his former master, Badile. · In 1560 he decorated the villa at Tiene, near Vicenza, a masterpiece by Palladio (q.v.), with a series of historical frescoes, which are among the most remarkable of his works. Among the best subjects represented are



PAUL VERONESE

"THE MARRIAGE AT CANA," FROM THE PAINTING IN THE DRESDEN MUSEUM

York—the last three probably painted for Emperor Rudolf II. His few portraits, which are decorative and subjectively rendered, include the "Young Mother and Child," in the Louvre, "Unknown Women" at Florence and Munich, and "The Man in Green," in the Colonna Palace, Rome.

Veronese was the true heir of Giorgione and Titian in Venetian art Although gifted with narrative talent of a high order, he never appealed to the intellect, but to the eye and the imagination. From Verona he brought a sound naturalism, the silvery tone and mild harmony of color. He was a decorative painter of the highest rank. The example of Titian enriched his color and ennobled his forms, but without depriving them of their individual quality His color is transparent and brilliant in its lightness; he is one of the best all-round draftsmen of the Venetian school, a consummate master of composition, and in the sureness of his brushwork he stands almost the peer of Velazquez. In the eighteenth century he inspired Tiepolo, and he has been a very important influence in the modern decorative revival in Europe and America.

In subject Veronese was characteristically Venetian. He painted the Venetian aristocracy —the men preferably in the ease of middle life, the women blond, fair-haired, and in richest costume Especially did he delight in their fêtes, then the most pompous and luxurious in the world, and it is as the great "painter of pageants" that he is chiefly known.

Bibliography. Monographs on Veronese have been written by Pietro Caliari (Rome, 1888); Charles Yriarte (Paris, 1888); F. H. Meissner (Bielefeld, 1897); and Mrs. Arthur Bell (London, 1908). But the most critical account thus far is the article "Paolo Caliari," by Detlef von Hadeln in Thieme-Becker, *Kunstler-Lexicon*, vol. v (Leipzig, 1911).

VERONICA, Saint. The name Veronica was applied, demonstrably in the thirteenth century (from a mediæval corruption of the Latin *vera icon*, true image), to a supposed authentic likeness of the features of Christ, said to have been miraculously impressed upon a linen cloth which one of the women of Jerusalem (see Luke xxiii. 27) offered him to wipe his face as he was carrying his cross towards Calvary; later the name was applied to the woman herself. The miraculous picture is reported to have been preserved in Rome since the year 700, and its possession has been claimed also by Milan and Jaén The face has been frequently reproduced, especially by the Spanish painter Morales Consult E von Dobschutz, *Christusbilder* (Leipzig, 1899), H. Thurston, *The Stations of the Cross* (London, 1906).

VERONICA. See Leptandra; Speedwell.

VERPLANCK, vĕr-plănk', Gulian Crommelin (1786–1870). An American scholar and essayist, born in New York City. He graduated at Columbia in 1801, practiced law in New York, spent several years in European travel, was active in State politics, and from 1821 to 1825 was professor of the evidences of revealed religion in the General Theological Seminary, New York. Subsequently he was a member of Congress (1825–33), State Senator (1838–41), and vice chancellor of the State University (1855–70). He was also president of the Board of Emigration (1846–61). His chief books are. *Essays on the . . Evidences of Revealed Religion* (1824); *Essay on the Doctrine of Contracts* (1825); *Discourses and Addresses on American History, Arts, and Literature* (1833), and an edition of *Shakespeare's Plays* (3 vols, 1844–46) With Bryant and R C. Sands, he edited the *Talisman* (1827–30), an annual. As a critic and a Shakespearean scholar he exercised in his day in America a useful function.

VERRALL, vĕr'al, Arthur Woolgar (1851–1912) An English classical scholar, born at Brighton He received his education at Wellington College, and at Trinity College, Cambridge, where he became fellow in 1874. In 1911 he was appointed to the chair of English literature at Cambridge. He was the author of *Euripides the Rationalist* (1895). He also edited Euripides' *Medea* (1881), Æschylus' *Seven against Thebes* (1887), *Agamemnon* (1889), *Choephori* (1893); and wrote *Essays on Four Plays of Euripides* (1905) His papers were collected, after his death, in two volumes, *Collected Studies in Greek and Latin Scholarship* (1913), and *Collected Literary Essays, Classical and Modern* (1913) The latter contains a memoir, by M. A. Bayfield.

VERRAZANO, vĕr'rat-tsa'nō, Giovanni da (?1480–?1527). A Florentine navigator. Little is known with certainty of his career The year of his birth is doubtful. He journeyed widely in the East, and in 1521 is reputed to have been sailing as a French corsair under the name of Juan Florentin or Florin, preying upon Spanish commerce His first voyage of discovery, under commission from Francis I, was apparently in 1523, though it is much confused with the doings of Juan Florin in that year against the Spaniards His notable voyage to America was made in 1524 and he seems to have touched the coast of North Carolina near Cape Fear. He apparently coasted south and then north, probably as far as Cape Breton. The chief evidence of this interesting voyage is a letter of Verrazano to Francis I, the authenticity of which is questioned. After his return he fought in the battle of Pavia, Feb. 24, 1525, and was temporarily a prisoner of the Spaniards. If Verrazano was Juan Florin he was captured again at sea in 1527 and hanged, but some later documents indicate that he was at a later time in the year in Paris, preparing another expedition for America. Consult· H. C Murphy, *The Voyage of Verrazano* (Albany, 1875), the most complete presentation of the argument against the authenticity of the account of the voyage; also, on the other side, B. F. De Costa, *Verrazano the Explorer* (New York, 1880), with a full bibliography; Justin Winsor, *Narrative and Critical History of America*, vol. iv (Boston, 1886), for a critical discussion of authorities.

VERREIUS FLACCUS, Marcus. See Flaccus, M. V.

VERRES, vĕr'rēz, Gaius. A Roman politician. He was elected prætor in 74 B C., and by lot became prætor urbanus. At the expiration of his term of office he went as Governor (proprætor) to Sicily, the richest province of the Republic (74–71). Here he was guilty of oppression and extortion, and was accused by the Sicilians. Cicero agreed to manage the prosecution, and Hortensius (q.v.) the defense. The defense put forth a sham prosecutor, Quintus Cæcilius Niger (there was no official prosecuting attorney in ancient Rome), and it became necessary to hold a trial to determine whether Cicero or Cæcilius should prosecute the case. By his *Divinatio in Cæcilium*, still extant, Cicero won

the right to act as prosecutor. Cicero then gathered his evidence, and prepared five orations against Verres, but when the first had been delivered, so clear was the guilt of Verres that, without awaiting his sentence, he fled to Massilia (Marseilles), remaining in exile 27 years He was proscribed by Antonius in 27. Consult the article "C Verres," in Friedrich Lubker, *Reallexikon des klassischen Altertums*, vol. ii (8th ed., Leipzig, 1914).

VERRILL, vĕr'ĭl, ADDISON EMORY (1839–1926). An American zoologist, born at Greenwood, Me. He graduated at Harvard College in 1862, and held a chair of zoölogy at Yale from 1864 till his retirement in 1907. In 1868–70 he was professor of comparative anatomy and entomology in the University of Wisconsin. From 1860 Verrill investigated the invertebrate fauna of the Atlantic coast, with especial reference to the corals, annelids, echinoderms, and mollusks, and became the chief authority on the living cephalopods, especially the colossal squids of the North Atlantic His *Report upon the Invertebrate Animals of Vineyard Sound* (1874), with S. I. Smith, is a standard manual of the marine zoology of southern New England. His collections were deposited in the Peabody Museum of Yale University. In later life he explored with his students the geology and marine animals of the Bermuda Islands. Besides many memoirs and articles on the subjects mentioned above, he published a work on *The Bermuda Islands* (1903; 2d ed., 1907).

VERROCCHIO, vĕr-rō'kĕ-ō, ANDREA DEL, properly ANDREA DI MICHELE CIONE (1435–88). A celebrated Florentine sculptor, painter, and goldsmith, one of the foremost of the early Renaissance. He was born in Florence, the son of Michele di Cione, a tiler, who died in 1452. That year Andrea accidentally killed a companion while throwing stones, but was acquitted of homicide. He was apprenticed to the goldsmith Giuliano Verrocchio, after whom he was called, but his master in sculpture was Donatello, whose pupil he probably was. The only surviving example of his goldsmith work, a relief of the "Beheading of John the Baptist," is part of the silver altar of San Giovanni in the Cathedral Museum at Florence, and shows a thorough mastery of this art. He studied painting with Alessio Baldovinetti, and was besides a bronze founder, an architect, and a mechanical engineer. In rivalry with the Pollaiuoli he conducted a large and important bottega, which became the principal training school in Florence for the young artists of the branches he practiced. Notwithstanding his many commissions he was often in financial difficulties, owing to his support of many impecunious relatives. One of his earliest works was the completion of Donatello's charming marble fountain in the sacristy of San Lorenzo.

The most important of Verrocchio's commissions in Florence were for the Medici. In San Lorenzo he designed the simple sepulchral slab of Cosimo de' Medici (died 1464), restored in the sixteenth century, and the beautiful tomb of Giovanni and Piero, a decorative masterpiece of most original conception, finished in 1472. For Lorenzo the Magnificent he also executed a bronze statue of the "Youthful David" (1476, Museo Nazionale), an admirable rendering of the transition from youth to manhood, as naturalistic as it is graceful in position and form. His "Boy with a Fish," a charming fountain piece, still adorns the court of the Palazzo Vecchio. The marble group of the "Incredulity of Thomas," in Or San Michele, Florence, survives as one of the finest of the Renaissance, both in technical execution and in the beauty and majesty of the figures. His last work, the equestrian Bartolommeo Colleoni at Venice, is his most important. Admirable alike in the martial bearing of the rider and the anatomy and stride of the horse, it is probably the finest of equestrian statues Upon his death in 1488, he had completed the model of horse and rider, which were cast somewhat later by Alessandro Leopardi, who also designed the pedestal. He executed also a number of works in terra cotta and marble Among the latter are reliefs of the Madonna in the Museo Nazionale, Florence, the Shaw collection, Boston; the tomb of Francesca Tornabuone, of which parts survive in the Museo Nazionale, Florence; and the André collection, Paris; and the tomb of Cardinal Forteguerri in the Cathedral of Pistoia. His finest relief of the Madonna is the terra cotta of the Museo Nazionale. For his portrait busts, especially of young women, he is justly celebrated. The best of these are the "Unknown Florentine," called Ginevra dei Benci, in the Museo Nazionale, Florence, Verrocchio's masterpiece in marble sculpture; and the terra-cotta bust in the Foulc collection, Paris Dr. Bode attributes also to him the terra-cotta bust of an unknown young man in the Museo Nazionale and those of Piero (Dreyfuss collection, Paris) and Lorenzo de' Medici (Shaw collection, Boston). He modeled also many attractive statuettes, of which there are terra cottas in the South Kensington and Berlin Museums, and bronzes in the Morgan collection (Metropolitan Museum, New York).

Verrocchio is the most important among the pupils and followers of Donatello, whom he, more than any other, approached in individuality and strength, even surpassing him in movement The influence of his training as a goldsmith is evident in the thorough and conscientious finish of his work.

As a painter he is known chiefly as a teacher of great pupils, Leonardo, Lorenzo da Credi, Botticini, and Perugino, rather than as an independent artist. Most of the pictures attributed to him were executed after his designs by his pupils; but a few reflect his personal style. It was distinguished by exquisite workmanship, firm drawing and modeling, and enamel-like color. The landscapes in particular show him as a pioneer of atmospheric perspective, which forms his chief contribution to Florentine painting. Among his principal paintings are the "Baptism" (Florentine Academy), the well-known "Annunciation" of the Uffizi, after his design, and partly by him in execution; the "Unknown Young Woman" in the Liechtenstein Gallery, Vrenna; a "Madonna and Child" in the Altman collection (Metropolitan Museum, New York); and a "Madonna and Two Angels," after his design (National Gallery, London). Of the numerous drawings attributed to him, the "Angel's Head" in the Uffizi, and the "Female Head" in the British Museum are the most celebrated

Bibliography. The chief monographs on Verrocchio are by H Mackowsky (Bielefeld, 1901) and Maud Crutwell (New York, 1906). For complete illustrations of his sculptures see Wilhelm Bode, *Denkmaler der Renaissance Skulptur Toscanas* (Munich, 1892–1905).

VERRUCA. See WARTS

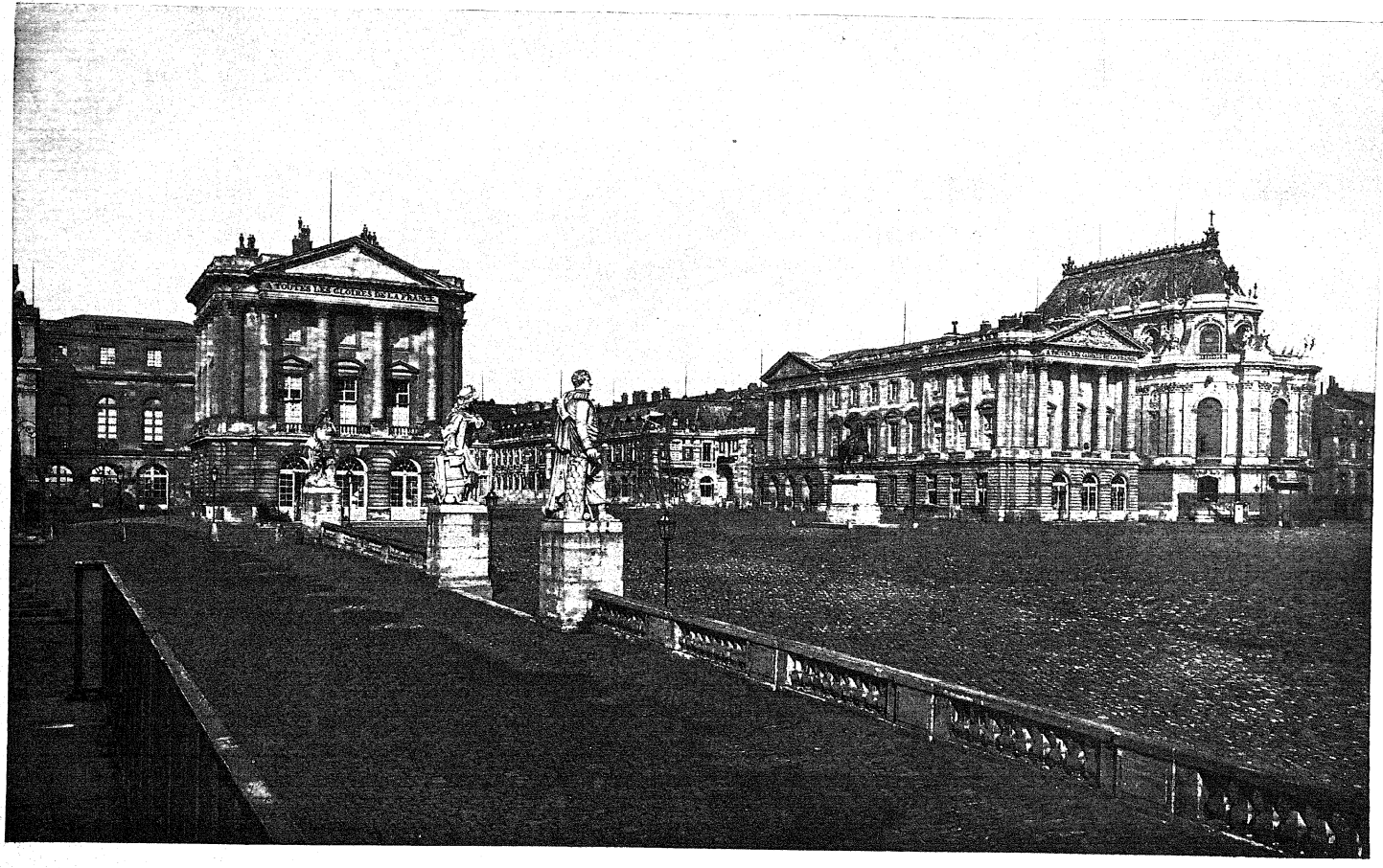
VERSAILLES, vĕr'sā'y'. The capital of the Department of Seine-et-Oise, France, situated about 12 miles by rail and by tram southwest of Paris (Map. France, N., H 4) The flat town, with its quiet avenues, has little of interest or charm save what is offered by the famous palace and park of Louis XIV, whose magnificence under the Bourbons made this unequaled in fame among all the royal residences of the world In the town are a library of over 112.000 volumes, a hippodrome, and a shooting school. Pop., 1901, 54,982; 1911, 60,458

The palace, chiefly dating from 1661, and restored and converted into an historical museum under Louis Philippe, is on the western side of the town, with the park beyond Three spacious avenues—de Saint-Cloud, de Paris (the middle one), and de Sceaux—converge in the great Place d'Armes, which separates the palace from the town and through which the former is entered. South of this place is the room of the Jeu de Paume, where the famous Third Estate met in June, 1789. The room contains a Musée de la Révolution. The palace consists of a central block, surrounding three sides of the Cour d'Honneur and Cour Royale, which is open to the east, and of two immense wings, stretching north and south from the Cour Royale, and each inclosing two or more courts. The length of the palace is over a quarter of a mile, or, including its dependencies, nearly half a mile. The palace is entered from the Cour d'Honneur, between which and the Place des Armes intervenes the Cour Royale, containing an equestrian statue of Louis XIV and two columns of victory. The parts adjacent to the Cour d'Honneur or Cour de Marbre are the oldest extant portions. They belong to the hunting château erected in 1627 for Louis XIII by an architect LeRoy (as has recently been proved), to replace an earlier structure of 1624. This was later enlarged (1631) by Levan, and later again by J. H. Mausart, who was employed by Louis XIV to create the present vast palace. He built the garden façade of the central block and added the great north and south wings, including the magnificent chapel, his masterpiece, the ceiling of which was painted by Coypel. The theatre at the north end of the palace was remodeled by Gabriel for Louis XV. It was later used by the National Assembly after the Franco-Prussian War (1871), and then by the Senate until 1878. The central block contains the famous Galerie des Glaces, with paintings by Le Brun. William I was proclaimed Emperor of Germany in this hall in 1871. Adjoining it on the north side are the Grand Apartments of Louis XIV, with the splendid bedchamber in which he signed the revocation of the Edict of Nantes in 1685. In the Salle de l'Œil-de-Bœuf—so termed from its oval "bull's eye" window—the gentlemen of the court of Louis XV awaited the royal "lever." In the south range of this block are the Queen's apartments, with the smaller suite occupied by Marie Antoinette. The long north and south wings contain imposing corridors filled with statuary, the chapel and theatre, the gorgeous Galerie des Batailles 130 yards long, the Galerie de l'Empire, the Salles des Croisades with modern paintings of the Crusades, and innumerable rooms, corridors, and staircases. Some of these rooms are of great magnificence, adorned with paintings by great artists of the seventeenth century and of later times, and the whole palace is a vast museum of French history and art Parts of it are worthy of high praise, but the planning is defective and the architecture generally—except the Chapel—monotonous and pretentious rather than noble and effective.

The park with its decorative ponds and vast fountains was first laid out by the celebrated Le Nôtre. It is imposing, but thoroughly stiff and artificial, and has served as a famous type of Renaissance garden. Terraces, large ornamental basins, huge vases overflowing with flowers, marble groups and busts, statues—especially reflecting the appropriate art of Coyzevox—quincunxes, bosquets, and geometrically trimmed trees, here mock nature and the natural An immense pond stretches away in the shape of a cross in front of the palace. The playing of the grand fountains, enlivened by colored lights, is one of the great sights in and about Paris. The water is supplied by the famous machine of Marly. The largest fountain, the Bassin de Neptune, is a wonderful piece of hydraulic mechanism. Two immense flights of marble steps descend on the opposite side of the palace to the famous orangery, beyond which extends a vast pond, which was dug by the Swiss guard of Louis XIV. The gardens proper have a salle de Bal or des Rocailles, and contain the Bosquet de la Reine, where the notorious transaction of the diamond necklace took place In the northern section of the park are the charming Grand and Petit Trianon (See TRIANON.) Near by are the carriage houses, with many vehicles of state, including some of the magnificent equipages used by Napoleon.

History. When Louis XIV chose Versailles as the site of his new palace and park, it had little to commend it, being a low, swampy area, and distant from an adequate water supply. Louis XIII began the reclamation of the territory, which he bought from the Archbishop of Paris and others; but it was Louis XIV who converted the hunting-seat into a palace of imperial extent. The court came here permanently about 1682, and from this date for over 100 years Versailles figured prominently in history. Louis XV dwelt here and Mme. de Pompadour and Mme. Du Barry reigned over this vast pleasure establishment. Here, too, Louis XVI and Marie Antoinette resided. In the palace was signed the Treaty of 1783 between England, France, and Spain, on the same day (September 3) on which the definite treaty of peace in which England recognized the independence of the United States was signed in Paris. On October 6 the palace was ravaged in the presence of Louis by the market women and fish wives, with the result that the King and Queen were forced to go to Paris. The meeting of the States-General, the opening act of the French Revolution, took place here on May 4, 1789. Since then it has never been a residence. During the siege of Paris in 1870–71 King William I made his headquarters here. When the Germans departed, the French government established itself at Versailles, whence it carried on war against the Paris Commune. It remained here until 1879, when Paris was once more made the political capital See the articles on COMMUNE; FRANCE; FRENCH REVOLUTION; WILLIAM I.

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musées, et ses collections (ib, 1888); J. Roussel, *Monographie des palais et parcs de Versailles et des Trianons* (ib., 1899); Gustave Geffroy, *Les chefs-d'œuvre de Versailles* (ib, 1907), text in French and English, André Pératé, *Versailles · Le château, les jardins, les Trianons, le musée, la ville* (3d ed, rev, ib., 1909), Pierre de Nolhac, *Versailles and the Trianon* (Eng trans., New York, 1912).

VERSCHAFFELT, vĕr-sKaf'fĕlt, PIETER ANTONIS (known also as PIETRO FIAMMINGO) (1710–93) A Flemish sculptor and architect. He was born in Ghent, and studied there under de Sutter and in Paris under Bouchardon. In 1737 he went to Rome, where he modeled the bust (Capitol, Rome) and the marble statue (Monte Cassino) of Pope Benedict XIV, and the bronze figure of the archangel Michael (1740) surmounting the castle of Sant' Angelo. In 1752 he was appointed court sculptor and architect and director of the academy at Mannheim. There he was architect of the arsenal and the Bretzenheim Palace, and modeled decorations, reliefs, and statues for the library, the palace of Swetzingen, and the façade and high altar of the court church. His chief work in Belgium is the tomb of Bishop van der Noot in Ghent Cathedral. Verschaffelt possessed a good sense of the beautiful and of decoration, and much inventive talent. Consult the monograph by Beringer (Strassburg, 1902).

VERSECZ, vĕr'shĕts, or **WERSCHETZ**. A town in the County of Temes, Hungary, at the foot of the Versecz Mountain, 45 miles south of Temesvár (Map: Hungary, G 4). Steam saw mills, breweries, and machine shops are the chief industrial establishments. The town is famous for its brandy and red wine. Pop., 1900, 25,199; 1910, 28,759.

VERSIEGELT (Ger, Sealed). An opera by Blech (q.v.), first produced in Hamburg, Nov. 4, 1908; in the United States, Jan. 20, 1912 (New York).

VER'SIFICA'TION (Lat. *versificatio*, from *versificare*, to versify, from *versus*, turning, furrow, row, line, verse, from *vertere*, to turn). A term used to designate both the art of making verses and the principles on which that art is based. In the latter sense it includes rhythm and metre. By rhythm (q.v.) is meant the measured movement of language which is caused by the regular recurrence of metrical units known as feet. These units may be formed by a combination either of long and short syllables, i.e., be based on quantity, or of stressed and unstressed syllables, i.e., be based on accent. Metre deals with the measurement of poetry by means of the rhythmical feet. See METRE; METRICAL FOOT.

GREEK AND LATIN

According to the theory prevalent in England and America since the publication, in 1868, of the well-known works of Schmidt (see the bibliography below), the unit of measure for the foot is the short syllable, ⏑, technically called mora, having the musical value of an eighth note, 𝅘𝅥𝅯; a long syllable is (approximately) equivalent to two moræ, –, 𝅗𝅥. In certain measures a long syllable may be protracted to the length of three or four moræ, –, 𝅗𝅥.; –, 𝅗𝅥 ; or a syllable may be shortened so as to occupy less than its normal time. These phenomena, however, are confined for the most part to logaœdic verse (q v). Each foot has an accented and an unaccented part. The portion on which the metrical accent, ictus, falls is called the thesis; the unaccented part is called the arsis. See BEAT.

The principal feet are the following:

Feet of three morœ (𝅗𝅥. *time*)

Trochee ´ ⏑ εἶπε, prīmus 𝅗𝅥 𝅘𝅥𝅯

Iambus ⏑ ´ λέγω, amō 𝅘𝅥𝅯 𝅗𝅥

Tribrach ⏑ ⏑ ⏑ λέγετε, hominis 𝅘𝅥𝅯 𝅘𝅥𝅯 𝅘𝅥𝅯

Feet of four morœ (𝅗𝅥 *time*)

Dactyl – ⏑ ⏑ εἴπομεν, dūcimus 𝅗𝅥 𝅘𝅥𝅯 𝅘𝅥𝅯

Anapæst ⏑ ⏑ ´ σέβομαι, facerent 𝅘𝅥𝅯 𝅘𝅥𝅯 𝅗𝅥

Spondee ´ – εἶπω, dūcō 𝅗𝅥 𝅗𝅥

Proceleusmatic ⏑ ⏑ ⏑ ⏑ λεγόμεθα, mulieris 𝅘𝅥𝅯 𝅘𝅥𝅯 𝅘𝅥𝅯 𝅘𝅥𝅯

Feet of five morœ (𝅝 *time*)

Cretic – ⏑ – εἰπέτω, dūcerent 𝅗𝅥 𝅘𝅥𝅯 𝅗𝅥

First Pæon – ⏑ ⏑ ⏑ λειπόμεθα, duximus 𝅗𝅥 𝅘𝅥𝅯 𝅘𝅥𝅯 𝅘𝅥𝅯

Fourth Pæon ⏑ ⏑ ⏑ – λεγομένη, celeritās 𝅘𝅥𝅯 𝅘𝅥𝅯 𝅘𝅥𝅯 𝅗𝅥

Bacchius ⏑ – – λεγοίμην, amābant 𝅘𝅥𝅯 𝅗𝅥 𝅗𝅥

Antibacchius – – ⏑ φαίνητε, dūcēbat 𝅗𝅥 𝅗𝅥 𝅘𝅥𝅯

Feet of six morœ (𝅘𝅥𝅯 *or* 𝅗𝅥 *time*)

Choriambus – ⏑ ⏑ – ἐρχομένη, difficilēs 𝅗𝅥 𝅘𝅥𝅯 𝅘𝅥𝅯 𝅗𝅥

Ionic *a maiore* – – ⏑ ⏑ ἐκλείπομεν, dēdūcerem 𝅗𝅥 𝅗𝅥 𝅘𝅥𝅯 𝅘𝅥𝅯

Ionic *a minore* ⏑ ⏑ – – ἐλελοίπη, relegēbant 𝅘𝅥𝅯 𝅘𝅥𝅯 𝅗𝅥 𝅗𝅥

These feet are variously combined into the larger units of dipody (two feet), metrical sentence or colon, and verse, which are bound together by the fact that the chief ictus falls on one foot in each unit; the colon and the verse may be identical, as in some lyric measures, or the verse may contain two or more cola. Verses are named trochaic, iambic, dactylic, etc., according to the nature of the fundamental foot. The last syllable of most verses may be either long or short indifferently, without regard to the theoretical requirements of the metrical scheme; hence it is called syllaba anceps. If the last foot lacks a syllable, the verse is called catalectic; but if the verse is complete, it is called acatalectic. The missing syllable in a catalectic verse is indicated by a rest mark, ∧. Whenever a word ends within a foot, the resulting break is known as cæsura and is marked thus, ||; if the end of a word coincides with the end of a foot, the break is named diæresis and is noted thus, ‡.

Trochaic Rhythms. Trochaic verses are usually measured by dipodies (´ ⏑ ‡ ⏑). In the place of the second trochee, rarely of the first, a spondee pronounced in the time of a trochee (hence called an irrational spondee, – >) may be admitted. The apparent (irrational) anapæst (⏑ ⏑ >) and the cyclic (irrational) dactyl (– ⏑ ⏑) are sometimes used; and the tribrach (⏑ ⏑ ⏑) is freely substituted in any foot but the last. The most frequent trochaic line is the tetrameter catalectic, measuring seven feet and one syllable, divided into two cola by

a diæresis after the second dipody. The movement is rapid and well suited to express excitement It was employed by Archilochus (q v) and Solon (q v), it was the favorite measure of Epicharmus, and is frequently employed in the old Attic comedy. In early tragedy it was also used, but in the later only after about 415 B.C. Example

$$\frac{/}{\tilde{\omega}}\ \cup\ \frac{\cdot}{\sigma o\phi\acute{\omega}\tau\alpha}\ \cup \Big|\ \frac{/}{\tau o\iota}\ \cup\ \frac{\cdot}{\theta\epsilon\alpha\tau\alpha\grave{\iota}}\ >\ \frac{/}{\sharp}\ \cup\ \frac{\cdot}{\delta\epsilon\hat{\upsilon}\rho o}\ >\ \Big|\ \frac{/}{\tau\grave{o}\nu}\ \cup\ \cup\ \wedge\ \frac{}{\nu o\hat{\upsilon}\nu}\ \frac{}{\pi\rho\acute{o}\sigma\chi\epsilon\tau\epsilon}$$

Aristophanes, *Nubes*, 575.

The same form of verse, under the name trochaicus septenarius, was common in Latin comedy and was employed also by Varro, Seneca, and many later Latin poets. In the early period, however, the Romans admitted substitutions in any foot but the last, in later Latin verse the Greek models were adhered to more strictly.

Hipponax (q.v) introduced a modification of the trochaic tetrameter catalectic in which the last syllable but one is always long; the substitutions allowed are few. This form is called Hipponactean or Scazon, the lame tetrameter, from its peculiar movement. This may be illustrated by the following:

$$\frac{/}{\grave{\alpha}\mu\phi\iota\delta\acute{\epsilon}\xi\iota}\ \cup\ \frac{\cdot}{}\cup \Big|\ \frac{/}{o\varsigma}\ \cup\ \frac{\cdot}{\gamma\acute{\alpha}\rho}\cup\ \frac{/}{\epsilon\grave{\iota}\mu\iota}\ \cup\ \frac{}{}\cup \Big|\ \frac{/}{\kappa o\hat{\upsilon}\chi}\ \frac{}{\grave{\alpha}\mu\alpha\rho\tau\acute{\alpha}}\ \Big|\ \frac{/}{\nu\omega}\ >\ \frac{\cdot}{\kappa\acute{o}\pi\tau\omega\nu}\ \wedge$$

Hippon. frg. 83.

$$\frac{/}{\text{nec}}\ \cup\ \frac{\cdot}{\text{coruscus}}\ \cup \Big|\ \frac{/}{\text{imber}}\ \cup\ \frac{\cdot}{\text{alto}}\ > \Big|\ \frac{/}{\text{nubilo}}\ \cup\ \frac{\cdot}{}$$

$$\text{ca}\ \cup \Big|\ \frac{/}{\text{dens}}\ >\ \frac{\cdot}{\text{multus}}\ \wedge$$

Varro, *Sat.* frg. 557.

The rare trochaic tetrameter acatalectic (trochaicus octonarius) is mostly confined in both Greek and Latin to lyric systems. Great freedom of substitution is allowed, especially in Latin comedy

$$\frac{}{}\cup\ \frac{\cdot}{}\cup\ \frac{}{\kappa\lambda\hat{\upsilon}\theta\grave{\iota}}\ \frac{}{\mu\epsilon\upsilon}\ \frac{}{\gamma\acute{\epsilon}}\ \cup \Big|\ \frac{/}{\rho o\nu\tau o\varsigma,}\ \cup\ \frac{\cdot}{}\cup\ \frac{/}{\epsilon\grave{\upsilon}\grave{\epsilon}}\ \frac{}{\sharp}\ \frac{}{\theta\epsilon\iota\rho\alpha}\ \frac{}{\chi\rho\upsilon\sigma\acute{o}}\ \cup \Big|\ \frac{/}{\pi\epsilon\pi\lambda\epsilon}\ \cup\ \frac{/}{}\ >\ \frac{}{\kappa o\acute{\upsilon}\rho\alpha}$$

Anacreon, frg. 76.

$$\text{adeon}\ \frac{/}{\text{homin(em)}}\cup\ >\ \frac{/}{\text{es}}\cup\ \Big|\ \text{s(e)}\ \frac{/}{\text{invenust(um)}}\cup\ \frac{\cdot}{}\ >\ \text{aut}\ \sharp$$

$$\frac{/}{\text{infelicem}}\cup\ \frac{\cdot}{}> \Big|\ \frac{/}{\text{quemqu(am)}}\ \cup\ \frac{\cdot}{}\cup\ \text{ut ego sum}$$

Terence, *Andria*, 245.

Of the other trochaic rhythms too great variety, ranging from the dipody to the hexapody, is employed in lyric passages to admit of illustration here.

Iambic Rhythms. Iambic, like trochaic rhythms, are usually measured by dipodies ($\cup\frac{/}{}\cup\frac{\cdot}{}$). The tribrach is here allowed in any foot but the last, and the irrational spondee ($>\frac{/}{}$), the irrational dactyl ($>\frac{/}{}\cup$), or the cyclic anapæst ($\cup\cup\frac{/}{}$) may be substituted in the first foot of any dipody. The most common iambic verse is the trimeter acatalectic, in which the dialogue of the drama, tragic and comic, is composed. In Greek tragedy resolutions are not frequent and substitutions are usually confined to the first foot of the dipody, e g.:

$$>\ \frac{/}{\tilde{\omega}}\cup\ \frac{\cdot}{\tau\acute{\epsilon}\kappa\nu\alpha}\ \text{Κάδ} \Big|\ >\ \frac{/}{\mu o\upsilon}\ \cup\ \frac{\cdot}{}\ \Big\|\ \frac{/}{\tau o\hat{\upsilon}}\ \cup\ \frac{\cdot}{\pi\acute{\alpha}\lambda\alpha\iota}\ \Big|\ \cup\ \frac{/}{\nu\acute{\epsilon}\alpha}\cup\ \frac{\cdot}{\tau\rho o\phi\acute{\eta}}$$

$$\cup\ \frac{/}{\tau\acute{\iota}\nu\alpha\varsigma}\cup\ \frac{\cdot}{\pi o\theta'}\ \frac{}{\check{\epsilon}} \Big|\ >\ \frac{/}{\delta\rho\alpha\varsigma}\ \cup\ \frac{\cdot}{}\ \Big\|\ \frac{/}{\tau\acute{\alpha}\sigma\delta\epsilon}\ \cup\ \frac{\cdot}{\mu o\iota}\ \Big|\ \cup\ \frac{/}{\theta o\acute{\alpha}\xi\epsilon\tau\epsilon}\cup$$

Sophocles, *Œdipus Tyrannus*, 1–2.

In comedy, however, the greatest freedom is allowed, except in the sixth foot, which is always an iambus (or, through use of the syllaba anceps, a pyrrhic, $\cup\cup$), e g.:

$$\cup\cup\ \cup\ \frac{\cdot}{\acute{o}\sigma\alpha}\ \frac{}{\delta\grave{\eta}}\ \frac{}{\delta\acute{\epsilon}\delta\eta\gamma} \Big|\ >\ \frac{/}{\mu\alpha\iota}\ \Big\|\ \frac{/}{\tau\grave{\eta}\nu}\ \cup\ \frac{\cdot}{\grave{\epsilon}\mu\alpha\upsilon} \Big|\ >\ \frac{/}{\tau o\hat{\upsilon}}\cup\ \frac{\cdot}{\kappa\alpha\rho\delta\acute{\iota}\alpha\nu,}$$

$$>\ \frac{/}{\check{\eta}\sigma\theta\eta\nu}\ \cup\ \frac{\cdot}{\delta\grave{\epsilon}\ \beta\alpha\iota} \Big|\ \cup\ \frac{/}{\acute{\alpha},}\ \Big\|\ \cup\ \frac{/}{\pi\acute{\alpha}\nu\upsilon}\cup\ \frac{\cdot}{\delta\grave{\epsilon}\ \beta\alpha\iota} \Big|\ \cup\ \frac{\cdot}{\acute{\alpha},}\cup\ \frac{}{\tau\acute{\epsilon}\tau\tau\alpha\rho\alpha}$$

Aristophanes, *Achar* 1–2.

With the early Latin poets this verse, called by the Roman grammarians the senarius, was even less restrained, the proceleusmatic ($\cup\cup\cup\cup$) being a possible substitution in any foot but the last, e.g.:

$$\cup\cup\ \cup\ \frac{\cdot}{\text{ubi vent(um)}}\ \text{ad}\ \cup\ \frac{\cdot}{\text{æ}} \Big|\ >\ \text{dis}\ \Big\|\ \frac{/}{\text{est}}\ \cup\ \frac{\cdot}{\text{Dromo}} \Big|$$

$$>\ \frac{/}{\text{pultat}}\ \cup\ \frac{\cdot}{\text{fores;}}$$

$$\cup\cup\ \cup\ \frac{\cdot}{\text{anus}}\ >\ \frac{\cdot}{\text{quædam prod}} \Big|\ \cup\ \frac{\cdot}{\text{it;}}\ \Big\|\ \frac{/}{\text{hæc}}\ \cup\ \frac{\cdot}{\text{ub(i)}}\ \cup\cup\ \frac{\cdot}{\text{ape-}} \Big|$$

$$\cup\ \frac{/}{\text{rit}}\cup\ \frac{\cdot}{\text{ostium}}$$

$$>\ \frac{/}{\text{continu(o)}}\cup\ >\ \frac{\cdot}{\text{hic se}} \Big|\ >\ \frac{/}{\text{coniecit}}\cup\ \Big\|\ \frac{\cdot}{\text{in-}} \Big|$$

$$\cup\cup\ \cup\ \frac{\cdot}{\text{tr(o), ego consequor}}$$

Terence, *Heaut.* 275–277.

The later Roman writers, like Horace, conformed more closely to their Greek models, but the degree of strictness varied with each writer.

The Choliambus or limping iambus is an iambic trimeter in which a trochee has been substituted for the last iambus of the normal line. As this verse, like the corresponding trochaic measure, was introduced by Hipponax for satiric and ludicrous effects, it is also known as the Hipponactean. In the Alexandrine period it became a favorite measure for narrative and didactic poetry, especially for fables; the mimes of Herondas, discovered in 1890, are in this verse. In Latin it was used by Catullus, Martial, and others, often in poems of tenderest feeling:

$$\cup\ \frac{/}{\text{miser}}\ \cup\ \frac{/}{\text{Catul}} \Big|\ \cup\ \frac{/}{\text{le,}}\ \Big\|\ \frac{/}{\text{desinas}}\cup\ \frac{\cdot}{} \Big|\ \cup\ \frac{/}{\text{ineptire}}\ >\cup$$

Catullus, 8, 1.

The iambic tetrameter catalectic (in Latin called the septenarius) is frequent in comedy. Resolutions and substitutions are numerous in the first six feet, and in Latin are allowed even in the seventh

$$>\ \frac{/}{\kappa\alpha\grave{\iota}}\ \frac{}{\mu\grave{\eta}\nu}\ \frac{}{\pi\acute{\alpha}\lambda\alpha\iota}\cup\ \frac{\cdot}{} \Big|\ \cup\ \frac{/}{\gamma'}\ \frac{}{\grave{\epsilon}\pi\nu\iota\gamma\acute{o}\mu\eta\nu}\cup\ \frac{\cdot}{}\ \Big\|\ \cup\ \frac{/}{\tau\grave{\alpha}}\ \frac{}{\sigma\pi\lambda\acute{\alpha}\gamma\chi\nu\alpha}\cup\ \frac{\cdot}{\kappa\acute{\alpha}} \Big|$$

$$\cup\ \frac{/}{\pi\epsilon\theta\acute{\upsilon}\mu o\upsilon\nu}\ \frac{}{}\ \wedge$$

Aristophanes, *Nubes*, 1036.

$$>\ \frac{/}{\text{verb(um)}}\ >\ \frac{}{\text{unum cave}} \Big|\ >\ \frac{/}{\text{de nuptiis,}}\cup\ \frac{\cdot}{}\ \Big\|\ \text{n(e)}\ >\ \frac{}{\text{ad}}$$

$$\frac{/}{\text{morb(um)}}\ >\ \frac{}{\text{hoc eti}}\cup\cup \Big|\ >\ \text{am teneo}\cup\cup\ >\ \wedge$$

Terence, *Andria*, 300.

The iambic tetrameter acatalectic (Latin octonarius) is much less frequently used, but is found in the Greek lyric poets and in the cantica of Latin comedy.

$$>\ \frac{/}{\text{Κάστωρ}}\ \frac{}{\tau\epsilon}\ \cup\ \frac{\cdot}{\pi\acute{\omega}} \Big|\ >\ \frac{/}{\lambda\omega\nu}\cup\ \frac{\cdot}{\acute{\omega}\kappa\acute{\epsilon}\omega\nu}\ \Big\|\ >\ \frac{/}{\delta\mu\alpha\tau\hat{\eta}\rho\epsilon\varsigma,}\ \frac{}{\grave{\iota}\pi}\ \Big|\ \cup\ \frac{/}{\pi\acute{o}\tau\alpha\iota}\ \cup\ \frac{\cdot}{\sigma o\phi o\grave{\iota}}$$

Alcman, frg. 2.

$$\cup\cup\ \frac{\cdot}{\text{enim vero,}}\ >\ \frac{\cdot}{\text{Da}} \Big|\ \cup\ \frac{/}{\text{ve,}}\ \cup\ \frac{\cdot}{\text{nil locist}} \Big|\ >\ \frac{/}{\text{segnitiæ}}\cup>$$

$$\cup\ \cup\ \text{neque} \Big|\ >\ \frac{/}{\text{socordiæ}}\cup\ \frac{\cdot}{}$$

Terence, *Andria*, 206.

Dactylic Rhythms. In all dactylic rhythms the regular substitute for the dactyl (– ∪ ∪) is the spondee (– –). In Greek and Latin alike the dactylic or heroic hexameter is the most common form of verse, and is regularly employed in epic, didactic, and bucolic poetry. It contains six feet, of which the first four may be either dactyls or spondees, the fifth is usually a dactyl (when a spondee is here used, the verse is called spondaic), and the sixth is either a spondee or a trochee. The chief cæsura is usually after the thesis—occasionally in the arsis—of the third foot, less often after the thesis of the fourth. A diæresis after the fourth foot is called bucolic from its frequency in bucolic poetry.

ἄνδρα μοι | ἔννεπε, | Μοῦσα, || πο | λύτροπον, | ὃς μάλα | πολλά
πλάγχθη ἐ | πεὶ Τροί | ης || ἱε | ρὸν πτολί | εθρον | ἔ | περσεν

Odyssey, 1, 1–2.

conticu | er(e) om | nes, || in | tenti | qu(e) ora | te | nebant.

inde to | ro pater | Æne | as || sic | orsus ab | alto.

Vergil, *Æneid*, 2, 1–2.

The dactylic pentameter consists of two catalectic dactylic tripodies, separated by diæresis. Spondees as substitutes for the dactyls are permitted only in the first half of the verse, and syllaba anceps is allowed only at the end of the second tripody. This verse is never used by itself, but always follows a dactylic hexameter, the two making an elegiac distich. (See DISTICH.) This couplet is found in elegiac poetry (hence the name; see ELEGY), and was frequently employed for amatory verse and epigrams.

ὦ ξεῖν', | ἀγγέλ | λειν || Λακε | δαιμονί | οις ὅτι | τῇδε
κείμεθα | τοῖς κεί | νων ♯ ῥήμασι | πειθόμε | νοι

Tityrus | et sege | tes || Æ | neia | qu(e) arma | le | gentur
Roma tri | umpha | ti ♯ dum caput | orbis e | rit

Ovid, *Amores*, 1, 15, 25–26.

The tetrameter acatalectic was used by Alcman and other Greek lyricists in dactylic strophes.

A tetrameter catalectic with an hexameter forms the Archilochian strophe, and the trimeter catalectic is known as the lesser Archilochian verse, both are employed by Horace.

Anapæstic Rhythms. Anapæstic verses are much more numerous in Greek than in Latin, as the latter language does not lend itself readily to this measure. The most common metrical equivalents for the anapæst (∪ ∪ –) are the spondee (– –), dactyl (– ∪ ∪), and rarely the proceleusmatic (∪ ∪ ∪ ∪). The verses are measured in dipodies. The common forms in Greek are: (*a*) the monometer; (*b*) the dimeter acatalectic; (*c*) the dimeter catalectic or parœmiac, e.g.:

(*a*) σύμφω | νος ὁμοῦ

Aristophanes, *Aves*, 221.

(*b*) πτερύγων | ἐρετμοῖ | σιν || ἐρεσ | σόμενοι

Æschylus, *Agamemnon*, 52.

(*c*) σὲ μὲν εὖ | πράσσοντ' | ἐπιχαί | ρω

Sophocles, *Ajax*, 136.

Both tragedy and comedy frequently employ a series of anapæstic dimeters, acatalectic, with an occasional monometer, closing always with a parœmiac, the whole forming an anapæstic system. Such systems are very common as march movements, e.g.·

(*d*) δέκατον μὲν ἔτος | τόδ' ἐπεὶ Πριάμου
μέγας ἀντίδικος
Μενέλαος ἄναξ | ἠδ' Ἀγαμέμνων,
διθρόνου Διόθεν | καὶ δισκήπτρου
τιμᾶῆς ὀχυρὸν | ξεῦγος Ἀτρειδᾶν
στόλον Ἀργείων | χιλιοναύταν
τῆσδ' ἀπὸ χώρας
ἦραν, στρατιῷ | τιν ἀρωγήν.

Æschylus, *Agamemnon*, 40–47.

By the union of an acatalectic with a catalectic dimeter the anapæstic tetrameter catalectic is formed, which was employed by Tyrtæus and Epicharmus In Attic comedy this is the regular measure for the entrance and departure of a chorus or an actor.

(*e*) ἄγετ', ὦ Σπάρτας | ἔνοπλοι κοῦροι, | ποτὶ
τὰν Ἄρεος | κίνασιν

Tyrtaeus, frg 16.

ὑμεῖς δ' ἡμῖν | πρόσχετε τὸν νοῦν ‖ χαίροντες
τοῖς | ἀναπαίστοις

Aristophanes, *Equites*, 69.

In Latin, anapæstic measures are found in Plautus, where their measurement is often doubtful; Terence avoided them; but Varro, Seneca, Prudentius, and other late writers employed them, conforming, however, more strictly to their Greek models than Plautus did. Of the forms enumerated above, *b*, *c*, *d*, and *e* are found.

(*b*) hic homost omni(um) homi | num præcipuos
voluptatibus gan~~e~~ diisqu(e) antepotens.

Plautus, *Trinummus*, 1115–16.

(*c*) nimis tand(em) eg(o) abs te | contemnor

Plautus, *Pseudolus*, 916.

(*d*) sed quis hic est qu(i) in | plate(am) ingreditur |
cum nov(o) ornatu | specieque simul?
pol quamquam domi | cupi(o) opperiar: |
qu(am) hic rem gerat, anim(um) | advortam

Plautus, *Trinummus*, 840–842.

(*e*) hunc hominem decet | aur(o) expend(i)· huic ‖
decet statuam statu(i) | ex auro

Plautus, *Bacchides*, 640.

Further, in Latin two anapæstic dimeters acatalectic are combined to form a tetrameter acatalectic or octonarius. Diæresis regularly occurs after the second dipody, and both hiatus and syllaba anceps are allowed before the diæresis

— ⏑ ∪ ∪∪ | — ⏑ ∪ — | —
quid mihi meliust | quid magis in remst ‡ qu(am) a
— ∪ ∪ | — — —
corpore vi | tam secludam
Plautus, *Rudens*, 220.

Cretic and Bacchiac Rhythms. Rhythms of this class are all employed to express great emotion. For the cretic (— ∪ —) may be substituted the following forms

— ∪ ⏑ ∪, — ⏑ ∪ —, — > —, — ⏑ ∪ > —, — > ∪ ∪.

The bacchius (∪ — —) may have the forms ∪ ⏑ ∪ —, ∪ — ∪ ∪, > — —. (for the antibacchius these are reversed). The tetrameter acatalectic is the most common measure.

∪ — — | ∪ — — | ∪ — — | ∪ — —
τίς ἀχὼ, | τίς ὀδμὰ | προσέπτα | μ' ἀφεγγὴς;
Æschylus, *Prometheus*, 115.

— ∪ — | — ∪ — | — > — | — ∪ —
ut malis | gaudeant ‖ atqu(e) ex in | commodis
Terence, *Andria*, 627.

In the lyric portions of Greek tragedy, where great excitement is expressed, a peculiar foot, called the dochmius, is found, made up of an iambus and a cretic (∪ —, — ∪ —), or of a bacchius and an iambus (∪ — —, ∪ —). Since all possible substitutes for the constituent parts are allowed, the foot appears in a great variety of forms.

Choriambic and Ionic Rhythms. Many verses once called choriambic are now regarded as logaœdic; genuine choriambics are exceedingly rare, there being not over six cases in Latin.

— ∪ ∪ — | — ∪ ∪ — | — ∪ ∪ — | — ∪∪ —
δεινὰ μὲν οὖν, | δεινὰ ταράσ | σει σοφὸς οἰ | ωνοθέτας
Sophocles, *Œdipus Tyrannus*, 484.

— ∪ ∪ — | — ∪∪ — | — ∪ ∪ — ‖
ut neque quid | me faciam | nec quid agam ‖
> — ∪ ∧
certum sit
Terence, *Adelphœ*, 611.

Ionic rhythms appear chiefly in tripodies and tetrapodies.

∪∪ — — | ∪ ∪ — — | ∪∪ — —
πεπέρακεν | μὲν ὁ περσέ | πτολις ἠδη

∪∪ — — | ∪ ∪ — — | ∪∪ — — | ∪∪ — —
βασίλειος | στρατὸς εἰς ἀν | τίπορον γεί | τονα χώραν
Æschylus, *Persæ*, 65–66

— — ∪∪ | — — ∪∪ | — ∪ — ∪ | — — ∧
molles, vete | res Delia | ci manu re | cisi
Petronius, 23.

The ionic a minore tetrameter catalectic or Galliambic verse admits of the greatest variety of resolutions and substitutions, which can be seen only by a study of Catullus, 63. See the editors of Catullus, in notes on that poem

Dactylo-Epitritic Rhythms. About one-half the extant poems of Pindar are written in the dactylo-epitritic measure, which consists of dactyls, spondees, prolonged syllables ⏑, and epitrites. The epitrite is a dipody of the form — ∪ — —, which may also be catalectic, — ∪ — ∧. An unaccented syllable at the beginning of the verse (anacrusis) is also permitted

— ∪∪ | — — ∪ ∪ | — — | — ∪ — — ‖ — ∪∪ | — ∪ —
Τυνδαρί | δαις τε φι | λοξεί | νοις ἀδεῖν καλ ‖ λιπλοκά | μῳ
∪ ∪ —
θ' Ἑλέ | να ∧

— | — ∪ ∪ | — ∪ ∪ | — — | — ∪ — ∧
κλει | νὰν Ἀκρά | γαντα γε | ραίων | εὔχομαι
Pindar, *Ol.* 3, 1–2

Dactylo-Trochaic Rhythms. These verses consist of two separate cola, one dactylic, the other trochaic. The following combinations are distinguished: (1) the greater Archilochian, consisting of a dactylic tetrameter acatalectic, and a trochaic tripody

— ∪ ∪ | — ∪ ∪ ∪ | — — | — ∪∪ — ∪ | —
solvitur | acris hi | emis ‖ gra | ta vice ‖ veris | et
∪ — >
Favoni
Horace, *Carmina*, 1, 4, 1.

(2) The iambelegus, a trochaic dimeter catalectic with anacrusis followed by a dactylic tripody catalectic. No resolutions are allowed in the first colon, or substitutions in the second.

> — ∪ | — > | — ∪ | — ∧ — ∪ ∪ |
tu | vina | Torqua | to mo | ve ‖ consule |
— ∪ ∪ | — ∧
pressa me | o
Horace, *Epodes*, 13, 6.

(3) The elegiambus, which is the same as the iambelegus with the cola reversed.

— ∪ ∪ | — ∪ ∪ | — ∧ ∪ | — ∪ | — > | —
scribere | versicu | los ‖ a | more | percus | sum
∪ — ∧
gra | vi
Horace, *Epodes*, 11, 2.

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White's book are those by P Shorey, in *Classical Philology*, vol. viii, and by M W. Humphrey, in *Classical Weekly*, vol. ix.

ROMANCE VERSIFICATION

On the versification of the various Romance countries the influence of classic Latin, Celtic, Oriental, and German versification is very slight as compared with the influence in the Middle Ages of Provençal, and in the Renaissance of Italian, versification.

The long or short quantity of vowels plays no part in Romance versification, except in some scattered and fruitless attempts at imitations of antique verse, as in the *vers mesurés* of such poets as Baif in the sixteenth century and a few more recent ones. There are, however, remodelings of the old measured verse which attempt to replace syllable length by word accent Examples of this are to be found all the way from the Eulalia sequence down to the Odi barbare of Carducci in our own day.

The principle of syllable count is fundamental in all Romance verse. The rhythm is marked by one or more fixed accented syllables. These are the final syllables of the verse and of the syllabic series when there is more than one accented syllable in the verse. The counting of syllables in each syllabic series or verse includes this last accented syllable; the one or two optional additional syllables at the end of the syllabic series or verse cannot alter the rhythm, for these syllables are unaccented In the earlier Romance verse we find verses with three or even four fixed accents, as in the trochaic eleven-syllable and fourteen-syllable verse; also the twelve-syllable verse with accented fourth, eighth, and twelfth, long used in the French folk songs.

A second principle of Romance versification is the vocalic or consonant-vocalic likeness in sound of the last accented syllable at the end of two or more verses. Assonance (likeness of vowels) and rhyme (likeness of vowels and consonants) emphasize the verse ending and make the rhythm of the verse fall more sharply on the ear, thus compensating in some measure for the decrease, as time went on, in the number of fixed accented syllables.

Very few popular Romance verses are found entirely without rhyme or assonance, yet even more seldom is rhyme found confined to the same sound of the consonant, or on an unaccented syllable, or binding accented with unaccented syllables. In the sixteenth century in Italian, under the influence of classic Latin, rhymeless verses (*versi sciolti*) appear, as in Trissino's *Sofonisba*, Ariosto's comedies, Rucellai's *Api*, and Allemanni's *Coltivazione*. The Spanish *versos sueltos*, the French *vers blancs*, and also English blank verse are learned productions and largely imitations of Italian models. Verses without assonance or rhyme are not present in the older French and Provençal poetry; unbound single lines like those at the ends of the tirades in *Aucassin et Nicolette* are very rare.

Accent, syllable count, and rhyme are thus the characteristic elements of Romance versification. Early attempts to explain the change from Latin foot measure to Romance accent, syllable count and rhyme, by foreign influence (Celtic, German, Arabic) as well as by the supposed character of ancient Roman (Fescenine, Saturnian) metres, have been thwarted by recent scholarship. Meanwhile no theory has enjoyed a documentation sufficient to establish itself beyond doubt. Certain basic facts have, however, gained general acceptance. In Latin the tonic accent was associated with long vowels. Poetic inscriptions of popular origin early show the growing uncertainty in the quantity of unaccented vowels, and hence an increasing importance of the accented syllable The identity of accent, as now understood with the ictus, in other words the change from quantity to accent, was first recognized in criticism by Martianus Capella (*ictus* = *elevatio vocis*) of the fifth century. But the change probably occurred much earlier. For the earliest rhymed poem, that of St. Augustine against the Donatists was written c 393; while there are poems containing rhymes already in the first century A.D.; and the development of rhyme seems closely affiliated with the disappearance of quantity into accent, a change which disintegrated the classic metrical units, and necessitated the use of some other device to mark the close of the metrical period. Rhyme and assonance are but extensions of the principles of alliteration and of the repeated metrical movement already familiar in classic poetry itself, though probably much more common in ancient popular verse.

Similarly criticism has rejected various attempts to derive the particular Romance verses from any specific Latin measure (e.g., the Romance decasyllable from Latin hexameter), favoring generally the theory that side by side with the classic versification there existed from very ancient times a parallel popular versification, bearing much the same relation to it as vulgar Latin to the classic tongue. The first characteristically Romance verse to appear in writing is the decasyllable, perhaps unjustifiably identified by Stengel in the *Vita Sancti Faronis* (ninth century), but appearing fully developed in the Provençal *Boecis* (tenth century), and the French *Vie de Saint Alexis* and the *Chanson de Roland* (eleventh century). In these poems the decasyllable is a verse of ten counted syllables with a tonic accent on the fourth and tenth, and a cæsura after the fourth An uncounted extra atonic syllable sometimes appears at the end of the cæsura (called thus the epic cæsura), sometimes at the end of the verse (called a feminine verse), sometimes in both places. There is almost without exception a conformity of cæsura and verse divisions to divisions of the sense, run-over verses being practically nonexistent. The exact syllable count is preserved by admitting hiatus, elision, and word contraction. The verses were grouped in assonanced strophes of varying length. Later in France appeared frequent decasyllables with the cæsura after the sixth syllable. Rhyme gradually replaced assonance after the twelfth century. While attempts to localize the origin of the decasyllable in north France have failed of conclusive proof, it is admitted that especially the epic cæsura was more in the genius of the *Langue d'oïl* (French). The later occurrences in Provençal epics (e.g, Girart de Roussillon) are almost certainly imitations of French. The Italian hendecasyllable, in view of the learned origins of written Italian verse, seems also to have been an adaptation of the French decasyllable, the extra syllable being due to the almost obligatory *verso piano* (_ ⏑) ending demanded by the Italian language. The cæsura never, however, became established in Italian verse with its French regularity. The hendecasyllable is the Italian verse par excellence, the lyric *set-*

tenario (seven-syllable) alone appearing as a poor competitor in point of frequency in all types of composition. The ten-syllable verse entered Spain with Provençal poetry, and was sparingly used and closely imitated In the fifteenth century came a new introduction from Italy, and it was very popular for a time, yet it was built entirely on Italian models

The eight-syllable verse is partly of popular origin, and can be followed nearly as far back as the ten-syllable. At first it shows two fixed accented syllables, and was among the most popular versifications of French and Provençal literature. Most narrative poetry of the Middle Ages in north and south France uses the eight-syllable verse, and the courtly epos and older drama are nearly exclusively eight-syllable. It is generally rhymed in pairs in this period Since the middle of the sixteenth century it has lost ground and is now used only in lyrics. It is a stranger to Spain, Portugal, and Italy.

In France the twelve-syllable verse with accented sixth succeeded to the place of the ten- and eight-syllable verses. First called Alexandrine (after the French *Roman d'Alexandre*) in the fifteenth century, it was used also in *chansons de geste*, and in drama and didactic poetry of the Middle Ages. Out of style in the fourteenth and fifteenth centuries, it became the verse of classicism in the sixteenth century, and has been important ever since. The rhyming in pairs, so common in Renaissance poetry, first appears in an Anglo-Norman poem on the Old Testament (thirteenth century). In Provençal the twelve-syllable verse is used far less than in France, and is probably an imitation. In Italian are found some early examples, and also in folk song; in the eighteenth century G. Martelli adapted it in the fourteen-syllable *Martellian* verse (each hemistich being piano, i.e., $\underline{/}\ \cup$, with seven syllables for the masculine French hemistich of six) which has been much used in dramatic poetry down to the present time. The earliest twelve-syllable verses in Spain are in the thirteenth century. They are distinctly imitations of French Alexandrines and are bound in four-line strophes of one rhyme, exactly as in France. Moreover, they are always called *versos franceses*.

The twelve-syllable verse with accented fourth, eighth, and twelfth syllables is of popular origin, and is found somewhat in French and Provençal poetry. The six-syllable verse is a free creation of the Romance people, and is considerably found in Italian as the *settenario*, though seldom used as the exclusive verse of a complete poem. It is less used in Provençal, modern French, and old Portuguese lyrics. The four-syllable and two-syllable verses are found in lyrics, and are due to dissection of longer verses. The trochaic verses are native to Spain and Portugal, and are generally little used in France, Provence, and Italy.

The fourteen-syllable verse with accented seventh was very popular in Spain as verse of the romances, and later of the drama, and goes back to the catalectic trochaic tetrameter, which is very popular in older rhythmic Latin poetry. Also the lines of the *Poema del Cid*, a poem of the twelfth century, but preserved in a garbled manuscript of the fourteenth century, are mutilated fourteen-syllable lines, and not, as some have tried to prove, imitations of the French Alexandrine.

The ten-syllable verse with accented fifth is closely allied to the fourteen-syllable, and is called *verso de arte mayor*. It falls into two lines of five syllables each and is met in purely lyrical romances. The fourteen-syllable verse is again shortened into the eleven-syllable with accented seventh, the *verso de redondilla mayor con pie quebrado*. This is also found in Provençal, and sometimes bound in strophes with fourteen-syllable verses The nine-syllable verse is a further shortening of the fourteen-syllable. Examples are found in Italian, Galician, Provençal, old and modern French.

Much more abundant is the seven-syllable verse, *verso de arte real*, or *de redondilla mayor*, which is the independent half of the fourteen-syllable, and is also related to the similarly cut trochaic tetrameter. As a result of this breaking up of the fourteen-syllable came the four-line strophes with cross rhyme—such as the later ballads offer. This seven-syllable verse is also seen in the lyric poetry of North and South France *Aucassin et Nicolette* is written in this verse in single assonance tirades.

The five-syllable, or *redondilla de arte menor*, is often met in Spanish and Portuguese, and comes through division of the ten-syllable trochaic verse with accented fifth. Three-syllable and one-syllable verses, from the breaking up of longer verses, are little more than tests of metrical skill.

As time went on the number of syllabic series was generally reduced to two at most, and feeling for independent nature of the syllabic series was gradually lost. As, in the binding together of verses, assonance was replaced by rhyme. a great number of rhyme schemes grew up For such schemes, see the particular name, e.g., SONNET, BALLAD, RONDEAU, ETC.

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GERMANIC AND ENGLISH

There has been a steady stream of works on English versification ever since the appearance of Gascoigne's *Certayne notes of Instruction Concerning the making of verse or ryme in English* (1575), the first formal discussion of the subject. These treatises are mainly practical in character. In recent years, however, the historical and scientific study of language, especially through the experimental methods evolved in the study of phonetics, has reacted strongly upon investigations in metre and versification. The traditionally current system of nomenclature and classification, adapted from classical Greek and Latin practice to a metre of quite different kind, is generally acknowledged to be only remotely descriptive of the facts of English versification. Briefly stated, the purpose of the modern scientific student of versification is to

secure a basis in direct observation, usually with the aid of mechanical record of some kind, of the actual physical phenomena of the vocal rendition of verse for an independent system of terminology and organization. Physicists and psychological physicists have thus been enabled to secure results certainly more precise than those dependent entirely upon the variable testimony of the ear, and more exact than can be indicated by the conventional methods of scanning Interesting and important as these results are, however, they remain at present incomplete, and certainly more significant for the psychologist and physicist than for the literary critic or historian It is a fact in versification, as in many other forms of art, that a complete scientific or theoretical demonstration is not a necessary preliminary either for the enjoyment or production of works in the art. Until the scientific study of versification has something to add which can be shown to affect the practice of the art, its interest to the student of versification must be largely theoretical and its effect upon nomenclature must be slight. In the meantime, the traditional system, imperfect though it be, is the only one current, and as it has been followed from the earliest times down, it is the only one which has historical significance for the student of English literary criticism.

According to this traditional system the temporal unit of metrical measurement is the foot The line is the next larger division, being composed of two feet, three feet, four feet (the common form being the octosyllabic line), five feet (pentameter), six feet (hexameter or Alexandrine), or seven feet (septenarius). Lines of two, three, or seven feet are relatively uncommon, the line of five feet in English poetry leading all the rest in popularity. The foot in turn is capable of division into stressed and unstressed syllables. The stressed syllables mark off the division of the line into approximately equal intervals constituting the feet. It is a prime condition of English verse that the metrical stress or accent (often called the ictus) shall coincide with the logical stress of words as they are used in natural speech, or, if the coincidence is not complete, it must be at least sufficiently complete to preserve the sense of the identity of the logical values of words in prose and verse. On the other hand, the metrically unstressed elements in the foot may not be words which ordinarily would take a heavy logical stress, since, if they were, they might obscure the value of the metrically stressed syllables in marking the division of the line into feet. Each foot ordinarily contains one stressed syllable, and one, two, or three unstressed syllables, though feet with three unstressed syllables are relatively uncommon. The question of quantity in connection with the stressed and unstressed syllables of English versification has been very much discussed, but with little agreement in theory, and no advantage to practice. It is mathematically demonstrable that the feet of an average line of English verse are approximately equal, but the temporal division of the elements of which the foot is composed is not constant. Usually a stressed syllable will be longer than an unstressed one, but this is not necessarily the case. And as any syllable may occupy the position of metrically stressed syllable, providing its logical significance is sufficiently great, it is evident that there is no absolute quantity in syllables which determines the part they play in the schematic foot of English verse The same syllable may fall in one line in the metrically accented position, and in the unaccented in the next. The determining element in the constitution of syllables into feet is stress or accent, and for this reason English, like the other Germanic dialects, is rightly said to make use of an accentual rhythm in its system of versification It is obvious, however, that the term "accent" is used as indicating not an absolute, but a relative value. In a five-foot line, e.g, each of the five accents does not necessarily receive an equal degree of force or energy in utterance, but each metrically stressed syllable is relatively energetic as compared with the metrically unstressed elements of its foot. And the unstressed syllables are of course not absolutely without stress, for if they were they would be without utterance. This stage of actual disappearance is sometimes reached when a pause is made to take the place of the unstressed element in a verse. On the other hand it is doubtful if a foot of two equally stressed elements (corresponding to the spondee of classical metre) falls within the spirit of English versification. Occasional examples of this type of foot may be found, but a succession of them would be impossible, since the elements of which they are composed being equivalents, there would be nothing in the structure of the line to indicate the division into feet. The main types of feet commonly used in English poetry are the trochaic ($/ \times$), the iambic ($\times /$), the dactylic ($/ \times\times$), and the anapestic ($\times\times /$). The macron, or dash, with the accent over it is customarily used to indicate the stressed syllables, but with no implications as to quantity; and the cross indicates merely unstressed syllables. Normally a line of English verse employs a succession of feet of the same type, but substitûtions and transpositions occur not uncommonly. Mechanically regular verse is not regarded as good verse.

Accentual rhythm, accompanied by alliteration, is characteristic of the earliest known Germanic verse. In fact, the type may be still older, and may have been a common inheritance of the Indo-Germanic peoples. A great body of this alliterative verse is preserved in Anglo-Saxon, Old Saxon, and Old Norse, and a few lines from Anglo-Saxon will illustrate its structure:

Hwæt! wē Gār-Dena in gēardagum
þēodcyninga þrym gefrūnon
hū þā æþelingas ellen fremedon

The long line consists regularly of two half lines bound together by carefully regulated alliteration. The number of accents in the half line is a matter of discussion According to one theory there are four; and the whole line, with its eight stresses, is made to correspond to a primitive long line assumed for Indo-Germanic. According to another theory, which is the one most generally accepted, each half line (disregarding certain hypermetrical forms) has only two accents, and in the distribution of them it conforms to one of the following general types in which the grave accent (—̀) represents secondary stress:

A. $/ \times \mid / \times$ stīdum wōrdum.
B. $\times / \mid \times /$ ne wīnterscūr.
C. $\times / \mid / \times$ and fōrd gāngan.
D. $/ \mid / \grave{} \times$ fōrd fōldwège.
E $/ \grave{} \times \mid /$ ândlângne dæg.

Each of the five types admits of several modifications, and except in a few situations there is great freedom as to the number of unaccented syllables. End rhyme is almost unknown; and stanza structure is very rare in Anglo-Saxon, though regular in Old Norse This "five-type" verse was employed with marked regularity throughout the Anglo-Saxon period for poetry of all kinds With the introduction of French models, the older alliterative verse of native origin lost literary caste, but in the fourteenth century occurred an interesting patriotic revival of it, and it was handled with masterly skill by two of the ablest poets of the age of Chaucer—Langland and the unknown author of the romance of *Gawayne and the Green Knight*. The *Pearl*, an elegy by the latter poet, exhibits a very difficult combination of alliteration with a complicated rhyme scheme.

The Middle English period, however, is marked in general by the adoption and gradual perfection of the more regular measures of which mediæval Latin and Old French verse afforded models Three new characteristics, all due to foreign influence, made their appearance in this later verse. (1) end rhyme (see RHYME) became much more generally used, often in place of and often combined with the alliterative style; (2) stanza structure, a development closely associated with rhyme, became common; (3) the number of unaccented syllables in a line was more strictly regulated. The change to the new type of versification was gradual, and English poetry, especially in the matter of alliteration, has never ceased to show traces of the older usages. Yet the *Poema Morale*, a poem of the twelfth century, in rhymed septenaries, attained a pretty strict regularity in syllable counting; and the *Ormulum* (about 1200, in unrhymed septenaries) is mechanically monotonous. Layamon's *Brut*, on the other hand, a long poem of about the same time, is more various in structure. It employs both rhyme and alliteration, and retains the old freedom in the number of unstressed syllables. The free system persisted in many poems throughout the Middle English period, and later still in popular ballads and in the so-called tumbling verse of early modern English writers. In fact, the new principle of Coleridge's *Christabel* was really a revival of the old, native English method of counting accents and paying little attention to unstressed syllables.

In addition to the metres already mentioned, wide use was made in Middle English of the Alexandrine (often combined with the septenary), the octosyllabic couplet (extremely frequent), and a number of lyric forms. There was considerable imitation of French poetry in its more complicated, as well as its simpler stanza arrangements; and the so-called tail-rhyme stanza (used with humorous effect in Chaucer's *Sir Thopas*) was fairly common in narrative verse. To Chaucer, the first great master of the newer versification, is due the popularity of two important metres· the rhyme royal (seven-line pentameter stanzas rhyming ababbcc), and the decasyllabic couplet, or heroic couplet, as it is more commonly called. Of the former he has some 14,000 lines, and of the latter some 16,000; and both measures became in his hands admirable instruments for continuous narration. The rhyme royal was popular with Chaucer's immediate followers, Lydgate, Occleve, Dunbar, and James I of Scotland, and was used later by Skelton, Barclay, and Sackville. Shakespeare employed it in *The Rape of Lucrece*, but since then it has been rare. The pentameter couplet always remained a favorite English metre

The beginning of the modern English period is marked by no such change in the fundamental principles of versification as that which took place between Anglo-Saxon and Middle English Chaucer's system has been in all essentials the system of English poets ever since, though the modifications of the language through loss of inflections, and the like, have considerably altered the technical problems of English poetry. The nature of these changes can best be made to appear by comparing a few lines of Chaucer's *Knight's Tale* with Dryden's modernization of the same.

"The Firstë Moevere of the cause abovë,
When he first made the faire cheyne of lovë,
Greet was theffect and heigh was his ententë;
Wel wiste he why and what ther of he mentë,
For with that fairë cheyne of love he bond
The fyr, the eyr, the water and the lond,
In certeyn boundës that they may nat flee"

Dryden renders the passage:

"The Cause and Spring of motion from above
Hung down on earth the golden chain of Love;
Great was the effect, and high was his entent,
When peace among the jarring seeds he sent;
Fire, flood, and earth and air by this were bound,
And love, the common link, the new creation crowned."

A complete survey of modern English verse forms lies far beyond the range of this article. It is not possible here to do more than name the commoner metres and give some brief indications of their history.

The long septenary, or seven-stress line, of which Chapman's *Iliad* is a famous example, is unusual in modern English. But in its resolved form, printed as quatrains of alternating four-stress and three-stress verse, it constitutes the common metre of the hymn-books; and one of the most frequent ballad stanzas has the same movement, though perhaps different in origin. The combination of septenaries with Alexandrines made the so-called "poulter's measure," which was rather popular with Elizabethan writers. Pure Alexandrine measure, like that of Drayton's *Polyolbion*, has not been common.

The octosyllabic couplet has been relatively less important in modern than in early English, particularly for narration. It was a good deal used for descriptive and reflective poetry by writers of the seventeenth and eighteenth centuries, partly because of the influence of Milton's *L'Allegro* and *Il Penseroso*. Butler's *Hudibras* gave it a new character as a typical metre of satire or burlesque, also well exemplified by Swift. In the nineteenth century it was again adopted for serious narration by Wordsworth, Byron, and Scott.

The various combinations of pentameter verse have undoubtedly been the favorite forms of English metre. The eight-line stanza, imitated from the Italian "ottava rima" (rhyming abababcc), was introduced by Wyatt and Surrey, and used by Spenser, Daniel, Drayton, Harrington, and Fairfax, chiefly in romantic poetry. In the nineteenth century Keats, Shelley, and

other poets wrote it in the romantic spirit, while Byron and Hookham Frere turned it to satirical uses The Spenserian stanza (whatever the exact process of its formation) consists of eight pentameter lines with an added Alexandrine (rhyming ababbcbcc) invented by Spenser and used in the greater part of his poetry; it has been imitated by a number of later poets, among them Thomson, Shenstone, Beattie, and Keats. The pentameter couplet, Chaucer's favorite metre, was used by the Elizabethans for various purposes But its greatest vogue was in the classic period of the seventeenth and eighteenth centuries, when it was steadily developed and perfected by Jonson, Sandys, Waller, Denham, Dryden, and Pope. Throughout the eighteenth century it was the prevailing measure and was written by many poets with strictness and technical skill. In the nineteenth century a freer form, approaching the effect of blank verse, was developed by Leigh Hunt, Keats, Shelley, and Browning. Alongside of the heroic couplet should be mentioned the less widely used heroic stanza (a pentameter quatrain rhyming abab), best known through Gray's *Elegy* Blank verse, or iambic pentameter measure without rhyme, is probably the most distinctive of English metres, and has served the highest uses. Introduced in the sixteenth century, during the classical reaction against rhyme, it became in the hands of Marlowe and Shakespeare the accepted form for English dramatic poetry; and after Milton's use of it in *Paradise Lost* it was widely adopted for epic and reflective poetry as well. Among the nondramatic writers who used it in the eighteenth century were Blair, Akenside, Thomson, Young, and Cowper. In the nineteenth century it was very generally written —in highest perfection, perhaps, by Keats and Tennyson, and with great freedom and individuality by Browning. (For fuller treatment of the more important lyric forms, see ODE; SONNET.) It is impossible to take account here of the numerous minor metrical forms, chiefly lyric, of different periods. Some of them have arisen from the imitation of French metres which began in the Middle English period. There was a distinct revival of this in the nineteenth century, represented by the lighter verse of Henley, Dobson, and Andrew Lang. A number of metrical experiments have been made in the effort to reproduce in English the ancient classical verse forms, sometimes preserving even their quantitative scansion. One important metre which has been often tried, but, like all the rest, never completely naturalized, is the dactylic hexameter. This was first taken up in the time of the classical Renaissance, and among the poets who attempted it were Stanyhurst and Gabriel Harvey, and even Sidney and Spenser. The early hexameters were quantitative. In the eighteenth century the measure was revived, largely under German influence, by Coleridge and William Taylor. The modern hexameters have been for the most part accentual in rhythm, and in the hands of Southey, Clough, Longfellow, and Kingsley have attained some real popularity.

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VERS LIBRE. 1. A term which has not yet acquired a precise and fixed meaning, but which is often used to describe various kinds of poetical composition, rhymed or unrhymed, where metrical regularity is disregarded. In this sense vers libre and free verse are used as practically synonymous, and describe kindred productions in French or English. Free verse is often applied, e.g., to the metrically irregular poetry of Walt Whitman, and vers libre is the term similarly applied to poems of the French Gustave Kahn and Paul Ford, in which the stringency of orthodox prosody is disregarded.

2. In the early years of the twentieth century vers libre—and perhaps also free verse—tended to assume a slightly different meaning. Practitioners of irregular forms who aimed to build upon the laws of cadence—whatever those laws may be—and sought to give their poems the rhythms of the speaking voice, with its breathing spaces, claimed the term for their own, and would not willingly have it applied to such irregular poems as those of Whitman, which were set down as rhythmic prose. This distinction was made by writers in both French and English. Early twentieth-century vers librists count as proper to their favorite form some notable poetry of the past, as, e.g., Dryden's "Absalom and Achitophel," Matthew Arnold's "Nightingale," and various poems of Henley.

Consult the essays in Amy Lowell's *Six French Poets* (New York, 1915); the preface to *Some Imagist Poets* (Boston, 1915), an anthology; and studies on this subject in the works (*passim*) of Rèmy de Gourmont, Gustave Kahn, André Spiré, and Robert de Souza.

VERSTEGEN, fĕr-stā'gən, RICHARD (fl.1565–1620). An Anglo-Dutch antiquarian author, born in London. In 1565 he was entered at Christ Church, Oxford, as Richard Rowlands. After 1576 he removed to Antwerp and resumed the Dutch name of his family. There he established a printing press, and was actively concerned in the printing and dissemination of Catholic literature. His zeal in this respect later caused his imprisonment in Paris (1587) at the instance of the English ambassador. He is known to have gone about 1595 to Spain, where he was received by Philip II and remained for some time at the Catholic college at Seville.

He wrote: *The Post of the World, wherein is contayned the antiquities and originall of the most famous cities in Europe* (1576), *Theatrum Crudelitatis Hæreticorum Nostri Temporis* (1587, 1588, and 1592, Fr trans., 1588); *A Dialogue on Dying well* (1603, translated from the Italian of Pietro di Lucca), and *Restitution of Decayed Intelligence in Antiquities concerning the English Nation* (1605).

VERSTOVSKY, vĕr-stôf'skĭ, ALEXEI NIKOLAIEVITCH (1799–1862). A Russian composer, born near Tambov. He studied piano with John Field and Steibelt, violin with Bohm and Maurer, theory with Brandt and Zeiner, and singing with Tarquini. From 1823 to 1860 he was director of the Moscow Theatre, where numerous of his operatic vaudevilles won popular favor. His first serious work was the opera *Pan Tvardovsky,* composed under the influence of Méhul and Weber (qq.v.) and produced in 1828. This was followed by five other operas—*Vadim* (1832), *Askold's Tomb* (1835), *Home-Sickness* (1835), *The Boundary Hills* (1841), and *Gromoboy* (1845)—of which *Askold's Tomb,* full of Russian folk tunes and based on a mythical subject, proved the most successful. Verstovsky holds a prominent place in the history of Russian music, being generally considered the most gifted promoter of national Russian opera before Glinka (q.v.). He wrote also ten cantatas, three sacred concerts, a mass, choruses, and songs.

VERSUNKENE GLOCKE, fĕr-zụn'ke-ne glō'ke, DIE. See SUNKEN BELL, THE.

VERT, vâr (Fr., green). The name for green in heraldry (q.v.), represented in engraving by diagonal lines drawn from the dexter chief to the sinister base.

VERTEBRA, vĕr'tĕ-brȧ. See SKELETON; SPINAL COLUMN.

VER'TEBRA'TA (Neo-Lat. nom. pl. of Lat. *vertebratus,* jointed, articulated, from *vertebra,* joint, vertebra, from *vertere,* to turn). A subdivision of the phylum Chordata, which includes the largest and most differentiated or highly developed of animals. The group called vertebrates, or back-boned animals, may be defined as follows: Segmented Metazoa provided at some stage of development with a gelatinous supporting rod or chorda running through the long axis of the body, and with throat clefts or gill slits. They have a main nerve tube lying near the dorsal surface of the body which enlarges anteriorly to a brain. There is an internal, metameric, cartilaginous or bony skeleton, consisting typically of an axial series of parts replacing the chorda; of a box (cranium), inclosing the brain; of a series of arches (neural arches) protecting the nerve tube, and of supports to the body wall (ribs). The heart is ventral to the alimentary tract, which begins in a ventrally placed mouth and ends in a ventral anus, placed near the base of the tail. Vertebrates are the only group of animals in which the body may be divided into head, trunk, and tail, the tail being postanal. They alone are characterized by having typically, except as lost by degeneration, four limbs. They have an outer skin that consists of more than a single layer of cells. They have an internal skeleton that is essentially living, containing active cells within it. Each pair of limbs, when present, is supported by a bony girdle, which may in extreme cases be rudimentary. The skull, except in Cyclostomi, consists of cranium and lower jaw. The jaws are typically provided with teeth, but these are lost in turtles and birds. The central nervous system consists of a nerve tube (spinal cord) and brain, with which latter the main sense organs are connected. The brain is the special seat of sense perception, of voluntary motor impulses, and of the higher intellectual faculties. From brain and spinal cord a metamerically repeated series of nerves runs off to the skin, viscera, and muscles. The sense organs consist of an olfactory pit usually paired; paired camera eyes, with lens, a pair of auditory organs (pits or closed cavities) usually comprising three semicircular canals. In addition to the cerebrospinal system is a visceral system (the sympathetic). The digestive tract is a tube separated from the body wall by the peritoneum-lined body cavity. The digestive tube is divided into œsophagus and stomach, the small intestine with liver and pancreas, and the large intestine. (See ALIMENTARY SYSTEM.) Respiratory organs are typically present, either as gills in the aquatic vertebrates or as lungs. In some salamanders, however, respiration is by the throat and entire skin. The gills (q.v.) are thin plates typically placed in two rows on the gill arches between the slits. The lungs, which arise, apparently, as swimming bladders in fishes, come to lie ventral and to have a purely respiratory function in land vetebrates. The circulatory system (q.v.) consists of a set of vessels almost wholly cut off from the body cavity, and carries red blood, due to the red blood corpuscles. This fluid is propelled by a heart that consists essentially of two parts, a thin-walled auricle that receives blood entering from the trunk behind, and a thick-walled muscular ventricle that forces the blood out forward, to the respiratory organs, head, and trunk. In addition to the blood vessels are the lymph vessels, spaces incompletely cut off from the body cavity, and carrying chiefly white blood corpuscles and special nutriment to the blood. Special excretory organs (see EXCRETORY SYSTEM) are present, essentially consisting of paired, metamerically repeated tubules into which blood vessels pour their waste material. The tubules empty into a common paired duct, which also may serve, in the male, to convey the sexual products to the exterior. Reproduction is always sexual and the sexes are usually separate. See REPRODUCTIVE SYSTEM; MUSCULAR SYSTEM.

Development usually starts with a yolk-laden egg that cleaves incompletely. The embryo first appears as a disk or blastoderm lying on the yolk. At the hinder edge of the growing disk some cells are pushed in to form the alimentary tract. A pair of parallel folds rise up along the back to form the neural cerebral tube. From the upper right and left angles of the cavity of the alimentary tract metamerically repeated pairs of pouches are cut off to form the mesodermal pouches from whose walls the muscles and lining of the body cavity arise. The notochord develops first as a continuous groove, and finally as a rod, between the mesodermal masses. By the time the germ disk has surrounded the yolk the body wall is completely formed. The yolk lies at the bottom of the gut and forms a huge lump there, which gradually becomes absorbed and the animal assumes the typical cylindrical form. See EMBRYOLOGY.

The vertebrates form the section Craniata of the phylum Chordata, and embrace six classes, viz.: the cyclostomes, fishes, amphibians, reptiles, birds, and mammals. See CLASSIFICATION OF

ANIMALS; and the names of these various classes, and of their subordinate groups.

MODE OF EVOLUTION OF THE VERTEBRATA

At a very early period in the history of vertebrates, the internal rod or backbone, at first cartilaginous, became ossified and segmented into vertebræ, and four appendages developed which became fins, legs, or wings, for progression in water, on land, or in the air, respectively Along the upper side of the backbone lay the spinal cord, holding the cells and nerves which coordinated the action of the different parts of the organism, and the anterior end of this cord early specialized into a brain. The sense organs and the mouth were grouped around the brain, and the bony structures which developed to protect them and facilitate their action constituted the skull, which became the most characteristic and highly differentiated part of the animal Many vertebrates developed various protective bony structures over the surface of the body as well as the head.

The higher specialization of an animal, its more exact adaptation to a particular mode of existence, are an advantage to it so long as the conditions of its environment remain the same. But if the conditions change, the highly specialized type is at a disadvantage, as it cannot so well adapt itself to a new environment as its more generalized rivals. It is, therefore, likely to become extinct and be replaced by the less specialized forms, which in turn become highly specialized in adaptation to the new conditions. The many and great geological changes which have taken place involve many and complex changes in the conditions of life, both of marine and land animals, and changes in each group of organisms involve a widening circle of change in all the other groups dependent on it. But in the more complex modes of life a higher intelligence and a better mechanical adaptation to the more general conditions of the environment have been at all times of advantage. We observe, therefore, in the history of vertebrates through geological time, a general continuous progress in intelligence and in the broader lines of adaptation, together with a series of successive specializations in the details of their construction.

The greater size of an animal is of advantage to it in the struggle for life as against its rivals or enemies, but the larger animals require more food in proportion to their size in order to maintain the same relative activity. As long, therefore, as food is sufficiently abundant, a race of animals will tend to increase in size. But if changed conditions bring about a scarcity of food, the larger animals will become extinct and the smaller alone survive, and in their turn increase in size when a season of plenty recurs.

Accordingly we find that as a race of animals specializes in structure it likewise frequently increases in size during stable conditions, and that with changed environment the larger and more specialized animals become extinct. But the improvement in the general mechanical adaptation of its parts enables an animal to attain a greater size without corresponding loss in activity, and through geological time there has been a continual increase in the largest size attained by successive races of similar habits.

Besides structures which serve to protect the animal or aid it in obtaining food or attacking its enemies, the higher vertebrates develop many which are partly or wholly ornamental. The evolution of these is due to sexual selection and goes hand in hand with the development of extreme specializations and the increase in size which mark constant conditions of environment.

EARLY HISTORY OF THE VERTEBRATA

The vertebrates probably originated as aquatic or marine animals, partly amphibious. From this point they split into great sections, one, the fishes, becoming entirely marine, the other becoming amphibious and giving rise to the land vertebrates. These amphibious animals are most nearly represented among modern groups by the newts and salamanders, which with the frogs and toads constitute the order Amphibia. From the primitive Amphibia budded off three great groups or classes, the reptiles, predominantly amphibious, the mammals, predominantly terrestrial, and the birds, predominantly aërial Each of those classes has since branched out into every available mode of life in its own province, and each has invaded more or less the especial province of the others, and also that of the fishes The greater diversity and complexity of the conditions of life on the land have favored the evolution there of the highest types of vertebrates. The strictly terrestrial and the aërial life have brought out the highest degree of mechanical specialization of parts; the arboreal life has been among the conditions favoring the highest development of intelligence, and the races standing highest in this respect are arboreal or exhibit indications of descent from arboreal ancestors

During the geological age of invertebrates, the vertebrates were probably being first evolved from lower animals, as soft eel-like creatures, not unlike the amphioxus which is still found living on the Brazilian coast, without limbs and without bony skeleton, and leaving no traces of their existence in the sediments. During the Silurian period, however, and perhaps as low down as the Ordovician, appeared certain marine vertebrates, somewhat allied to the fishes, but inferior to them in important points of organization, called Ostracodermi (q.v.). These had no internal bony skeleton, but were covered by bony plates over the head and sometimes over the body. Some had curious flipper-like appendages corresponding to the pectoral fins of fishes; there was no separate lower jaw. They are so unlike any living animal that it is difficult to get any complete knowledge of their anatomy from the external hard parts, which are all that is preserved, for the internal skeleton was not calcified.

In the succeeding or Devonian period the ostracoderms continue to exist, and true fishes appear and become the dominant forms of life. They are far more primitive than most modern fishes, less completely adapted for marine life, and in most of them the internal skeleton is not calcified and the fins are very imperfectly developed. The most remarkable among them is the *Dinichthys*, remotely allied to the modern lung fish, but of huge size and its head covered by massive bony plates. The ostracoderms die out at the end of this period. Fishes appear in all the succeeding marine formations and become more and more like those of the present day.

The next two periods, the Carboniferous and Permian, constitute the age of amphibians, when large and small Amphibia, mostly covered completely with bony plates, were the dominant forms of life. These animals were amphibious some probably terrestrial, and had developed

limbs and feet for progression on land. They show various stages in the calcifying of the backbone, and in some it is complete. In the Permian the first reptiles appear, primitive types not easily distinguished from the Amphibia from which they had originated, but superior to them in their capacity for higher evolution

Evolution of the Reptilia. During the Triassic, Jurassic, and Cretaceous periods the reptiles were the dominant types, and branched out into terrestrial, aërial, amphibious, and marine groups in great variety, and many of them, such as the dinosaurs (q.v.), were of gigantic size With them lived ancestors of the modern crocodiles and turtles. The marine reptiles, ichthyosaurs, mosasaurs, and plesiosaurs, were dominant on the ocean, while the pterosaurs or flying reptiles ruled the air. At the end of the Cretaceous most of the reptile orders became extinct

The first birds appear in the Jurassic, retaining many characters of their reptilian ancestors, especially reptile-like teeth and a long vertebrated tail, from which the tail feathers branch out on each side down to the tip. In the Cretaceous period the birds have lost the reptilian tail, but still retain the teeth. All later birds have horny beaks instead of teeth.

Evolution of the Mammalia. During the age of reptiles the mammals had been slowly evolving, but very little is known of them The remains that have been found are exceedingly rare and very fragmentary, and indicate very primitive types, of minute size and apparently arboreal habit. But at the beginning of the Tertiary period they appear in force, and rapidly increase in size and variety, taking the place of the reptiles as the dominant type, and like them branching out into terrestrial, arboreal, aërial, marine, and some amphibious races. The ancestry of many modern animals has been traced back through successive stages nearly to the beginning of the Tertiary period, always converging towards a common ancestor. The most complete and instructive of these lines of descent is that of the horse (see HORSE, FOSSIL); that of the camel stands next in completeness; and less complete series represent the ancestry of many of the higher ruminants of the elephants, rhinoceroses, tapirs, dogs, and many other animals. Indeed, it may be said that there are comparatively few land mammals of which some ancestral types are not known; and these ancestral forms invariably present primitive characters linking the modern representative to the common ancestor of the mammals, although they often combine these primitive characters with peculiar specializations which show that they are not in the direct line of descent. And these primitive characters are more pronounced in the more ancient forms.

We have, however, very little positive knowledge of the ancestry of the marine mammals, the seals, cetaceans (whales, dolphins, and porpoises, etc.), and sirenians (dugongs and manatees). Setting aside these, with a few rare and peculiar land mammals whose history is unknown, and the Australian mammals (marsupials and multituberculates) which probably diverged from the common stock at an earlier date, we can infer with a high degree of probability from these known lines of descent a common ancestor to the modern mammals, which lived during the Cretaceous period and whose descendants at the beginning of the Tertiary period had diverged comparatively little in characters. This common ancestor was of small size, of a low order of intelligence for a mammal, the legs short, five toes on each foot and claws on the toes, and a long heavy tail. Its teeth were 44 in number, 11 on each side of each jaw, consisting of three incisors, a canine, four premolars, and three molars The molars had each three sharp cusps arranged in the form of a triangle; the remaining teeth had but one cusp, but the canine was larger than the rest. The animal walked on the sole of the foot, and there are some reasons for thinking that it was at least partly arboreal Its food was probably chiefly insects or other small animals. Only a few fragments of jaws and teeth of Cretaceous mammals have been found, but some of them correspond, as far as they go, to the characters of the hypothetical type, while others represent more ancient offshoots from the central stock.

The oldest Tertiary mammals preserve nearly all the above characters of their supposed ancestor, but show the early steps of the divergence which led into the various types of the present day Some were becoming herbivorous, developing hoofs instead of claws, lengthening the limbs and losing one or more of the side toes on each foot to increase the speed, and changing the character of the teeth to fit them better for a vegetarian diet. Others were becoming more strictly carnivorous, adapting the teeth to cut and tear flesh; while others again were arboreal and frugivorous as judged from the characters of their limbs and teeth. In the succeeding stages of the Tertiary the characters of each line become more marked, some lines leading up into modern animals, others into side branches which have died out. Several of these side branches ended in clumsy monstrous races of huge size and peculiar form, occupying the same place in the various Tertiary faunas that the elephants, rhinoceroses, and hippopotami do in that of to-day. Such were the *Coryphodon* and *Uintatherium* of the Eocene, the *Titanotherium* and *Elotherium* of the Oligocene, the *Chalicotherium* of the Miocene, and various peculiar extinct rhinoceroses in America and Europe.

Evolution of Man. Of animals which can be considered as in or near the line of ancestry of man, the remains are very few and very fragmentary in the Tertiary, and are found only in the Old World. It must be supposed that the evolution of man during this period took place in a region which has not been thoroughly explored, or in which the Tertiary strata are not well exposed. But early in the Quaternary period remains and indications of man are found fossil in all parts of the world, along with animals identical or closely allied with those of modern time as well as others which have become extinct, such as the mammoth and the mastodon in the northern world, the *Megatherium* in South America, and the *Diprotodon* in Australia. For the extinction of these and for the rarity of most other large animals at the present time, man is, no doubt, largely responsible, directly as a hunter, or indirectly by depriving them of their food and range. He has become cosmopolitan and dominant in a sense that no animal ever was in previous ages, and it may almost be said that all other animals exist only by his sufferance or to be exploited for his benefit.

Museums and Collecting Grounds. The collections of fossil vertebrates are practically confined to the large museums of Europe and the

United States, the best being in New York, London, and Paris. With the Paris Museum is especially connected the name of Cuvier (q.v.). In the middle of the last century Owen and Huxley in England were the most prominent investigators, while in its latter years American students, especially Leidy, Cope, and Marsh, were in the front rank. In recent years American museums and collectors, under the masterful influence of Henry F. Osborn, have been in the lead, the arid Western States containing the richest fossil fields yet known. While in Europe the best collecting grounds have been quarries worked primarily for building stone, slate, or phosphate rock, or bone beds of limited area, the Western fossil fields are the extensive areas of Mesozoic or Tertiary rocks laid bare in the "bad lands," and while the fossils are widely scattered, they are remarkably well preserved.

CHART SHOWING DISTRIBUTION OF VERTEBRATES AND THE CHARACTERISTIC FORMS OF THE DIFFERENT PERIODS

PERIODS			Characteristic forms	Dominant type
Cenozoic	Quaternary	Recent		Man, estimated 50,000 years
		Pleistocene	Man (flint implements, skeletons of Spy and Neanderthal caverns) Mammoth, mastodon, woolly rhinoceros, *Elasmotherium*, Irish elk, *Megatherium*, *Glyptodon*, *Diprotodon*, one-toed horses, *Platygonus*, cave bear, sabre-tooth tiger	
	Tertiary	Pliocene	*Pithecanthropus*, *Sivatherium*, *Samotherium*, three-toed and one-toed horses, mastodon, horned rhinoceroses, *Chalicotherium*, camels, deer, oxen, *Dinocyon*, *Hyænarctos*	Mammals, estimated 3,000,000 years
		Miocene	Apes and baboons, three-toed horses, small-horned or hornless rhinoceroses, four-tusked mastodons, *Dinotherium*, *Merycochœrus*, *Procamelus*, deer, *Amphicyon*	
		Oligocene	Three-toed horses, *Titanotherium*, primitive rhinoceroses (*Cœnopus*, *Hyracodon*, *Metamynodon*), primitive ruminants (*Oreodon*, *Poebrotherium*, *Anoplotherium*, *Anthracotherium*), primitive dogs, and sabre-tooth tigers	
		Eocene	Four-toed horses, primitive types of hoofed and clawed mammals (*Uintatherium*, *Coryphodon*, *Phenacodus*, *Hyrachyus*, *Palæotherium*, *Patriofelis*, *Oxyæna*), monkeys, rodents, serpents	
Mesozoic		Cretaceous	Great land reptiles (dinosaurs), *Triceratops*, *Claosaurus*, marine reptiles (mosasaurs and plesiosaurs), flying reptiles (pterosaurs), toothed birds, crocodiles, turtles, sharks, rays, small insectivorous mammals	Reptiles, estimated 7,000,000 years
		Jurassic	Dinosaurs (*Brontosaurus*, *Diplodocus*, *Stegosaurus*, *Iguanodon*, *Megalosaurus*), plesiosaurs and ichthyosaurs, pterosaurs, reptile birds (*Archæopteryx*), crocodiles, turtles, true sharks and rays, true bony fishes	
		Triassic	Carnivorous dinosaurs (*Anchisaurus*, *Zanclodon*), primitive reptiles (*Pariasaurus*, *Cynognathus*, *Belodon*), large armored amphibians (*Labyrinthodon*, *Mastodonsaurus*), lungfish (*Ceratodus*)	
Paleozoic		Permian	Primitive reptiles (*Naosaurus*, *Diadectes*, *Pariotichus*), armored amphibians (*Eryops*, *Diplocaulus*, *Cricotus*, *Archegosaurus*), primitive sharks (*Pleuracanthus*)	Amphibians, estimated 5,000,000 years
		Carboniferous	Small amphibians (*Microsauria*), primitive bony fishes (*Palæoniscus*, *Platysomus*), primitive sharks (*Pleuracanthus*)	
		Devonian	Lungfish (*Dinichthys*, *Coccosteus*, *Dipterus*), primitive sharks, primitive bony fishes, ostracoderms (*Pteraspis*, *Cephalaspis*, *Pterichthys*, *Bothriolepis*), lampreys	Fishes, estimated 2,000,000 years
		Silurian Ordovician Cambrian	First vertebrates (ostracoderms), *Cyathaspis*, *Palæaspis*	Invertebrates, estimated 10,000,000 years
Eozoic		Algonkian Archean	No fossils	

The appended table shows the characteristic vertebrate animals found in the different geological periods as understood at the present time.

Bibliography. Lucas, *Animals of the Past* (New York, 1901), is a popular book on vertebrate fossils, most entertainingly written. A later book is *Animals Before Man in North America*, by the same author. Hutchinson, *Extinct Monsters* (London and New York, 1892), contains very good accounts of the more remarkable extinct types known up to the date of their publications, but does not include more recent American advances in the subject. A. Smith Woodward, *Outlines of Vertebrate Paleontology for Students of Zoology* (Cambridge, 1898), is one of the best English textbooks on the subject, and it contains a well-selected bibliographic list. Zittel, *Handbuch der Palaontologie*, vols. iii and iv (Munich, 1887–93), is an excellent reference book for advanced students, and his *Grundzuge der Palaontologie* (Munich, 1895), translated by Eastman under the title *Textbook of Paleontology*, vols. ii and iii (New York and London, 1900–03), gives a more condensed treatment. See also Lydekker, *Geographical History of Mammals* (Cambridge, 1896), and Gaudry, *Enchainements du monde animal* (4 vols., Paris, 1878–96); O. Abel, *Grundzüge der Paläobiologie der Wirbeltiere* (Stuttgart, 1912); S. H. Reynolds, *The Vertebrate Skeleton* (Cambridge, 1913)

VERTIGO (Lat., a turning or whirling round, giddiness), DIZZINESS. A condition characterized by an inability to maintain a due equilibrium. Vertigo may be caused by unusual and powerful visual sensations, such as those produced by water falling rapidly from a

great height, or by objects moving swiftly across the field of vision, or by looking down from an elevation. In some cases the subject feels as though all the visible objects were passing rapidly before him; in other cases as though he were falling in a certain direction. Vertigo may arise from changes taking place in the brain, and, while not a disease, is a symptom of many diseases and a result of several poisons. A severe form of dizziness is produced by rapidly rotating the body. A distressing form is produced by sending a galvanic current through the head from ear to ear. Vertigo caused by rotation of the body is due to false sensation in the vestibule and semicircular canals of the internal ear, and arises from excessive movements of the fluid contents passing over the delicate nerve filaments of the vestibular nerve. It is known that variations in the pressure of the endolymph within the canals give rise to two kinds of impulses: the auditory impulses and a series of afferent impulses which, although conducted to the brain through the auditory nerve, have nothing to do with hearing, but form the basis of our sense of equilibrium. Ménière's disease (q.v.) presents as its principal symptom a constantly recurring vertigo. Disease of the middle ear, and also rarely of the external ear, is accompanied by the same symptoms. Vertigo may be caused by an alteration of the intracranial blood pressure, and occurs in anæmia, hyperæmia, syncope, epilepsy, seasickness, hypertrophy of the left ventricle of the heart, hemorrhage, injuries of the brain, or after the use of alcoholics. Sometimes a sudden change of position causes it; as bending forward, stooping, rising, raising a weight above the head, or any sudden strain on the faculty of equilibration. Vertigo accompanying indigestion is due either to reflex circulatory disturbances in the brain, or to toxic influences, such as also accompany the use of alcohol, tobacco, belladonna, hyoscyamus, the inhalation of carbonic acid gas, etc. See EAR; LABYRINTH.

VER'TUE, GEORGE (1684–1756). An English engraver and antiquary. He was born in London and studied engraving with Michael van der Gucht for several years, and afterward was employed by Sir Godfrey Kneller to engrave some of his portraits. His plates of portraits, numbering over 500, are faithful transcripts of the originals. Vertue had always cherished antiquarian tastes, and during the latter part of his life, under the patronage of the Earl of Oxford and others, he traveled about England engraving objects of antiquarian interest. He became a member of the Society of Antiquaries in 1717, and until his death was its official engraver. Nearly all the plates of the *Vetusta Monumenta* till 1756 are by him, as are the headings of the Oxford Almanacs, 1723–51. He also collected materials for a proposed *History of the Arts in England,* which were purchased, after his death, by Horace Walpole, who compiled from them his *Anecdotes of English Painting.* See Plates of CHAUCER and MILTON.

VERTUM'NUS. In Roman mythology, the husband of the goddess Pomona (q.v.). See VOLTUMNA.

VER'ULAM, BARON. See BACON, FRANCIS.

VER'ULA'MIUM. See the first article SAINT ALBANS.

VERVAIN. See VERBENA.

VER'VET. One of the two South African representatives of that section of the cercopithecine monkeys called guenons. It is small, and its general color is a greenish grizzle; but the narrow face, the hands, feet, and end of the tail are black, while the cheeks, throat, and under parts are white, and the root of the tail is red—this last feature, with the black tail end, forming a distinctive specific mark. It inhabits the forests of Cape Colony and Natal, especially near the coast, and feeds mainly on the gum of the camel-thorn mimosa and similar trees. Its scientific name was *Cercopithecus lalandi,* but it is more correctly known as *Lasiopyga pygerythra.* Its nearest relative is the grivet (q.v.). See GREEN MONKEY.

VERVIERS, vâr'vyā'. The capital of an arrondissement in the Province of Liége, Belgium, on the Vesdre, 16 miles by rail east-southeast of Liége (Map: Belgium, D 4). It is an attractive modern industrial town separated into a lower and an upper quarter connected by handsome boulevards. The manufacture of glass, tools, and cloth, the preparation of wool, and the dyeing of yarn, for which the local water is particularly adapted, are large industries. It was at Verviers that the German troops entered Belgium at the beginning of the great war in 1914. See WAR IN EUROPE. Pop., 1900, 52,203; 1910, 48,084.

VERVINS, vâr'văN', TREATY OF. A treaty of peace concluded between Henry IV of France and Philip II of Spain, May 2, 1598. The Spanish restored their conquests, and, in general, the treaty marked a return to the conditions of the Treaty of Cateau-Cambrésis (q.v.), in 1559. The Peace of Vervins is noted as definitely closing the period of civil war in France, and was preceded by a few days only by the celebrated Edict of Nantes. See FRANCE; HENRY IV; NANTES, EDICT OF. Consult Ernest Lavisse, *Histoire de France,* vol vi, part i (Paris, 1904).

VER'Y, FRANK WASHINGTON (1852–). An American astronomer, born at Salem, Mass. In 1873 he graduated from the Massachusetts Institute of Technology. He served as astronomer at Allegheny (Pa.) Observatory (1878–95) and adjunct professor of astronomy at the Western University of Pennsylvania (1890–95), as professor at Brown, and was later connected with the United States Weather Bureau and the Smithsonian Institution. After 1906 he was director of the Westwood (Mass.) Astrophysical Observatory. He made various important researches.

VERY, JONES (1813–80). An American poet, born in Salem, Mass. He graduated from Harvard College in 1836, and taught Greek there during the next two years. His first published work was *Essays and Poems* (1839), edited by Ralph Waldo Emerson, with whose Transcendental views Very was in sympathy. He was a friend of Emerson, Channing, and Clarke, the last of whom contributed a preface to the complete (posthumous) edition of his *Poems and Essays* (1886). Though few in number, his poems, chiefly in Shakespearean sonnet form, are marked by religious feeling, and are subtly introspective

VERY HARD CASH. A story by Charles Reade which appeared serially in *All the Year Round,* as a sequel to *Love Me Little, Love Me Long,* and was published in 1863 under the abbreviated title *Hard Cash.*

VERY WOMAN, A. A comedy, possibly a final version of the lost plays *The Woman's Plot* (1621) and *The Spanish Viceroy* (1624), writ-

ten by Fletcher and revised by Massinger in 1634. It was printed as the latter's in 1655

VESA'LIUS, ANDREAS (1514–64) A distinguished anatomist, born at Brussels He studied classics at Louvain, and medicine at Cologne, Paris, Louvain, and Padua (M.D., 1537) He lectured on anatomy in Louvain, Venice, Padua (where he was professor in 1537–44), Basel, Pisa, and Bologna In 1544 he was made physician in chief to Charles V and later to Philip II at Madrid, where he continued mainly to reside. In 1564 he made a pilgrimage to the Holy Land. The story is that he had begun to dissect a body before life was extinct and because of this was prosecuted not only for murder but for impiety and narrowly escaped death at the hands of the Inquisition. Philip II gained a pardon for him on condition that he make the pilgrimage. While in Jerusalem he was invited to Padua to occupy again the chair of anatomy, made vacant by the death of his pupil Fallopius (q.v.). He embarked for Europe; but was shipwrecked on the island of Zante, where he died from exhaustion.

Vesalius published: a translation of the ninth book of Rhazes (1537); an atlas of six plates, *Tabulæ Anatomicæ* (1538; reprinted in facsimile by Sir W. S. Maxwell, London, 1874); and his two best-known works, *De Humani Corporis Fabrica Libri Septem* (1542) and *De Humani Corporis Fabrica Librorum Epitome* (1543). Possibly these two, and certainly the *Tabulæ*, were illustrated by Jan Stephen van Calcar, a friend of Vesalius and a pupil of Titian. Vesalius proved that Galen (q.v.) described anatomy from dissections of lower animals and not of man, and he became the pioneer of comparative anatomy and of race craniology. Fallopius criticized his teacher in his *Observationes Anatomicæ* (1561), to which Vesalius replied in *Observationum Fallopii Examen* (1561). In 1547 he published *Radicis Chinæ Usus*, the result of his observations of the new remedy China root. The great edition of Vesalius' collected works, with fine plates cut in copper by Jan Wandelaar, was published at Leyden in 1725 under the supervision of Boerhaave and Albinus. It contains also the *Chirurgia Magna*, wrongly attributed to Vesalius. Consult the lives by Burggraeve (Ghent, 1841); Roth (Berlin, 1892); and J. M. Ball (St. Louis, 1910) with reproduction of cuts. See ANATOMY.

VESICANT. See BLISTERS.

VESIC'ULAR MURMUR. See RESPIRATORY SOUNDS.

VESON'TIO. See BESANÇON.

VESPA'SIAN (TITUS FLAVIUS VESPASIANUS) (9–79). A Roman Emperor. He was born at Reate, in the Sabine country. His father was a man of humble origin; his mother, Vespasia Polla, was daughter of a camp prefect and sister of a senator. Entering public life, Vespasian served as military tribune in Thrace, as quæstor in Crete and Cyprus, and as ædile and prætor at Rome. In the reign of Claudius he was made commander of a legion stationed in Germany, whence he was sent into Britain (43), where he conquered the Isle of Wight. He became consul suffectus in 51, and afterward passed a number of years in command of Roman legions. In 66 he was appointed to conduct the war against the Jews, and this proved the turning point of his life. He proved a fine disciplinarian, and endeared himself to his troops, who, on the news of the death of the Emperor Galba, proclaimed their general Emperor, in Alexandria, July 1, 69 The Roman Senate had meanwhile named Otho Emperor, and the troops in Germany had likewise declared in favor of their general Vitellius A civil war was thus precipitated. (See OTHO, VITELLIUS.) The legions of all the eastern provinces soon declared in favor of Vespasian, and he had the advantage also of the control of Egypt, from which he could cut off the grain supply of Rome. Leaving his elder son, Titus (q.v.), to conduct the Jewish campaign, he intrusted his interests at Rome to the care of his loyal supporter, Mucianus, Governor of Syria, remaining himself in the East to strengthen and organize his support Otho soon met a violent death, and the army of Vitellius in Italy was routed by Vespasian's supporters at Cremona. The murder of Vitellius in December, 69, left Vespasian in control of the Roman world. The chief events of his successful reign of ten years were the suppression of a formidable revolt of the Batavians under Civilis (q.v.) (69–70), the capture and destruction of Jerusalem by Titus (70), the grand triumph of Vespasian and Titus, the construction of the Colosseum, and the conquests in Britain by Agricola (q.v.) (78–79). Vespasian was succeeded by his son Titus, to whom he had already given a share in the government Consult his *Life* by Suetonius (q.v.); B. W. Henderson, *Civil War and Rebellion in the Roman Empire*, 69–70 A.D. (London, 1908); the article "Flavius, 49," in Friedrich Lübker, *Reallexikon des klassischen Altertums*, vol. i (8th ed., Leipzig, 1914).

VESPASIAN, FORUM OF. See FORUM PACIS.

VESPER. See HESPERUS; LUCIFER.

VESPERS. See BREVIARY.

VESPER SPARROW, or GRASS FINCH. A common resident sparrow (*Pœcetes gramineus gramineus*) of the eastern United States and Canada, distinguished by the bright chestnut color of the bend of the wings. See GRASS FINCH.

VESPUCIUS, vĕs-pū'shĭ-ŭs, AMERICUS. (It *Amerigo Vespucci*) (1451–1512). A Florentine navigator, from whom the Western continents received their name of America He was born March 9, 1451; entered the offices of the commercial establishment of the Medici in Florence, and between 1483 and 1492 occupied a position of responsibility with that house. In 1492 he went to Spain and established himself as a merchant in Seville. In 1495 he took over the business of another Florentine merchant of Seville, who had been in the habit of furnishing supplies for the vessels engaged in the voyages to the West Indies. This brought Vespucius into direct touch with the affairs of the New World. Vespucius claims that in 1497 he placed his business in other hands, and set out to see something of the New World for himself. Sailing in May, 1497, he was absent 18 months, probably exploring the South American coast, on the lookout for opportunities for commercial profit. Instead of returning to Spain with the vessel on which he had sailed, Vespucius seems to have left it at some port at which he met a fleet commanded by Alonso de Ojeda. Despite Varnhagen's defense thereof, most scholars do not believe in this 1497 voyage. With Ojeda he started (May, 1499) on what he calls his second voyage, lasting 14 months. He returned to Spain in September, 1500. Shortly after this he must have gone to Portugal, for on May 10, 1501, he sailed on a Portuguese expedition which

reached the South American mainland on June 6, and returned in September, 1502 In May, 1503, he sailed again with the Portuguese, returning June 18, 1504 In February, 1505, he was back in Seville, where he met Columbus, who described him, in a letter to his son, Diego Columbus, as "a very worthy man who has always endeavored to be agreeable to me . . He is determined to do for me all he can" This letter of Columbus has been used to discount the assertion that the two explorers were rivals, or that Vespucius tried to secure the renown properly belonging to Columbus. After a visit to the court of Ferdinand, Vespucius became a citizen of Seville again and naturalized himself as a Spanish subject, in April, 1505. He spent the next 18 months in preparing an expedition for the Moluccas, in coöperation with Vicente Yáñez Pinzón (q.v), which was eventually prevented from sailing by Portuguese intrigues. In November, 1507, Vespucius was summoned to the court at Burgos, where he was appointed pilot major on March 22, 1508. He then repaired to Seville, where he occupied himself with the duties of his office, examining pilots, collecting geographical and cartographical data, and supervising the dispatch of expeditions to the New World He died on Feb 22, 1512

During his sojourn at Lisbon, in September, 1504, Vespucius completed and dispatched to his old patrons, the Medici, an account of his alleged four voyages. The original has unfortunately disappeared, and the abridged translations which were printed at the time are so confused, and in places so incoherent, that it is impossible to decide from them (the only source of information regarding those voyages) exactly where Vespucius went, or what he discovered. It is quite certain that he explored a large section of the coast of South America, and if his claims concerning the 1497 voyage could be authenticated, they would prove that he had landed on the American mainland a few days before Cabot reached the shores of North America. A literal reading of his narrative would give an exploration from somewhere on the Guiana coast northwestward for 1000 miles or more, reaching into the Pacific Ocean off the California coast. As there are physical difficulties against this, the champions of Vespucius have ascribed to him a voyage around the Gulf of Mexico and up the United States coast as far as the Chesapeake, but the country described by Vespucius is clearly that of northeastern South America, perhaps stretching south on his later voyages nearly to La Plata. Aside from all the other evidence, internal and external, against this voyage of 1497 with its alleged vast discoveries, we have the famous map of Juan de la Cosa made in 1500, after he had served on the 1499 voyage with Ojeda and Vespucius, and which indicates all the farthest known points, but marks none of the places that would have to be included if Vespucius' figures and claims were correct.

Vespucius' narrative was translated in 1507 by Martin Waldseemuller (q.v.), who printed it as an appendix to his *Cosmographiæ Introductio*. In this work he made a suggestion that inasmuch as Vespucius had been the first to make known this new southern continent, it might be proper to name the new continent America. The new name was given only to the newly discovered southern continent, with no thought of extending it over the islands of the West Indies. Waldseemuller's suggestion was embodied in printed and manuscript maps, a few of which have survived to the present day. The name gradually became fixed in popular usage. The actual facts regarding Vespucius are given in Henry Harrisse, *Discovery of North America* (London, 1892) Consult also John Fiske, *Discovery of America* (New York, 1892), and C. E Lester, *Life of Americus Vespucius* (New York, 1905). The details of Waldseemuller's christening of America are given in Justin Winsor, *Narrative and Critical History of America*, vol ii (New York, 1886), and in Thatcher, *Continent of America* (ib , 1896). One of the most scholarly books on the whole controversy is "The Letters of Amerigo Vespucci," etc , translated with Notes and an Introduction by C. R. Markham, in The Hakluyt Society, *Publications, No. 90* (London, 1894).

VEST, George Graham (1830–1904) An American political leader, born at Frankfort, Ky. He graduated at Centre College, Danville, Ky., in 1848, and in 1853 from the law department of Transylvania University at Lexington. He thereupon removed to Missouri, where he practiced his profession first at Georgetown and then at Booneville. He was a Democratic member of the Missouri House of Representatives in 1860–61; of the Confederate House for two years, and of the Confederate Senate for one year. After the war he renewed the practice of law at Sedalia, Mo., and later at Kansas City. Vest was a member of the United States Senate from 1879 to 1903.

VESTA (Lat., connected with Gk. Ἑστία, *Hestia*, goddess of the hearth and home). In classical mythology, the goddess of the hearth fire. In Greece, Hestia plays but a very small part in legend. The manifest connection of her name with the word for hearth made it difficult to conceive of her as fully a personal deity. However, she appears as the eldest daughter of Cronos and Rhea, and as wooed by Poseidon and Apollo, whose suit she escaped by vowing eternal virginity. If legend made little of Hestia, her cult was widespread in all Greek lands. To her, therefore, was given the honor of a place in all temples of the gods and all houses of men. Every community had its common hearth where the sacred fire burned (a survival from the time when the primitive community maintained constantly a fire for common use). From this sacred fire every colony took the sacred flame which was to kindle a new sacred centre in close connection with the old. Even confederacies recognized a central hearth, as the Arcadians at Tegea, the Cyclades at Delos, and the Amphictyonic Council at Delphi. In some places the sacred fire was in charge of maidens, in others of old women, and we hear of priestesses of Hestia in Athens and Sparta. At Rome this cult reached a far more prominent place than it seems to have assumed in Greece. *Vesta mater* is the only female in the original series of great Roman gods, and as Janus occupied the first place in the ritual invocations, so Vesta closed the series. The worship of the goddess was spread throughout Latium also, though the evidence for its early existence elsewhere in Italy is unsatisfactory. Her festival, the Vestalia, fell on June 9, while on March 1 the sacred fire was solemnly renewed, by a method belonging to primitive times (i.e., by the friction of dry sticks or by bringing the rays of the sun to a focus with a concave

mirror). The state worship was, however, the most important Near the Forum, at the foot of the Palatine, close to the fountain of Juturna and the temple of Castor, was the little circular temple of Vesta (Ædes Vestæ), containing no image, but only the sacred hearth with the ever-burning fire, and a shrine in which were kept the implements and provisions for the sacrifices, and, according to popular belief, the Trojan palladium and other sacred objects on which the safety of the city was believed to depend. Near the temple was the Atrium Vestæ, where the vestal virgins lived From the time of Numa Pompilius there were four vestals; some later King added two others. At first the King, later the Pontifex Maximus, controlled the selection of vestals. To be eligible a girl must be over six and under ten years of age; her father and mother both must be living; she must be without mental or physical defects; and, finally, she must be a daughter of a free-born citizen resident in Italy Consult Aulus Gellius, *Noctes Atticæ*, i, 12 They served for 30 years, bound by a vow of virginity, and busy with exacting duties, chief among which were the guarding and annual renewing of the sacred fire. In return they enjoyed many privileges

Bibliography. For a description of the Ædes Vestæ and of the Atrium Vestæ: R. A. Lanciani, *Ancient Rome in the Light of Recent Discoveries* (Boston, 1898), Christian Hülsen, *The Roman Forum*, English translation by J. B. Carter (2d ed., Rome, 1909); S. B Platner, *The Topography and Monuments of Ancient Rome* (2d ed., Boston, 1911). For the worship of the goddess: W. W. Fowler, *Roman Festivals* (London, 1899); Otto Gruppe, *Griechische Mythologie und Religionsgeschichte* (2 vols., Munich, 1906); L. R. Farnell, *The Cults of the Greek States*, vol. v (Oxford, 1909); W. W. Fowler, *The Religious Experience of the Roman People* (London, 1911); Georg Wissowa, *Religion und Kultus der Romer* (2d ed., Munich, 1912); and the articles "Vesta" and "Vestalin" in Friedrich Lübker, *Reallexikon des klassischen Altertums* (8th ed., Leipzig, 1914).

VESTALE, La. An opera by Spontini (q.v.), first produced in Paris, Dec. 15, 1807.

VESTED RIGHT. A technical legal phrase denoting a present fixed interest resting in a definite person or corporation in or to a property right or franchise. It is the opposite of a prospective or contingent interest of any nature. For the security of property interests and the general welfare, the law very jealously protects such rights, and will not permit their destruction or allow their holders to be hindered in the full enjoyment of them, except for the public good, and then only upon just compensation being made therefor. The Fifth Amendment of the United States Constitution provides that no person shall be deprived of property without due process of law, but as this has been construed to be a restraint upon the Federal government only, it became necessary to incorporate in the Fourteenth Amendment a prohibition against any State taking such action. These constitutional provisions make vested rights secure and leave only the difficulty of determining what may be included under that head. A right in or to real or personal property not subject to a condition or contingency is considered as vested in the person who enjoys it. An expectant interest is, however, sometimes confused with one which has become fixed and unconditional. For example, the right of a husband to curtesy in his wife's property is, during her lifetime, inchoate or contingent in its nature, depending upon his survivorship Therefore, it amounts only to an expectancy during that period, and may be regulated or even taken away by statute.

No one has a vested interest or property right in the rules of the common law as such, or the law as contained in statutes, and, therefore, the law may be changed by statute, even though the amendment may cause damage and hardship to persons who may have taken action relying upon the continuance of the existing law. For example, a great business may be established and built up under a high tariff act, which would be rendered very unprofitable if the tariff were reduced, but the owners of such an enterprise have no constitutional right to object to an amendment of the tariff act Thus, also, the rules of descent may be changed, as the living have no heirs, but such a change would not affect the rights of persons who inherited property upon the death of ancestors before the amendment. Furthermore, such changes in the rules of law may be made retroactive, except in criminal cases. See CONSTITUTIONAL LAW; DUE PROCESS OF LAW, POLICE POWER, PROPERTY, and consult authorities there referred to.

VESTERÅS, vĕs'tĕr-ȧs. The capital of the Province of Vestmanland, Sweden, on a northern bay of Lake Mälar, 69 miles by rail northwest of Stockholm (Map Sweden. F 7). The handsome Gothic cathedral, built by Birger Jarl before 1271 and since then twice restored, has a tower 309 feet high, the loftiest in Sweden. The episcopal library of more than 12,000 volumes contains the books taken by the Swedes from Mainz in the Thirty Years' War. The Gymnasium dates from 1620, and the castle from about 1390. There are iron and copper mines in the vicinity of the town. Vitriol is manufactured. Pop., 1900, 11,999; 1910, 19,145. At a diet held here in 1527 Gustavus Vasa secured the establishment of Protestantism in Sweden.

VES'TIBULE (Lat. *vestibulum*, forecourt, entrance, probably connected with *Vesta*, goddess of the hearth and home, Gk. *ἄστυ*, *asty*, city, Skt *vas*, to dwell; less plausibly associated with Lat. *ve-*, apart + *stabulum*, abode). (1) An entrance lobby preceding a more important interior space for general circulation and communication; or (2), a lobby or small antechamber in the interior of a building. In dwellings and small buildings it is the space between the outer or storm door and the inner entrance door. Its function is, first, to provide an intermediate space between the outdoor air and the interior of the building, so that the wind, rain, heat, or cold from out of doors may not penetrate the building with every entrance or exit of one or more persons; secondly, to form an approach or gradual transition from the exterior architecture to that of the interior; thirdly (this especially in ancient Roman buildings), to provide a waiting place sheltered and inclosed for persons awaiting admission to the house or hall. In this sense the term is also often applied to an anteroom between a public hall and an important office or suite, and to the lobby between the public hall of an apartment house and the private hall or corridor of any of the apartments. The narthex of a church or basilica is also called the vestibule.

VESTIGIAL (from Lat. *vestigium*, footprint), or **RUDIMENTARY STRUCTURES.**

Organs which in some animals appear not to function, but which resemble functional organs in others They are believed to be phylogenetic and formerly useful There are reasons for believing that vestigial structures are rarely, if ever, present in plants. See DEGENERATION AS A FACTOR IN EVOLUTION; EVOLUTION; ORGAN, *Undeveloped and Vestigial Organs*

VESTMENTS, SACRED See COSTUME, ECCLESIASTICAL; EMBROIDERY

VESTRIS, MADAME (LUCIA ELIZABETH MATHEWS, née BARTOLOZZI) (1797–1856). An English actress, born in London. She was married at 16 to Armand Vestris, a celebrated dancer and ballet master at the King's Theatre. She then studied singing under Corri and made her début in Winter's *Il Ratto di Proserpina* in 1815 at the King's Theatre, London. She became a favorite with the public and appeared at different places in England and France. A large part of her success was undoubtedly due to her good fortune in securing great artists to appear with her. In Paris she played Camille in *Les Horaces* with the celebrated Talma as *Horace.* Her greatest English success was as Tilla in the *Siege of Belgrade* (London, 1820), which permanently established her in London as a popular favorite. Here she had the advantage of introducing popular ballads such as *Cherry Ripe* and *Meet Me by Moonlight Alone.* She accumulated a fortune and became manager in turn of the Olympic, Covent Garden, and Lyceum theatres. Her husband deserted her in 1817. She married in 1838 Charles Mathews the younger, and with him produced at Drury Lane important operas and musical productions of the period.

VESTRY (OF., Fr. *vestiaire,* from Lat. *vestiarium,* wardrobe, neut. sing of *vestiarus,* relating to clothing, from *vestis,* clothing). (1) The room in which church vestments were kept, and where the clergy robed Since meetings for parish business were sometimes held there, it came to mean (2) the representative and administrative body in parishes of the Church of England and of the Episcopal church in the United States. In England vestries are either general or common, i.e., composed of all the parishioners who are ratepayers, or select, i.e., composed of representative parishioners. Anciently all the affairs of a parish, as such, whether ecclesiastical or civil, were regulated in vestry. At the present time, however, the only duties of an ecclesiastical nature which a vestry has to perform are the election of a church warden (q.v.), the levying of church rates, and the reception of the accounts of church trustees. A vestry cannot interfere (except by observation and complaint) with the manner in which the services in the church are conducted. Although the minister is the proper head of the vestry, and, if present, is entitled to preside at all meetings, he is not an essential part of it.

The vestry in American parishes is a much more highly developed body with wider powers. They, together with two wardens, are elected by the members of the congregation at the annual parish meeting to serve for one year. The rector is ex officio a member of the vestry, and is entitled to preside, if present, at all its meetings. The function of the vestry is to represent the congregation in law, to have charge and care of its property, and to collect and disburse its revenues. The vestry choose and call a rector and make provision for his support. If the rector prove unworthy or incompetent, they may make complaint to the bishop of the diocese, but they may not themselves remove him In some dioceses the vestry, instead of the body of parishioners, elect the lay deputies to represent the parish in the convention or council of the diocese. Consult H. M Baum, *Rights and Duties of . . . Vestrymen in the American Church* (Philadelphia, 1879).

VESUVIANITE, or IDOCRASE. A mineral basic calcium-aluminum silicate crystallized in the tetragonal system. It has a vitreous lustre and is brown to green, sometimes light-blue, in color. It was originally found among the masses ejected from Vesuvius (whence its name) and Monte Somma, Italy. It also occurs with frequency in limestone, serpentine, gneiss, and other rocks. The crystallized varieties are sometimes cut as gems, especially in the form of the letters V and I.

VESUVIUS. A volcano near the eastern shore of the Bay of Naples, about 10 miles from the city of that name (Map: Italy, E 4). It is a solitary mountain rising from the plain of Campania, with a base of about 30 miles in circumference, and surmounted by two summits. The higher of these is a nearly perfect cone known as Vesuvius proper. The other, of ridgelike outline, partially inclosing the central cone, is called Somma. Up to the year 79 A.D. Vesuvius was looked upon as a truncated mountain, its volcanic origin being unsuspected. The crater formed a deep depression in the summit, and its sides were forest clad. Suddenly on August 24 of that year an eruption began with the appearance of a huge black cloud which rose from the mountain, accompanied by an explosion that blew off the top and rained a mass of ashes, lapilli, and mud on the towns and cities in that region. No lava was ejected in this eruption, nor in fact during any other eruption within historic times until the year 1066. In the first historic eruption Pompeii was buried under a thickness of 20 feet of loose ashes, and Herculaneum was covered by a torrent of mud. The elder Pliny, who commanded the Roman fleet at Misenum, sailed to help the distracted inhabitants. He landed near the base of the mountain and was himself suffocated by the vapors emanating from the volcano. The younger Pliny gives a graphic account of the eruption in two letters to Tacitus (written long after the event), which are well known.

Since the year 79 there have been a number of eruptions. One occurred in the year 203, and another in the year 472, during which the ashes were carried as far as Constantinople. Other outbursts were noted in the years 512, 685, 983, and 1066. In 1631 the villages at the base of Vesuvius were covered with lava and torrents of boiling water. During an eruption of 1779 showers of ashes, scoriæ, and stones were thrown to a great height, and streams of lava poured down the side of the cone. In 1794 another violent outburst took place which destroyed much of the town of Torre del Greco, and in the eruption of 1822 the mountain is said to have lost 800 feet of its height, but most of this loss has been made up by subsequent eruptions. Previous to this eruption of 1822 the summit is said to have been a rough and rocky plain, covered with blocks of lava and scoriæ, and rent by numerous fissures, from which issued clouds of smoke; it was then altered to a vast elliptical chasm, 3 miles in circumference,

and about 1000 feet deep Another remarkable eruption took place in May, 1855, and a series of outbursts began in 1865. More recent eruptions have occurred in 1872, 1878, 1880, 1895, and 1906. In the last there was a considerable destruction of life and property. The present height of Vesuvius is a little over 4000 feet, and that of Somma 3730. The lavas of Vesuvius belong to the acid types, and among the gases hydrochloric acid has been detected Ferric chloride often forms a yellow crust on the lava, especially in the vicinity of fumaroles. A railroad has been built from the base of the cinder cone to the summit near the edge of the crater.

Bibliography. F. A. Perrett, "Vesuvius" in *American Journal of Science*, vol. clxxviii (New Haven, 1909); T. G. Bonney, *Volcanoes: Their Structure and Significance* (3d ed., New York, 1912); Shaler, *Aspects of the Earth* (ib., 1890); Alfred Lacroix, *Eruption of Vesuvius in . . . 1906*. See VOLCANO; POMPEII.

VESZPRÉM, vĕs'prām (Ger. *Veszprim*). The capital of the County of Veszprém, Hungary, on the Séd, 60 miles southwest of Budapest (Map: Hungary, E 3). It has a fine cathedral, a Piarist college, a Gymnasium, and an institution for disabled priests. The vine, fruits, and tobacco are cultivated; there are coal mines, iron works, and large cattle markets. Pop, 1900, 14,114; 1910, 14,677, mostly Magyars.

VETĀLAPAÑCAVIṂŚATI, vā-tā'lā-pān'-chā-vĭm'shā-tē (Skt., 25 stories of a demon). A collection of Sanskrit novelettes. According to the framework of the tales, King Vikrama (q.v.) is bidden by an ascetic to carry a corpse which hangs on a certain tree to a graveyard where certain magic rites are to be performed which will give the monarch supernatural powers. While bearing this corpse, complete silence is enjoined on the King. As Vikrama carries the body, a Vetāla, or demon, which enters corpses, tells him a story, which ends in a problem that he asks the King to solve. Vikrama inadvertently answers, and the corpse returns immediately to the tree. This continues until the Vetāla has told 25 stories. The tales are of much interest, and the entire work bears a marked resemblance to the two other principal Sanskrit collections of like genre, the *Siṁhāsanadvātriṁśikā*, or *Thirty-two Stories of the Lion-Throne* (also called *Vikramacarita*, or *Adventures of Vikrama*), and the *Sukasaptati* (q.v.), or *Seventy Stories of a Parrot*. The Vetālapañcaviṁśati has been edited by Uhle (Leipzig, 1881) and translated by Burton, *Vikram and the Vampire* (new ed., London, 1893).

VETANCURT, vā'tän-kōōrt (or **VETANCOUR**), AUGUSTÍN DE (1620–1700). A Mexican historian, born in the city of Mexico. He joined the Franciscan Order at Puebla, became a member of the provincial chapter, and when he died was commissary-general of the Indies. He was a profound Aztec scholar, and published *Arte de lengua mexicana* (1673) and *Teatro mexicano, descripción breve de los sucesos ejemplares, históricos, políticos, militares y religiosos* (2 vols., 1697–98). Much of the work is based upon that of Torquemada, but it is nevertheless of great value. A reprint of the *Teatro*, etc., was issued at Mexico in 1870–71 as vols. vii–x of the *Biblioteca Iberia*. Consult H. H. Bancroft, *History of Mexico*, vol. iii (San Francisco, 1883).

VETCH (OF. *veche*, Fr. *vesce*, from Lat. *vicia*, vetch; connected with Gk *βικίον, bikion*, vetch, Lat. *vincire*, to bind) A name properly applied to the genus *Vicia*, but loosely related to other genera of the family Leguminosæ There are numerous species, mostly climbing annual, biennial, and perennial herbs, natives of Europe, northern Africa, western Asia, and America. Their cultivation dates back to the Romans. The crop can be grown on a variety of soils, but heavy well-tilled soils yield best. They are generally grown with a cereal crop for a support and to keep them off the ground. The annual species most commonly cultivated in Europe is the common or spring vetch or tare (*Vicia sativa*). In the United States this species, which is susceptible to dry and hot weather, has not given general satisfaction. One of the best species introduced into the United States is the hairy vetch (*Vicia villosa*), an annual which is successfully grown in various



HAIRY VETCH (*Vicia villosa*).

sections of the country. Hairy vetch is sown in August and September when intended for winter forage, and in regions of mild winters it will produce a second crop early in the spring. In the United States it is generally treated as a winter annual, being sown in the fall and harvested the following spring or early summer. For summer forage it is sown in April and May. The yield of hay varies from 2 to 4 tons per acre. See Plate of USEFUL LEGUMES with article LEGUMINOSÆ.

Some of the most important species not belonging to the genus *Vicia* are kidney vetch, or horned pod clover (*Anthyllis vulneraria*), winter vetch (*Lathyrus hirsutus*), and Dakota vetch (*Hosackia purshiana*). Kidney vetch is a perennial found wild in Europe on dry, thin soils with calcareous subsoil. Its cultivation originated in Germany about 1860. The yield of hay is usually small. Winter vetch is valuable in southern latitudes, where it furnishes forage late in autumn and early in spring. In the United States it is not hardy north of the latitude of 40°. Dakota vetch is a common bushy annual, native to the Rocky Mountain region of the Northwest, affording pasturage and hay in its wild state. Both green and cured vetches are fed to farm animals. Uncured spring vetch cut in bloom has the following composition: water, 83.9; protein, 4.0; fat, 0.6; nitrogen-free extract, 6.3; crude fibre, 3.2; and ash, 2.0. Hairy vetch: water, 68.7; protein, 5.2; fat, 1.3; nitrogen-free extract, 14.7; crude fibre, 7.7; and ash, 2.4. Vetch hay contains: water, 11.3; protein, 17.0; fat, 2.3; nitrogen-free extract, 36.1; crude fibre, 25.4; and ash, 7.9 per cent.

Like other leguminous crops, vetch is fairly rich in protein.

Consult United States Department of Agriculture, *Farmers' Bulletins Nos 515 and 529* (Washington, 1913), and C V Piper, *Forage Plants and their Culture* (New York, 1914). See TARE.

VETCH, CHICKLING. See LATHYRUS

VETCH, SAMUEL (1668–1732) The first British Governor of Nova Scotia, born near Edinburgh, Scotland He was educated at Utrecht, and returned to England in 1688 with Prince William of Orange. In 1705 he was sent by Governor Dudley of Massachusetts to Canada to negotiate a treaty of neutrality and arrange for an exchange of prisoners. A plan for the capture of Canada proposed by him in 1708 was accepted by the British Government, but was never carried out. Subsequently, as the representative of the colonists, he induced the Government to undertake an expedition against Port Royal (now Annapolis, N. S). Vetch was one of the commanders of this expedition, and after the capture of Port Royal in October, 1710, he became Governor of the conquered territory, part of which was now renamed Nova Scotia. In 1711 he was besieged in Port Royal by the French, but was relieved by the approach of a British squadron. In 1712 he was superseded as Governor by Sir Francis Nicholson, but was again Governor in 1715-17. He died in London.

VETCHLING, MEADOW. See LATHYRUS

VETERAN LEGION, UNION. A patriotic organization, organized in Pittsburgh, Pa., in March, 1884. The simple requirements for admission to the Grand Army of the Republic (q.v) had led to criticism, and in consequence the Union Veteran Legion requires for admission to membership that the applicant must have volunteered prior to July 1, 1863, for a term of three years and have served two years continuously in the same command unless discharged by reason of wounds. There are organizations in nearly all the States and the District of Columbia, and about 150 local bodies known as encampments, with a total membership of over 20,000. It has as an auxiliary an organization of women known as Ladies of the Union Veteran Legion.

VETERAN NAVY, THE UNITED STATES. See UNITED STATES VETERAN NAVY.

VETERAN UNION, UNION. A patriotic society founded in Washington, D C., in 1886. Membership is extended to veterans who served honorably in the army, navy, or marine corps of the United States between April 12, 1861, and April 30, 1865, who participated in one or more engagements or battles, and received an honorable discharge There are about 50,000 members.

VETERINARY MEDICINE (Lat. *veterinarus*, relating to beasts of burden, from *veterina, vetermum*, beast of burden). In early times men depended on domesticated animals for food and transportation. Attention was therefore devoted to a study of the means of combating animal plagues. The causes of animal diseases were grossly misunderstood, on account of superstitions, but certain men acquired reputation from their skill in the treatment of diseases by the application of empirical therapeutics. Some of the earliest veterinary literature is found in the ancient writings of India. Among the Greeks much was written on the anatomy and diseases of animals. Hippocrates found hydatids in the lungs of animals, and described articular dislocations, dropsy, epilepsy, and gid Xenophon mentions a number of diseases of the horse. Aristotle described the chief symptoms of angina, tetanus, glanders, and other diseases Among the Romans there were many writers on veterinary topics—Varro, Celsus, Columella, Pliny, Galenus.

The anatomical knowledge of the Greeks and Romans was largely based on the dissection of domesticated animals. This was practiced by physicians and veterinarians alike. The organs and parts of the animal body were well understood and accurately described by Aristotle, Herophylus, Erasistratus, and Galen Concerning the nature and occurrence of animal plagues we have many records. Mention of destructive epizootics is made in Deuteronomy and by Ovid, Homer, Thucydides, Vergil, Columella, and other Greek and Roman writers.

There were veterinarians attached to the Roman armies, but Vegetius Renatus states that their work was not skillful and that the profession was not held in high esteem. During the Middle Ages the Arabs made some progress in the treatment of diseases of the horse. In general, however, little real advance was made in veterinary medicine from 500 to 1500 A.D. Empiric "horse doctors" were found among the Germanic and Celtic peoples. Elaborate treatises on horseshoeing were published. The extensive movements of the nomadic races during the Middle Ages were responsible for the enormous distribution and destructiveness of animal plagues at this period. Not less than 32 epizootics spread over the greater part of Europe during the Middle Ages and affected not only all domestic animals, but also man. During the first part of the Middle Ages the study of human anatomy was greatly neglected. With the revival of this study in the thirteenth to the fifteenth centuries, veterinary science was neglected The *Anatomia del Cavallo*, by Carlo Ruini, however, marked a distinct advance in the study of animal anatomy.

While much information regarding animal diseases was accumulated anciently and during the Middle Ages, this knowledge was mere empiricism—experiences without formulation of underlying principles. Modern veterinary medicine, however, has been placed upon the same basis as human medicine and by similar methods of investigation. The veterinary investigator has found a most fruitful field in the pathology of organic, constitutional, functional, and infectious diseases of animals, as well as in bacteriology, methods of vaccination and immunization, and animal hygiene and methods of disinfection. Systematic investigations have been made in veterinary pharmacology and toxicology (including mineral and plant poisons). The field now includes meat and milk inspection, the establishment of quarantine, regulating traffic in live stock, and stamping out animal plagues, as well as general practice While in the past there was most demand for the practitioner's services in connection with the horse, the raising of more improved stock and the increased value of live stock in general have caused greater attention to be given to their ailments and to providing proper conditions of hygiene for them. In large cities there are specialists in the diseases of dogs, cats, and other pets. The establishment of veterinary schools has done much to promote the science. The first veterinary

school was established at Lyons, France, in 1762 Later schools have been at Alfort (1766), Copenhagen (1773), Vienna (1777), Marburg (1789), Berlin (1790), London (1792), Madrid (1793), St. Petersburg (1808), Stockholm (1820), Edinburgh (1825), and New York 1857). In the United States the best veterinary schools are connected with State universities or other institutions of learning. Among the more important of these are the universities of Pennsylvania, Cornell, and Ohio. In connection with a number of the agricultural colleges courses in veterinary science are given and veterinary degrees are granted

Until recently the entrance requirements and standard of instruction in veterinary schools have not been as high as they should be The veterinary profession was accordingly considered distinctly lower than that of human medicine. Persistent efforts of more progressive veterinarians have brought about the gradual elevation of entrance requirements in the better class of veterinary schools, the extension of the course so as to include three or four years of regular academic length, and a decided improvement in the social and scientific standard of the veterinary profession. The American Veterinary Medical Association wields a strong influence in the same direction, since graduation from an approved school is required for eligibility to membership.

As a good example of a four years' veterinary course that at the Iowa Agricultural College may be cited. The entrance requirement is a certificate of graduation from an accredited high school, or examination in subjects covering an equivalent course. The subjects taught during the veterinary course include the following: Comparative anatomy, histology, physiology, pharmacy, materia medica, therapeutics, structural botany, chemistry, poisonous plants, entomology, pathology, bacteriology, physical diagnosis, vertebrate zoology, animal parasites, animal husbandry, theory and practice of veterinary medicine, ophthalmology, surgery, embryology, horseshoeing, milk inspection, meat inspection, sanitary science, obstetrics, jurisprudence, etc. It will readily be seen that such a course offers instruction not only in the subjects immediately concerned in veterinary practice, but also in related fields, so that the student receives a rounded, comprehensive training.

Great changes have taken place in veterinary practice. In place of the indiscriminate use of firing iron, purgation, and bloodletting, we have a more rational system of treatment on a humane basis. Moreover, the excessive use of drugs has been abandoned and more attention given to the proper care and diet of animals and to preventive medicine. The course and severity of most diseases may be greatly modified by the use of pure water and wholesome food in reasonable quantities. Careful attention to the temperature and ventilation of stables is also important, especially in the treatment of diseases of the respiratory organs. It is along the line of preventive medicine, however, that the greatest progress has been made. Successful methods of vaccination and immunization have been devised for the prevention of anthrax, blackleg, hydrophobia, Texas fever, rinderpest, hog cholera, tetanus, etc., and much use is made of serodiagnosis—especially complement fixation, which is employed in glanders, dourine, contagious abortion, Malta fever, hemorrhagic septicæmia, etc. (See these articles) The period of incubation of various diseases has been definitely determined and upon the data thus obtained quarantine regulations for dealing with infectious diseases have been formulated The importance of isolating diseased animals and thoroughly disinfecting the premises after the occurrence of animal plagues is well understood The adoption of such measures tends to restrict the spread of any epizootic. Sometimes great losses to the animal industry of a country have been avoided apparently by the application of very drastic methods of eradication, including the destruction and innocuous disposal of all affected animals. Such measures are usually accompanied with the payment of an indemnity by the government. Great advances have been made in methods of disinfection by means of corrosive sublimate, formalin, live steam, lime, copper sulphate, lysol, carbolic acid, and other antiseptics The development of antisepsis has yielded as important results in veterinary practice as in human surgery. In ordinary veterinary practice, however, the observance of strict antiseptic precautions is an exceedingly difficult matter.

In veterinary surgery a much larger proportion of operations are made without anæsthesia than in human surgery It is generally believed that minor operations cause less pain and inconvenience to the animal than the struggles during administration of anæsthetics. Ether or chloroform is used for the larger animals, and ether alone for cats and dogs In minor operations and in determining the location of lameness cocaine is satisfactory In veterinary practice drugs are ordinarily administered in the allopathic form. Medicines are administered by way of the mouth in the form of balls, boluses, pills, capsules, and drenches; by hypodermic, intratracheal, intravenous, intra-abdominal, or intragastric injections; or in the form of an enema Drug doses are usually larger than for man and vary according to the size of the animal

As a rule veterinary dentistry is merely one branch of the ordinary practitioner's work, and is confined almost entirely to equine practice. There are but few locations where there is demand for specialists to devote their whole time to this work. Some horses require frequent attention to their teeth on account of the tendency to develop sharp points and other irregularities.

The importance of veterinary science to animal industry can scarcely be overestimated. The veterinary inspection and quarantine service make it possible to import high-bred stock into the United States without danger of introducing infectious diseases among the home herds. The improvement of the dairy and beef industries in the Southern States was not possible until a method was discovered for immunizing northern cattle against Texas fever. Before this was accomplished high-bred dairy and beef cattle were not imported into the South, for the reason that from 70 to 90 per cent of them died after exposure to infection. In South Africa the method of inoculation devised by Koch, the use of serum, etc., greatly reduced the losses from rinderpest, and put the business of cattle raising on a stable basis. As long as animals affected with tuberculosis had to be destroyed the improvement of dairy and beef herds was a difficult and expensive matter. The Bang method for controlling tuberculosis, however, makes it pos-

sible to utilize full-blooded tuberculous animals for breeding purposes without danger to the future of the herd.

The relation of this service to human health is best shown in the inspection of milk and meat. Since many diseases are transmissible between man and animals, it is deemed necessary to exercise some control of the milk and meat supply. The importance of sanitary regulation of the traffic in milk and meat is rapidly gaining the recognition of legislators, and inspection of these products is quite generally required. In Germany there is a federal inspection of all meat and meat products, and in the United States export meat is inspected by the federal authorities. Inspection is merely one of the functions of the veterinary service.

The organization of the veterinary service differs somewhat in different countries, according to local conditions. In Germany, England, and other European countries there is an army veterinary corps, the personnel of which bear titles corresponding to the regular army grades. In the United States veterinarians attached to the army are civil and not military officers. Nearly all European and other foreign countries maintain some form of official veterinary service, charged with investigation of outbreaks of contagious or otherwise serious diseases among domesticated animals, and of inspecting animals and animal products which may be imported into the country. Germany has developed an elaborate organization, with department and district veterinarians in various parts of the Empire. Appeal may be taken from the decisions of these officials to the Federal Veterinary Commission or to the Imperial Health Office. From time to time special commissions are appointed for the investigation of urgent problems. In most of the English colonies there is a government veterinarian or chief inspector, with numerous deputies and assistants.

In the United States these duties devolve upon the Bureau of Animal Industry of the United States Department of Agriculture, and upon the various State veterinarians and State boards of agriculture. The Bureau of Animal Industry maintains inspectors and special agents in various parts of the country, and has charge of quarantine regulations. The State veterinarians have full authority to investigate animal diseases and to enforce all State laws concerning such matters. Many of the larger cities maintain municipal veterinarians in connection with the boards of health. The majority of animals kept in captivity in zoölogical gardens are subject to the diseases which affect farm animals. Tuberculosis is the most important of these, and affects nearly all captive animals. It is especially fatal to apes and monkeys. On account of this it has been found necessary to fulfill the conditions of ventilation and other sanitary requirements in the construction of animal houses. Official veterinarians are maintained in connection with the larger zoölogical gardens and administer treatment in cases of curable disease. The administration of medicines to most wild animals in captivity is not an easy matter, but may usually be accomplished in connection with food and drink. Surgery on such animals is largely confined to the reduction of dislocations and the setting of broken bones. Veterinary medicine compares favorably in its achievements with human medicine. The etiology, pathology, treatment, and prevention of a number of animal plagues have been carefully and satisfactorily worked out. Blackleg and Texas fever, for example, are controlled as easily as smallpox and diphtheria in man and rather more effectively. The discoveries regarding the etiology of malaria and yellow fever in man have been paralleled by equally brilliant and important results obtained in studying the protozoön diseases of animals—e.g., surra, dourine, mal de caderas, nagana, etc. Many problems, however, remain to be solved, and investigators have, in the study of animal diseases, a very tempting field which already boasts of such distinguished names as Koch, Ostertag, Bang, Von Behring, Kitt, Chauveau, Nocard, Arloing, Perroncito, Hutyra, Marek, McFadyean, T. Smith, Salmon, Pearson, Law, Moore, Melvin, Mohler, Eichhorn, etc.

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A large and increasing number of veterinary journals are published, among which may be mentioned the *Journal of the American Veterinary Medical Association*, formerly *The American Veterinary Review* (Ithaca); and the *American Journal of Veterinary Medicine* (Chicago). The bulletins and reports of the Bureau of Animal Industry and of the State Experiment Stations and State Boards of Agriculture are also important sources of veterinary information.

VETIVER, VITIVERT (from East Indian *vitivayr*), or **Cuscus.** The dried roots of an East Indian grass (*Andropogon squarrosus* or

Vetiveria zizanioides) which has an agreeable and persistent odor, resembling sandalwood It is much prized in India and elsewhere for perfuming linen, etc, making baskets, fans, and mats. It grows in low, moist, rich soils, and has been introduced in the West Indies, Brazil, and Louisiana to some extent. It has been grown in Tennessee, but the plants do not bloom. In Florida and along the Gulf it is considered a weed pest

VETO (Lat., I forbid). In its most general application, the power of the chief executive of a government to negative the acts and resolutions of the Legislature. There are several forms and degrees of veto power, the suspensive, qualified, and absolute vetoes, and the so-called "pocket" veto The suspensive veto is the form employed in France, where the President may suspend the operation of any law passed by the Legislature and demand its reconsideration If the bill is repassed by the ordinary majority it becomes a valid law, notwithstanding the disapproval of the President. The qualified veto is the form most generally employed in constitutional States. It allows the executive a negative on all bills passed by the Legislature, subject to the power of the Legislature to override the effect of the veto by an extraordinary majority. The absolute veto is one which cannot be overridden by the Legislature by any majority. The "pocket" veto is defined below.

The veto is the remnant of the more extensive legislative power formerly possessed by the crown. In Great Britain this right was unquestioned from the time of the Tudors until the revolution of 1688. From then it was used more sparingly until 1707, when the refusal of Queen Anne to give her assent to a militia bill was the last instance of its exercise by an English sovereign.

In the American Colonies the royal governors were given the authority to veto any measure passed by the Colonial Legislatures, while in all except Rhode Island and Connecticut and possibly Maryland the King or the proprietaries had an absolute veto on all measures, even though approved by the Governor. In the United States Constitutional Convention of 1787 Gerry introduced the principle of the Massachusetts veto, and after discussion it was adopted. The clause provides that every bill which shall have passed the two Houses shall be presented to the President for his signature; if he approve he shall sign it; if not, he shall return it with his objections to the House in which it originated. The two Houses are then required to enter the objections upon their respective journals and proceed to reconsider it. If after such reconsideration two-thirds of each House shall approve the measure it shall become law, notwithstanding the executive veto. If any bill is not returned by the President within 10 days (Sundays not included) after presentation to him it shall become law without his signature unless Congress by adjournment prevent its return. This is the so-called "pocket" veto. Notable instances of the exercise of the veto power by the Presidents have been the vetoes of the bills for the recharter of the United States Bank by Jackson and Tyler; the veto of the Civil Rights, Freedmen's Bureau, and Reconstruction bills by Johnson; and the veto of the currency-inflation bill by Grant. The veto power was used sparingly by the first six Presidents. President Cleveland during his first term vetoed 301 bills, nearly twice as many as had all his predecessors combined. The majority of Cleveland's vetoes were private pension bills which had passed with little opposition; only two of these were passed over his veto. The principle of the veto has been incorporated in all the State constitutions except that of North Carolina, where the legislative authority is vested in the Legislature alone Consult Mason, *The Veto Power* (Boston, 1891); Wyman and Sherwood, *Veto Power in the Several States* (Providence, R. I, 1907)

VETTER, LAKE See VATTER, LAKE.

VETURIUS, TITUS. See CAUDINE FORKS

VEUILLOT, vēl'yō', LOUIS (1813–83) A French ultramontane publicist and author, born at Boynes (Loiret). Self-educated, he began to contribute to journals supporting the government, edited from 1831 the *Echo de Rouen* and from 1837 in Paris the *Charte de 1830* and afterward *La Paix*. After a visit to Rome in 1836 he had become the most uncompromising representative of ultramontanism in France and as contributor to (since 1843) and editor of (since 1848) its chief organ, the *Univers Religieux*, upheld with great talent the claims of the papacy to unrestricted dominion over church and state. His polemics against the Italian policy of Napoleon III in 1860 led to the suppression of the *Univers*, which did not appear again until 1867. During the Council of the Vatican (1869–70), by threats and denunciations he held at bay the remotest Gallican manifestations on the part of the French episcopate His political influence reached its height under the government of the so-called moral order in 1877, whereafter, secluded by illness he seldom imparted his opinions through the medium of the *Univers*. Of his publications, including romances and saintly stories, political, historical, and literary essays, and poems, may be mentioned: *Pélerinages de Suisse* (1838); *Pierre Saintive* (1840); *Rome et Lorette* (1841); *Les Français en Algérie* (1845); *Les libres penseurs* (1848); *L'Esclave Vindex* (1849); *Le parfum de Rome* (1861); *Historiettes et fantaisies* (1862); *Les odeurs de Paris* (1866); *Les couleuvres* (1869), a collection of poems; *Paris pendant les deux sièges* (1871); *Rome pendant le Concile* (1872); *Molière et Bourdaloue* (1877); *Etudes sur Victor Hugo* (1885). Some of these went through many editions. A collection of his writings he published under the title *Mélanges religieux, historiques, politiques et littéraires* (1857–76). Consult the biographies by his brother Eugène Veuillot (Paris, 1883), and by Cornut (ib., 1891).

VEUSTER, JOSEPH DAMIEN DE. See DAMIEN DE VEUSTER, JOSEPH.

VEVEY, vĕ-vā' (Ger. *Vivis*). A town of the Canton of Vaud, Switzerland, on the left bank of the Veveyse, near its influx into Lake Geneva, 11 miles east-southeast of Lausanne (Map: Switzerland, A 2). Vevey, the scene of Rousseau's *Nouvelle Héloïse*, is a charming tourist resort, with a magnificent view of the Valais Alps. It has an extensive system of quays. The Tour de Peliz (thirteenth century) is now used as a prison. There is a modern museum, containing a natural-history collection, paintings, and a public library. Chocolate, children's food, and condensed milk are extensively manufactured. Pop., 1900, 11,781; 1910, 16,330.

VEYGOUX, LOUIS CHARLES ANTOINE DESAIX DE. See DESAIX DE VEYGOUX, L. C. A.

VEZIN, vē'zĭn, HERMANN (1829–1910). An actor, born in Philadelphia and educated at the University of Pennsylvania. He went to England and obtained an engagement at the Theatre Royal at York in 1850. His London début was made at the Princess's Theatre under Charles Kean's management in 1852 Two years later he "starred" through the English provinces. In 1857 he appeared in the United States, returning to England in 1858 The next year he appeared at the Surrey Theatre in an important series of Shakespearean rôles, including Macbeth, Hamlet, Shylock, and Othello. Then for a time he played at the Sadler's Wells Theatre. He married in 1863 Mrs. Charles Young, with whom he successfully brought out Marston's *Donna Diana* at the Princess's Theatre in 1864. Among his subsequent impersonations may be mentioned *Dr. Davey* (1866), James Harebell in Wills's *Man o' Airlie* (1867), Martel in Merwale's *Son of the Soil* (1872), Jacques in *As You Like It* (1875), *Daniel Druce* (1876), which ran for one hundred and six times at the Haymarket, and Dr. Primrose in Wills's *Olivia* (1878). Later he also became known as a teacher of elocution and as a writer.

VIADANA, vyȧ-da'nȧ (properly GROSSI), LODOVICO (1564–1645). An Italian composer, credited with being the inventor (1602) of the *basso continuo*. Little is known of his life, save that he was born at Viadana, near Mantua, became a monk, and held successive posts as organist and choirmaster at Mantua, Venice, and elsewhere Among his numerous works may be mentioned the famous *Cento concerti ecclesiastici a una, a due, tre e quattro voci, con il basso continuo per sonar nell' organo* (1602, 1603, 1609, 1611, and 1612); *Sinfonie musicali a otto voci* (1617). Consult A Parazzi, *Della vita e delle opere musicali di Lodovico Grossi-Viadana* (Milan, 1876).

VI'A DO'LORO'SA (Lat, dolorous way). The name, probably given during the Middle Ages, applied to a narrow street in Jerusalem, indicated by a doubtful tradition as the street through which Jesus carried his cross from the Hall of Judgment to Mount Calvary. The fourteen stations are marked by tablets. The location of these has varied at different times.

VI'ADUCT (ML. *viaductus*, from Lat. *via*, way, road + *ductus*, a leading). A structure for conveying a roadway or waterway across a valley or low level. They are of every kind of construction—of wood, iron, or steel, stone, brickwork, and in recent practice reënforced concrete. In recent years, and more particularly in America, the term "viaduct" has come to mean more specifically a structure composed of a number of comparatively short spans carried by tower-like piers of steel framework. These piers usually consist of four column-like legs spread wide apart at the base, converging towards the top, and braced together in all directions.

This construction was best typified for a great many years by a viaduct crossing Kinzua Creek in northwestern Pennsylvania, on the Erie Railroad, which is familiarly known as the Kinzua Viaduct. The Lethbridge Viaduct, on the Crow's Nest branch of the Canadian Pacific Railway in southern Alberta, a steel structure of this type, is the largest and highest bridge in the world, being 1 mile, 47 feet in length, and 307 feet above water level. It consists of 44 plate-girder spans 67 feet long, 22 plate-girder spans 99 feet long, and one deck lattice span 167 feet long. This whole structure is carried on 33 rigidly braced steel towers rising from concrete pedestals supported on concrete piles.

Two notable viaducts of quite a different type were completed (1914–15) west of Scranton, Pa., on the Lackawanna Railroad, to cross the valleys of Tunkhannock Creek and Martins Creek The former, or Nicholson Viaduct, is the largest concrete bridge in the world, 2375 feet in length, comprised of 10 spans of 180 feet each and two spans of 100 feet each. It is 242 feet in height The Martins Creek Viaduct consists of 11 spans, seven of 150 feet, two of 100 feet, and two of 50 feet, with a total length of 1600 feet. It is 150 feet in height. Both viaducts are of reinforced concrete and have considerable architectural merit See BRIDGE.

VIA LATINA. See LATIN WAY.

VIA MALA, vē'ȧ mȧ'la (Lat, Bad Road). A famous road, made in 1470, through a deep gorge of the Rhine in the Grisons, Switzerland

The present road, 7 yards wide, was built in 1818–24. It passes between limestone cliffs 1600 feet high and crosses the river three times by high bridges spanning the ravine. It forms the first part of the Splugen Road

VIA OSTIENSIS. See OSTIENSIS, VIA.

VIARDOT, vyȧr'dō', LOUIS (1800–83). A French art critic. He was born in Dijon, studied law in Paris, took up journalism, managed the Grand Opera (1838–41), and married the opera singer Pauline Garcia (1840) He traveled widely and made many translations from Spanish and Russian, writing also *Etudes sur l'histoire des institutions et de la littérature en Espagne* (1835); *Histoire des Arabes et des Maures d'Espagne* (1851); and *Les merveilles de la peinture* (1868), translated in part as *The Wonders of Italian Art.*

VIARDOT-GARCIA, -gȧr-thē'ȧ, PAULINE (1821–1910). A celebrated French vocalist, born in Paris She was the daughter of the tenor Manuel Garcia, and sister of Madame Malibran (qq v.). She was taken with her family first to England, then to the United States, and in 1828 returned to Europe. She was one of Liszt's most accomplished pupils. Her concert début was at Brussels in 1837, and her first London appearance was at the Opera House, in 1839, as Desdemona in Rossini's *Otello* She then appeared in Italian opera at the Paris Odéon with equal success. In 1840 she married the director of the Paris Italian Opera, Louis Viardot. After her marriage she made numerous European tours, until her retirement in 1863. Her name is associated with the first performances of Myerbeer's *Les Huguenots* and *Le Prophète*, and Gounod's *Sapho*. She sang the title rôles in the revivals at Paris of Gluck's *Orphée* (1859) and *Alceste* (1861). In 1871 she settled in Paris as a teacher of singing Her compositions include several operas, 60 popular vocal melodies, instrumental pieces, and an *Ecole classique de chant*. Consult La Mara, *Pauline Viardot-Garcia*, in Waldersee's "Sammlung musikalischer Vorträge" (Leipzig, 1882).

VIAREGGIO, vē'ȧ-rĕd'jō. A sea-bathing resort in the Province of Lucca, Italy, situated on the shore of the Mediterranean, 33 miles by rail southeast of Spezia (Map: Italy, C 3). The famous pine woods to the north extend for 6 miles and the town has lately become a winter resort. There is a monument erected to Shelley, who was drowned near Viareggio. Pop. (town), in 1911, 14,906.

VIA SA'CRA. See SACRED WAY.

VIAT'ICUM (Lat, journey money, provision for a journey). The word applied in ecclesiastical terminology to the communion administered to dying persons. The Roman Catholic church, which in all other cases requires an absolute fast from the midnight before communion, dispenses dying persons from this obligation. The viaticum may be given frequently during the same sickness, at intervals anciently of ten or seven days, but by the modern practice even daily, should it be earnestly desired by the sick person. It is administered by parish priests or their assistants, or, in case of necessity, by deacons.

VIAUD, vē'ō', JULIEN. A French writer. See LOTI, PIERRE.

VIAZMA, vyäz'mȧ. A district town in the Government of Smolensk, Russia, situated on the river Viazma, 151 miles west of Moscow (Map: Russia, D 3). Flax and oil are the chief products. Pop., 1911, 29,568. The town was founded in the eleventh century and was an important place in the Principality of Smolensk. In 1812 it was the scene of an engagement between the Russians and the French, in which the former were victorious.

VIBERT, vē'bâr', JEAN GEORGES (1840–1902). A French genre painter. He was born in Paris and studied at the Ecole des Beaux-Arts, under Barrias and Picot. He first exhibited in 1863, his early productions being in the grand style, such as "Repentance," "Narcissus Transformed into a Flower" (Bordeaux Museum), and "Christian Martyrs in the Lion's Den." His material success began when he turned his attention to genre, for which the popular demand was large, producing "Roll Call After the Pillage," and following it with a long succession of subjects mainly drawn from clerical life. In the satirical vein are "The Cardinal's Menu"; "The Missionary's Story" (Mrs. Collis P. Huntington); "The Convent Under Arms"; "The Wonderful Sauce"; "The Antechamber of Monseigneur"; "The Startled Confessor," and three others in the Metropolitan Museum, New York. In 1867 he was one of the five who originated the Society of French Aquarellists, which, under his presidency, had an influence in raising the technical standard of the Salon.

VIBORG, vē'bŏrg. A government occupying the southeastern part of Finland, Russia (Map: Russia, C 2). Area, 16,624 square miles, exclusive of its portion of Lake Ladoga (q.v.). The coast region along the Gulf of Finland and Lake Ladoga is low and exceedingly indented. The interior is rocky and mountainous and interspersed with marshes and lakes. The chief rivers are Kymenne and the Wuoxen. Viborg has extensive deposits of building stone, copper, lead, and iron. Agriculture is less developed than in most regions of Finland, owing to the scarcity of suitable land and the severity of the climate. Rye, oats, and barley are grown. Its forests occupy a large part of the area and are an important source of income. The manufacturing industries are highly developed, and consist chiefly of lumber and other products of wood, also paper, leather, metal products, and articles of rubber and bone. Its commerce is mainly domestic. Pop., 1897, 394,412; 1912, 515,000, chiefly Finns.

VIBORG (Finnish *Wüpuri*). The capital of the Government of Viborg, in Finland, Russia, and a third-class fortress, situated at the northern end of a deep inlet of the Gulf of Finland, at the mouth of the Saima Canal and about 75 miles northwest of St. Petersburg (Map: Russia, C 2). It is a clean, well-built town, with an ancient castle (1293) now used as a prison, and a notable museum. It has a school of navigation and a museum. The harbor is not sufficiently deep for large vessels, which anchor at Transund, about 8 miles distant. Viborg has extensive sawmills and carries on a large trade in lumber and dairy products, paper, and products of iron. Pop., 1900, 31,388; 1913, 35,000.

VIBORG, vē'bŏrg. The capital of the Government of Viborg, in Jutland, Denmark, about 140 miles northwest of Copenhagen (Map: Denmark C 2). The foundation dates back into antiquity, when it was the main sacrificial place for North Jutland. Most of the great historical events of the country up to modern times were connected with Viborg. It has a cathedral school, diocesan library, museum, insane asylum, and garrison. The cathedral, built in romanesque style in 1130–69, rebuilt in 1864–76, is the most important granite church in the country. Pop, 1901, 8623, 1911, 10,885.

VIBRATION. See ACOUSTICS; HARMONICS; MUSIC.

VIBRATO, vē-brä'tō (It., vibrated). A term denoting an effect somewhat similar to tremolo (q.v.). On stringed instruments it is produced by the quick oscillation of the finger on the string which it is stopping. The result is a pulsating, wavering tone. In vocal music it is a partial suppression and reënforcement of a note, producing an apparent reiteration.

VIBUR'NUM (Neo-Lat, from Lat. *viburnum*, the wayfaring tree). A genus of shrubs and a few trees of the family Caprifoliaceæ. The numerous species are characterized by their opposite, dentate or lobed leaves, showy cymes of white flowers and red or blackish fruits. Many are popular as ornamentals in gardens, perhaps the best known being the snowball (*Viburnum opulus*), which is a horticultural derivative closely related to the "high-bush cranberry" (*Viburnum opulus americanum*). Other well known species are *Viburnum tinus*, the laurustinus or laurestinus, which blooms from May to August; *Viburnum cassinoides*, the withe-rod or Appalachian tea, well known from Newfoundland to North Carolina and westward to Manitoba; *Viburnum lentago*, the nanny berry or sheep berry, also well known in the above territory and as far south as Mississippi and Georgia, and whose black berries are often eaten; *Viburnum prunifolium*, the stagbush or blackhaw, frequent from Connecticut and Michigan to the Gulf States; *Viburnum alnifolium*, the American wayfaring tree, a companion of the withe-rod, except in its more northerly quarters; *Viburnum dentatum*, arrow-wood, and *Viburnum acerifolium*, dockmackie, of similar range to the previous species. There are several evergreen species, of which *Viburnum japonicum* is the most hardy. The hardy species are easily propagated by seeds, cuttings, or layers, and easily cultivated in almost any soil. See Plate of TANSY, ETC.

VICAIRE, vē-kâr', GABRIEL (1848–1900). A French poet, born at Belfort. He belonged to the Parnassians (q.v.), but wrote popular and spirited verse of the folksong type, much of it being written in assonance (q.v.). He wrote *Emaux bressans* (1884); *Les déliquescences d'Adoré Floupette, poète décadent* (1885), in collaboration with Henri Beauclair, a satire of the

so-called "decadents"; *Le miracle de Saint Nicholas* (1888), *L'heure enchantée* (1890), *Cinq ballades* (1891); *Au bois joli* (1893), *Le clos des fées* (1897), *Au pays des ajoncs* and *Avant le soir* were published posthumously. He was twice crowned by the French Academy and was made Chevalier of the Legion of Honor in 1892

VIC'AR (OF, Fr *vicaire*, from Lat. *vicarius*, substitute, from *vice*, in place of, connected with Gk. *εἴκειν*, *eikein*, AS. *wīcan*, OHG *wīhhan*, Ger. *weichen*, to yield). A person deputed or authorized to perform the functions of another. In this sense the Pope is called in the Catholic church the Vicar of Christ.

A vicar in the Church of England is an incumbent of an appropriated benefice, who receives only a part of the emoluments; generally speaking, a share of the glebe and the small tithes. (See TITHES.) He is supposed to act as the deputy of the rector, who receives the great tithes. The title is used in a few of the larger city parishes of the Episcopal church of the United States which support two or more places of public worship, where the ministers of chapels belonging to the parish church are termed vicars.

VICAR APOSTOLIC. The title of certain prelates in the Roman Catholic church The vicars apostolic of the Middle Ages corresponded to the *legati nati* of later times (see LEGATE); those of the present time are delegated by the Pope to exercise pastoral care in certain churches or districts, not in their own name, but in that of the Pope. Vicars apostolic are appointed (1) for missionary countries where as yet dioceses are merely in the course of formation, as in some parts of the United States, (2) for the Roman Catholic portion of the population in some countries that have been lost to the Roman obedience; (3) in urgent cases, where the administration of a diocese fully organized becomes temporarily disordered, i.e., by the absence, captivity, sickness, and the like of its bishop. Consult Smith, *Elements of Ecclesiastical Law* (New York, 1895); E. L. Taunton, *The Law of the Church* (London, 1906).

VICAR-GENERAL. The title of an ecclesiastical functionary in the Roman Catholic church and in the Church of England. In the former a vicar-general is an ecclesiastic who is appointed to exercise, in a general way, episcopal jurisdiction in the bishop's stead, and in such manner that his acts are considered the acts of the bishop himself In the United States a vicar-general can (unless the bishop disposes otherwise) give priests faculties, together with the cure of souls, and revoke them for just reasons. He cannot, however, erect, unite, or divide benefices or parishes, nor can he give another bishop permission to exercise pontifical functions in the diocese.

In the Church of England a vicar-general is a lay legal officer of some dioceses, whose duties are practically the same as those of a chancellor (q.v.). Consult E. L. Taunton, *The Law of the Church* (London, 1906).

VICAR OF BRAY, THE. A popular ballad of the first half of the eighteenth century. The subject is a clergyman, called Simon Alleyn, Pendleton, or Symonds, notorious for the changes of faith he made during the Henry VIII to Elizabeth period in order to retain office. The name has become proverbial for political hedging.

VICAR OF WAKEFIELD, THE A novel by Oliver Goldsmith (1766). It narrates the misfortunes of a worthy but simple-minded country clergyman, Dr. Primrose.

VICE ADMIRAL. The permanent rank of vice admiral does not exist in the United States navy, but by an act of Congress in 1915 the second in command of the Atlantic, Pacific, and Asiatic fleets may be so commissioned while acting in that capacity. See ADMIRAL; also FLAG OFFICER.

VICE CHANCELLOR. In England, a judge of the court of equity who is appointed by the crown under letters patent as an associate to the Lord Chancellor. The office was created in the reign of Henry II and later fell into disuse, but was revived by the Statute of 53 Geo. III, c. 24, appointing one vice chancellor, and the Act of 5 Vict., c. 5, § 19, by which two vice chancellors were appointed, because of the increase of business on the abolition of the equitable jurisdiction of the court of exchequer. The vice chancellor presides over a branch of the court of equity, and is authorized to perform the duties of the Lord Chancellor in the latter's absence or illness. The term is employed in a few of the United States, as New Jersey, to designate an associate of a chancellor of a court of equity.

The vice chancellor of a university is an officer with authority to discharge certain duties of a chancellor, generally those connected with granting degrees in the absence of the latter.

VICEN'NIAL PRESCRIPTION. In Scottish law, a limitation of 20 years within which certain actions relating to real property may be commenced.

VICENTE, vē-sĕn'tā, GIL (1470–1540). The founder of the Portuguese drama, born probably in Lisbon. He studied jurisprudence at the University of Lisbon, but soon gave himself up to literature His first production was a pastoral monologue in Spanish, which celebrated in 1502 the birth of the prince who became John III. Other pieces followed, a number of them being the religious mysteries called *autos*, and also various comedies. His farce *Inez Percira* was composed impromptu. He wrote both in Spanish and in Portuguese, and sometimes used both languages in a single play. Vicente was an actor as well as a poet; and his children often appeared with him. A collected edition of his works was published by his son (Lisbon, 1561), and 25 years later a new edition appeared after expurgation by the Inquisition Eight of his Spanish pieces are included in Bohl von Faber's *Teatro español anterior á Lope de Vega* (Hamburg, 1832). His collected works were published by Bareto Feio and Monteiro in 1834 (Hamburg). Consult Braga, *Historia do theatro portuguez no seculo XVI* (Oporto, 1870); De Ouguella, *Gil Vicente* (Lisbon, 1890).

VICENZA, vē-chĕn'tsä. The capital of the Province of Vicenza, Italy, situated at the confluence of the Retrone and the navigable Bacchiglione, 41 miles by rail west-northwest of Venice (Map: Italy, C 2). Seven bridges span the rivers. The city is compact and is surrounded by a moat and by walls half in ruins. Many of the magnificent palaces for which the city is justly famed are by Palladio. The Piazza de' Signori, the remarkably fine square in the centre of the town, contains the Palazzo della Ragione, or town hall, surrounded by the splendid Basilica Palladiana, a beautiful colonnade having two stories and with a slender campanile 265 feet high. In the handsome Palazzo Chierecati is

the valuable municipal museum with some good paintings and archæological and natural history collections Near by, in the northeastern part of the city, is the fine wooden Teatro Olimpico by Palladio, finished in 1584. The curious permanent scenery in its stage represents a kind of piazza with diverging streets On Monte Berico, looming picturesquely on the south of the city, stands the pilgrimage church of Madonna del Monte, containing a number of paintings by Bartolommeo Montagna. East of it is situated the ruined villa Rotonda Palladiana, a square structure with a Greek colonnade, and a round domed room in the centre

Vicenza has an academy of science, literature, and art, and a library of 179,520 volumes, some 80,000 pamphlets, 1000 incunabula, and 6000 manuscripts. The Corpus Christi festival is of great interest. The principal industry is the production of silk and silk goods Straw hats, woolen goods, leather, machinery, and musical instruments are also manufactured The trade is active in wine, grain, and vegetables. Pop. (commune), 1901, 44,777; 1911, 54,555.

Vicenza, the Roman Vicetia, rose into prominence in the early part of the Middle Ages as the capital of a Lombard duchy. It was one of the cities which, banded together in the Lombard League, opposed Frederick Barbarossa in the twelfth century. It was stormed and pillaged in 1236 by the Emperor Frederick II. Having freed itself from Padua in 1311, it was successively in the hands of the Scala and Visconti families. It became subject to Venice in 1404

VICENZA, vē-chĕn'tsȧ, DUKE OF. See CAULAINCOURT, A. A. L. DE.

VICE PRESIDENT. The second officer of the government of the United States in rank and chosen for the same term and in the same manner as the President, except that in case no candidate for the vice presidency receives a majority of the electoral votes, the election is thrown into the Senate, which then chooses by a majority vote one of the two leading candidates. Previous to the election of 1804 the electors were not required to specify which candidate was voted for as President and which as Vice President. Although described as an executive officer, he performs no executive functions whatever, his only duty being to preside over the deliberations of the Senate, except when it is sitting as a court of impeachment for the trial of the President, when the Chief Justice presides. He has a casting vote in the Senate in case of a tie, and he presides at the joint meeting of the two Houses when the electoral votes are counted. The chief importance of the office consists in the fact that the Vice President is made by the Constitution the successor of the President in case of the latter's removal from office or of his death, resignation, or inability to discharge the powers and duties of the office. Of all these contingencies only one has so far occurred, viz., the death of the President. The deaths of Presidents Harrison in 1841, Taylor in 1850, Lincoln in 1865, Garfield in 1881, and McKinley in 1901 caused the succession to devolve upon the Vice President. The qualifications required of the Vice President are the same as those of the President. His salary is $12,000 per year.

VICEROY, vīs'roi. An American butterfly (*Basilarchia disippus*) which so closely resembles or mimics in color and markings the monarch (*Anosia plexippus*) that it is not infrequently mistaken for the latter The monarch is protected by a nauseous taste and smell from the attack of birds; the viceroy has no such protection (See MIMICRY.) The viceroy ranges over nearly all of the United States. Its larvæ feed on the willow poplar, cottonwood, aspen, and balm of Gilead. The eggs are laid on the tip of a leaf, and the young larva, feeding at the tip, attaches bits of leaf to the midrib, thus stiffening its perch and preventing it from curling as it dries Towards winter a tubelike case is formed along the midrib, and in this the larva passes the winter The pupa is suspended to a twig by a silken attachment at its posterior end, and is characterized by a projection like a Roman nose which issues from the middle of the body.

VICETIA. See VICENZA.

VICH, vĕk, or **VIQUE.** A city of the Province of Barcelona, Spain, on a hill-girt plain, 38 miles north of Barcelona (Map: Spain, G 2). Its cathedral, built about 1040, was repaired and modernized in 1803. Interesting pictures and sculptures are found in the Museum of Art and Archæology. Corn, fruit, and a poor wine are products of the vicinity; the inhabitants are employed in weaving, and in the manufacture of hats, paper, and cotton goods. Pop., 1900, 11,146; 1910, 12,171. Vich, the Roman Ausa, was afterward called Ausona and Vicus Ausonensis.

VICHY, vē'shē'. A town of the Department of Allier, France, on the right bank of the Allier, 69 miles by rail south-southeast of Paris (Map: France, S., H 2). It is one of the most famous of watering places, its numerous springs being annually visited by 60,000 persons. Vichy consists of the mediæval and the new towns and is almost surrounded by parks and gardens In the old town are the Romanesque church of St. Louis and Pavillon de Sévigné, now a hotel Here Madame de Sévigné, who first brought Vichy into prominence, passed the year 1676. The attractive new town, on the north, contains a fine promenade flanked by the Casino and large bazars on one side, by the main establishment of the baths on the other. The splendid Renaissance Casino is modern. The elegant thermal establishment is an immense edifice surrounded by a massive arcade, with a large annex on the west. There are yearly exported 11,000,000 bottles of Vichy water, the total daily supply being over 65,000 gallons. Salts, pastilles, and barley sugar are manufactured. The Vichy linen is made here. Pop., 1901, 14,254; 1911, 16,502. The waters were known to the Romans.

VICHY-CHAMROND, MARIE ANNE DE. See DEFFAND, MARQUISE DU.

VICIA, vĭsh'ĭ-ȧ *or* vĭs'ĭ-ȧ A genus of the Leguminosæ (pea family), whose species are known as vetches (see VETCH). It comprises about 130 species of wide distribution, about 25 of which occur in North America. The common vetch or tare (*Vicia sativa*) is a European species, often cultivated as a forage plant.

VICIOUS INTROMISSION. See INTROMISSION.

VICKSBURG. The largest city of Mississippi and the county seat of Warren County, 234 miles by rail north by west of New Orleans, on the Mississippi and the Yazoo rivers, and on the Yazoo and Mississippi Valley, the Alabama and Vicksburg, and the Vicksburg, Shreveport, and Pacific railroads (Map: Mississippi, D 6). It is attractively situated among the

Walnut Hills. The Federal building, the county courthouse, the Carnegie Library, the city hall, the banks, and the clubhouses are noteworthy structures; and among the prominent institutions are the Mississippi State Charity Hospital, All Saints College (Episcopal), St Francis Xavier Academy, St. Aloysius College, the Vicksburg Infirmary, and the Vicksburg Sanitarium. The National Cemetery has 16,727 graves, 12,723 of unknown dead. The Vicksburg National Military Park, with over 1300 acres, 30 miles of driveways, and more than 1000 markers and monuments, restores the Vicksburg battleground as it was in 1863. As a commercial centre Vicksburg is noted for its cotton trade, and in manufacturing it ranks second among the cities of the State. The industrial establishments include railroad shops, saw and lumber mills, cottonseed-oil mills, furniture, box, ice, wagon, and boat-oar factories, canning establishments, boiler and iron works, a molasses refinery, foundries, machine shops, etc. Pop., 1900, 14,834; 1910, 20,814; 1915 (U. S. est.), 22,453; 1920, 17,931.

Vicksburg was laid out on the plantations of William Vick and John Lane, and was incorporated in 1840. It was strongly fortified in 1861 and was provided with a large garrison, which, after a long siege, surrendered to General Grant on July 4, 1863 See VICKSBURG, CAMPAIGN AGAINST

VICKSBURG, CAMPAIGN AGAINST. The campaign or series of operations in 1862 and 1863, during the Civil War, which had for its object the capture by the Union troops under Generals Grant and Sherman of Vicksburg, Miss. It was pronounced by Sherman "one of the greatest campaigns in history." The year 1862 had been fruitful in reverses to the Union cause, and the Washington authorities realized that, both for political and military reasons, redoubled efforts must be made to turn the tide. In the West the great territorial object was the possession of the Mississippi River, which in the autumn of 1862 remained in the hands of the Confederates, who maintained strong garrisons at several points below Memphis—the largest force, under General Pemberton, being stationed at Vicksburg. In October, 1862, the Union forces near the Corinth and Memphis line comprised about 48,000 men under General Grant. He decided to assume the offensive, and having concentrated (November 4) a part of his command on the Mississippi Central Railroad (which in that vicinity runs parallel to the great river) at Grand Junction, prepared to move upon Vicksburg with an expedition down the Mississippi River under Sherman, and a force under his personal direction advancing by the way of the railroad. Sherman started December 20 with 32,000 men and 60 guns, reached Milliken's Bend, 20 miles from Vicksburg, attacked the Confederate position at Chickasaw Bluffs (q.v.), and was repulsed with a loss of 2000 men. In the meanwhile Grant's communications had been cut by cavalry under Forrest and Van Dorn, the latter having destroyed the Union depot of supplies at Holly Springs, while the former tore up the railroads in Grant's rear, compelling him to retire and recall Sherman. The project of a combined land and water movement upon Vicksburg had failed through the cowardice or incapacity of the commanding officer at Holly Springs, who surrendered the post without striking a blow, and from the unforeseen strength of the Confederate position at Chickasaw Bluffs. McClernand, who had been assigned to command the river expedition from Washington simultaneously with Sherman's advance, but whose order miscarried, now assumed command Escorted by gunboats under Admiral Porter, he ascended the Arkansas River to Arkansas Post Here was a strong work known as Fort Hindman, defended by 5000 men and 17 guns under General Churchill. A combined attack of land and naval forces resulted in the capture of the entire garrison on Jan. 11, 1863, of which 200 were killed, the Union loss aggregating 977 killed, wounded and missing A new campaign was now planned by Grant to get below Vicksburg and operate from the south. At first he intended to pass around the city through a canal to be cut across the peninsula opposite Vicksburg, but after much labor on the work it was abandoned. An attempt was then made to get in rear of the city by land from the north. Finally it was determined to move the Union land force by a series of bayous running from Milliken's Bend past Richmond to New Carthage, on the west bank of the Mississippi, 30 miles below Vicksburg, while the gunboats ran the batteries protecting the city. This was successfully done on the night of April 18, 1863, by the naval force under Porter. The ensuing operations, which brought Grant's army in rear of Vicksburg and to its final investment, must be referred to very briefly. Within a period of three weeks the battles of Grand Gulf (April 29), Port Gibson (May 1), Raymond (May 12), Jackson (May 14), Champion's Hill (May 16), and Big Black Bridge (May 17), and two assaults upon Vicksburg (May 19 and 22), occurred.

Reckoning upon the apparently demoralized condition of his enemy, who had given way precipitately in the affair of Big Black Bridge, Grant on May 19 promptly assaulted the works in his front with a part of his force, but after some hours was obliged to desist and prepare to invest the city completely. After establishing a depot of supplies and strengthening his communications with the Yazoo, Grant determined upon one more effort to dislodge the Confederate garrison. On the 22d he attacked with his entire force. The defenses were armed on the east and north sides with 128 guns, of which 36 were siege pieces; in addition water batteries comprising 44 guns protected the western front. The result again proved the superiority of the defense under such advantages of position. Although Grant's troops got inside the advanced line of works, they could not penetrate farther, and after eight hours' exposure to a severe and continuous fire from the Confederate works the Union troops withdrew with the loss of 4075 men. The siege was now commenced in earnest; 12 miles of trenches and 89 batteries were constructed, armed with 220 guns—most of which were field pieces; in addition at several points, where the hostile lines were separated by a few yards, small mortars were improvised by boring out tough logs and strengthening them with iron bands. After 12 days of incessant bombardment from the gunboats and the land forces, during which the Confederate garrison, cut off from relief and reduced to "one biscuit and a mouthful of bacon a day," showed signs of mutiny, General Pemberton surrendered on July 4, 1863. The number actually paroled was 29,391 officers and men; 790 refused paroles.

The artillery found comprised 172 pieces The capture of Vicksburg and the simultaneous defeat of Lee at Gettysburg marked the turning point of the war.

Consult: the *Official Records;* Johnson and Buel (eds), *Battles and Leaders of the Civil War* (New York, 1887), *Personal Memoirs of U. S Grant* (ib, 1895, new ed, 1909), Sherman, *Memoirs* (ib, 1892); Greene, *The Mississippi* (ib, 1882), in the "Campaigns of the Civil War Series", Swinton, *Twelve Decisive Battles of the War* (ib., 1867), and Nicolay and Hay, *Abraham Lincoln: A History* (ib., 1890), Steele, *American Campaigns* (Washington, 1907)

VICKSBURG NATIONAL MILITARY PARK. See PARK, NATIONAL MILITARY

VICO, vē'kō, GIOVANNI BATTISTA (1668–1744). An Italian philosopher and jurist He was born at Naples, spent most of his life in that city, and died there He studied law, history, and philosophy, and in 1697 obtained the chair of rhetoric in the University of Naples. In 1734 he was appointed historiographer to Charles III, King of Naples. The great work which has made his name illustrious, the *Principj di una scienza nuova d' intorno alla comune natura delle nazioni,* first appeared at Naples in 1725; but it was completely recast in a subsequent edition, published in 1730 A third edition, in which the work was considerably enlarged, was published in 1744, shortly after the author's death On account partly of its obscure and enigmatical style, the work was long in arriving at its proper place in European literature. The *Scienza nuova* was virtually unknown out of Italy until 1822, when a German translation of it appeared at Leipzig. It was five years later translated into French by Michelet, and the author has since that time found his proper rank among the most profound of modern thinkers His other writings include *De Ratione Studiorum* (1708); *De Antiquissima Italorum Sapientia* (1710); *De Universi Juris Uno Principio et Fine Uno* (1720), *De Constantia Jurisprudentis* (1721).

Vico proposed to himself the task of distinguishing amid social phenomena the regular from the accidental; of finding out the laws which govern the formation, the growth, and the decay of all societies, in fine, of tracing the outlines of the history of peoples—the idea of which he himself believed to have existed from eternity in the mind of God. In 1818 the Marquis de Villa Rosa published Vico's complete works. Another edition of his works, including an autobiography, was published at Naples (1858–69) in seven volumes, the Latin works in Italian translation. Consult: Ferrari, *Vico et l'Italie* (Paris, 1839); Cantoni, *G. B. Vico* (Turin, 1867); Diendorfer, *Gianbattista Vico und seine Ideen* (1877); Flint, *Vico* (Edinburgh and London, 1884); Klemm, *G. B. Vico als Geschichtsphilosoph und Volkerpsycholog* (1906).

VICOL, vē-kōl', or **BICOL.** A Christianized Malay people living in southern Luzon, and in Catanduanes and Masbate Islands. Their dialect stands midway between Tagalog and Visayan, while in general appearance and culture they differ little from the people of the latter group. See PHILIPPINE ISLANDS.

VICOMTE DE BRAGELONNE, vē'kōNt' de brä'zhe-lōn', LE. A romance by the elder Dumas (1848). a sequel to *Vingt ans après.* A charming criticism of it is in Stevenson's *Memories and Portraits.*

VICTOORS, JAN. See VICTORS, JAN.

VICTOR. A city in Teller Co., Colo., 45 miles southwest of Colorado Springs, on the Florence and Cripple Creek and the Midland Terminal railroads (Map Colorado, D 3). Victor is of considerable importance as the centre of a region noted for its extensive mineral deposits, and has gold mines, lumber mills, reduction works, ore-sampling mills, novelty works, bottling works, etc. Pop, 1900, 4986; 1910, 3162.

VICTOR. The name of three popes —VICTOR I, Saint, Pope 189–198, an African by birth. His best-known activity was in connection with the time for the celebration of Easter (q v.). He was only prevented from excommunicating the Quartodecimans of Asia Minor by the representations of St. Irenæus. St Jerome designates him the first Latin ecclesiastical author.— VICTOR II (c 1018–57), Pope 1055–57, Gebhard by name, son of the Count of Tollenstein and Hirschberg, and a relation of Leo IX, whom he succeeded He was nominated for the bishopric of Eichstätt by the Emperor Henry III, who opposed his elevation to the papacy through unwillingness to lose so faithful a counselor. His reign was distinguished by its purity, its zeal against the prevalent vices, and its constant alliance with the Imperial house. Henry III died in his arms, and he secured the succession of the youthful Henry IV under the regency of his mother, Agnes —VICTOR III (c.1027–87), called BLESSED. Pope 1086–87, Dauferius by name, of the family of the princes of Benevento. Under the name of Desiderius he became a Benedictine monk at an early age, despite strenuous objections by his family, and ultimately became abbot of Monte Cassino (1058). In the following year he was named Cardinal and Vicar of the Holy See in southern Italy, and conducted the negotiations between the Pope and the Normans He was chosen to succeed Gregory VII, but his excessive modesty induced him to refuse the honor, and he was crowned almost by force. Soon afterward the pressure of the Imperial party forced him to leave Rome, and he laid aside the papal insignia and retired to Monte Cassino. In the following year, however, he was enthroned in St. Peter's, which had previously been occupied by the Antipope Guibert, though the latter still contested the possession of the city with him. Though he had been an intimate friend of Gregory VII, and maintained the refusal to concede the Emperor's claims in the investiture question, his attitude towards Henry IV was somewhat more conciliatory than his predecessor's. The name of VICTOR IV was assumed by two antipopes: Cardinal Gregorio Conti, who opposed Innocent II in 1138, and Cardinal Octavian, whom Frederick Barbarossa supported against Alexander III in 1159–64. Consult Duchesne, *Histoire ancienne de l'église* (Paris, 1906), and H. K. Mann, *Lives of the Popes in the Early Middle Ages,* vols. vi–vii (London, 1910).

VICTOR, vēk'tōr', CLAUDE PERRIN, DUKE OF BELLUNO (1764–1841). A French marshal born at La Marche in the Vosges. He enlisted in the army in 1781, gained the attention of Napoleon by his conduct at the siege of Toulon (1793), and was promoted at the close of that year to the rank of brigadier general. He became general of division in 1797. In the Italian campaigns of 1796–97 and 1799–1800 Victor commanded the vanguard. He did bril-

liant service at Marengo. In 1806 he fought against Prussia, was captured in 1807, was exchanged for Blucher, and at Friedland won the baton of a marshal of France and the title of Duke of Belluno. He was Governor of Berlin after Tilsit In 1808 he commanded a corps in Spain, and gained several victories, but was defeated by Wellington at Talavera (July 27–28) In 1812 he commanded the Ninth Corps in the Russian campaign, and shared in the defense of the passage of the Beresina. He then went over to the Bourbons, from whom he received a peerage; was president of the military commission appointed to try those officers who deserted to Napoleon after the Emperor's return from Elba. He was Minister of War in 1821–23, and second in command in the Spanish Peninsula in 1823, but was recalled on suspicion of complicity in fraudulent contracts. There is a brief life, Boullée, *Biographie contemporaine*, vol ii (Paris, 1862)

VICTOR, JAN. See VICTORS, JAN

VICTOR AM'ADE'US. The name of three sovereigns of the house of Savoy. See SAVOY, HOUSE OF

VICTOR EMMAN'UEL I (1759–1824). King of Sardinia from 1802 to 1821. He was born at Turin, July 24, 1759, the second son of Victor Amadeus III, and bore the title of Duke of Aosta. He commanded the Sardinian forces against the French in 1792–96, and after the conclusion of peace lived in southern Italy and Sardinia. Upon the abdication of his brother, Charles Emmanuel IV, in 1802, he became King, all the dominions of his house at this time, except the island of Sardinia, being in the possession of the French. With the aid of an English subsidy he organized a fleet and army. The first Peace of Paris (1814) restored to him Piedmont, Savoy, and Nice, the second (1815) added the former dominions of Genoa. It was only then, when the fall of Napoleon had freed northern Italy from the French, that Victor Emmanuel really came into his Kingdom. He abdicated March 13 in favor of his brother, Charles Felix See ITALY, *History.*

VICTOR EMMANUEL II (1820–78). King of Sardinia from 1849 to 1861 and of Italy from 1861 to 1878. He was the son of Charles Albert (q.v.), King of Sardinia, and was born March 14, 1820. He was educated under his father's guidance, commanded the brigade of Savoy in the campaign of 1848–49, and displayed gallantry at Goito and Novara. Believing that his son could make better terms with Austria, Charles Albert, on the evening following the fatal day of Novara (March 23, 1849), abdicated in favor of his son. The new King chose for ministers such men as D'Azeglio and Cavour (q.v.), who sought to increase the strength and importance of the country by improved administration, rigid economy, care of the army, and encouragement of trade. Church property was sold, and reforms intended to diminish the privileges of the clergy were adopted—changes which brought displeasure from the Vatican; but Victor Emmanuel asserted and maintained his independence of the papacy. Under the guidance of Cavour Sardinia joined England and France on the outbreak of the Crimean War, sending an army of 17,000 men under La Marmora. After the Peace of Paris (1856) the King entered into a closer alliance with France, gave his elder daughter, Clotilde, in marriage (Jan. 30, 1859) to Prince Napoleon, and, backed by French arms, provoked a war with Austria The campaign of 1859 was brief but decisive, the Austrians were defeated at Magneta and Solferino, but the preliminary treaty between France and Austria at Villafranca, while securing the liberation of Lombardy, left Venetia in Austrian hands Victor Emmanuel was compelled by the agreement with Napoleon III to yield Nice and Savoy to France

In the meanwhile Tuscany, Parma, and Modena had emancipated themselves, and the Romagna had thrown off the papal authority, and in 1860 these regions were annexed to the dominions of Victor Emmanuel. Another step in the building up of his Italian kingdom was taken in the liberation of the Two Sicilies by Garibaldi (q.v.), who turned them over to the King. At the same time the Sardinian forces advanced into the marches of Umbria, which were seeking to free themselves from the rule of Pius IX, and these regions were also annexed. On Feb 26, 1861, Victor Emmanuel II was declared King of Italy by the National Italian Parliament assembled at Turin, and on March 17 he formally assumed the title When, in 1862, Garibaldi attacked the Papal States, the King was compelled to interfere, and the patriot leader was taken prisoner by the royal troops at Aspromonte. Italy joined Prussia against Austria in 1866, and, although defeated on land (Custozza) and on the sea (Lissa), she achieved her aim in the acquisition of Venetia. In 1870, after the outbreak of the war between France and Germany, the French garrison was withdrawn from Rome, and the Italian troops entered the Imperial city, which, finally united to the Kingdom, became the capital of Italy. Consult: Ruffer, *Konig Victor Emmanuel* (Vienna, 1878); Godkin, *Life of Victor Emmanuel II* (London, 1879); Massari, *La vita ed il regno di Vittorio Emanuele II* (Milan, 1880); Cappelletti, *Storia di Vittorio Emanuele II e del suo regno* (Rome, 1894); R. S. Holland, *Builders of United Italy* (New York, 1908) See ITALY, *History.*

VICTOR EMMANUEL III (1869–). King of Italy, the only son of King Humbert I and Queen Margherita (qq.v.). He was born at Naples, Nov. 11, 1869, and until he succeeded to the throne bore the title Prince of Naples. He was educated under the direction of his mother and of Colonel Osio, and, outgrowing the ill-boding weakness of his early years, he entered the army in 1887 as a second lieutenant. In 1890 he became colonel of the First Infantry Regiment at Naples, in 1892 major general, in 1894 lieutenant general, and in 1897 commanding general at Naples. Meanwhile the Prince had given much attention to horsemanship and to the study of warfare, extending his military knowledge by frequent visits to the German army. He represented King Humbert at the coronation of Czar Nicholas II in 1896, at the Victorian Jubilee in 1897, and at the celebration of the coming of age of the German heir apparent in 1900. On Oct. 24, 1896, he married Princess Helena, daughter of Prince (later King) Nicholas of Montenegro. King Humbert was assassinated at Monza July 29, 1900, and on the 11th of the following August Victor Emmanuel formally ascended the throne. The new King, although a man of quiet disposition, showed Liberal tendencies together with the desire and ability to exercise a forceful and just rule. To the King and Queen were born several

children, the heir, Prince Humbert, being born Sept 16, 1904 Upon the entrance of Italy into the European War the King assumed active command of the Italian armies on the Austrian front See WAR IN EUROPE Consult Helen Vacaresco, *Kings and Queens I Have Known* (New York, 1904), and A. G Gardiner, *The War Lords* (ib, 1915).

VICTO'RIA. A state of Australia, occupying the southeast portion of the continent (Map Australia, G 6). It is triangular in shape, with the apex pointing eastward. It is the smallest of the continental states, having an area of 87,884 square miles, only 210 square miles less than that of Great Britain

Victoria is traversed from west to east by an irregular range of mountains, an extension of the Great Dividing Range It sends out numerous branching spurs, which make the whole surface very diversified, except the northwestern portion, which belongs to the Great Plains. The mountains are low in the west, but rise towards the east into the rugged and romantic Australian Alps, whose highest peak in Victoria, Mount Bogong, has an altitude of 6508 feet The coast is lined with broken ranges of hills, and is irregular, with granitic headlands and land-locked bays, such as Port Phillip, the harbor of Melbourne. There are several navigable rivers. Those on the northern watershed are tributaries of the Murray, which forms most of the boundary on the side of New South Wales.

The climate is cool and more agreeable than elsewhere in Australia, though the maximum temperature in summer may be above 100°. In the lowlands the temperature is seldom below 32°, and the annual mean at Melbourne is 58°. The rainfall at Melbourne averages 25.61 inches, but may vary in different years between 15 and 44.14 inches, and droughts are liable to occur. The northwest plains are dry and treeless, covered with a scanty scrub vegetation. In other sections there are grassy slopes or open, parklike forests, becoming dense on the mountains. The trees of the genus *Eucalyptus* reach an extraordinary height. In general the flora and fauna of the state are not distinctive. See *Flora* and *Fauna* under AUSTRALIA.

The mountain system consists of greatly denuded Silurian and Carboniferous rocks with numerous extensive intrusions of granite overlain in area by Tertiary sandstones. Over 80 extinct volcanic peaks occur just west of Port Phillip and basaltic flows mark some of the plains. The mountains and drift deposits are rich in minerals, of which gold is the most important.

About two-thirds of the enormous gold production of Australia has been obtained in Victoria. From 1851 to 1913 the value of the gold produced in the state aggregated £293,550,928, from 73,515,268 ounces. The value of the output in 1913 was £1,847,475, from 467,052 ounces fine. The richest gold field is Bendigo. Coal, silver, tin, lead, and copper are also found. The total mineral production in 1913 was valued at £2,344,744.

General farming is more extensively followed in Victoria than in any other Australian state, the rainfall there being more propitious for crop growing There were 6,129,893 acres under cultivation in 1914. Over one-third of this area (2,565,860 acres) was in wheat. The production for that year was 32,936,000 bushels. With the exception of 1896 and 1903 the breadstuffs produced in the 38 years ending 1914 have been more than sufficient for home consumption The principal other cereals raised in 1914 were oats, 442,060 acres, producing 8,890,000 bushels, and barley, 83,351 acres, producing 1,813,000 bushels Hay crops, consisting chiefly of wheat and oats, cut green, covered an area of 977,684 acres, producing 1,350,000 tons, and 74,754 acres, producing 177,000 tons, were devoted to potatoes. Much attention is given to fruits, particularly grapes, 22,435 acres in 1913–14 producing 926,191 gallons of wine. Stock raising is more extensively carried on in connection with cropping than in any other Australian state. In 1914 there were 12,113,682 sheep, 1,528,553 head of cattle, and 221,277 swine The quality of the sheep has improved greatly since 1860. The wool produced in 1913–14 amounted to 106,833,690 pounds, valued at £4,032,954. The number of dairy cows in 1914 was 656,080, and in 1911 over 51,000,000 pounds of Victorian butter were exported In 1914 there were 562,331 horses

In 1913 there were 5613 manufactories, employing 118,744 persons, of whom 38,690 were females The manufactures were almost entirely for home consumption.

In 1913 the tonnage of vessels entering Melbourne, which has nearly all the tonnage for Victoria, amounted to 6.128,266. About half of this was British. Victoria ranks next to New South Wales in the amount of its foreign trade In 1914 its total oversea imports amounted to £23,109,678, and the total oversea exports to £14,791,121 Nearly all the total trade is with Britain, the other Australian states, and New Zealand Of the imports from foreign countries in 1913 £2,580,362 came from the United States of America, £1,738,678 from Germany, £683,083 from Belgium, and £215,475 from France The exports to foreign countries were £2,563,201 to France, £767,749 to Belgium, £1,029,433 to Germany, and £632,996 to the United States of America. The principal articles of Victorian produce exported in 1913 and their values were· butter, £1,681,987; wheat, £2,053,454; flour, £710,416; beef and mutton, £1,442,847; hares and rabbits, £107,818; skins and hides, £1,688,409; wool, £6,282,291; gold (bullion and specie), £624,264.

All the railroads belong to the state. The management of the system is in charge of three commissioners. A special committee from both Houses of Parliament considers all proposals for new lines and reports to Parliament There were 3747 miles open in 1914. The system connects with both the New South Wales and the South Australia lines. The gross receipts for 1914 were £5,560,958 and the working expenses £3,835,964.

The Governor receives his appointment from the British crown. The Parliament consists of a Legislative Council of 34 members, elected for six years, and a Legislative Assembly of 65 members, elected for three years. A voter for members of the Council must satisfy a property qualification, but this does not apply to certain classes, chiefly professional. No property qualification is required of those voting for members of the Assembly, who are elected by universal male and (since 1908) female suffrage. Clergymen are not allowed to hold seats in either branch of Parliament. Victoria sends 21 members to the Federal House of Representatives. Melbourne is the temporary capital of the Fed-

eral Parliament. For a discussion of the state's activities, see AUSTRALIA.

The total general revenue in 1912–13 was £10,287,285, and the expenditure £10,258,081. The revenue from taxation amounted to £1,317,079, and the surplus returned from the commonwealth (includes customs and excise revenue), £1,691,833. The revenue from the productive public works, principally railways and tramways, was £5,654,615. The largest items of expenditure were the working expenses of railways, which in 1912–13 were £3,627,510, and the interest on the public debt. The state's construction of railways and participation in other revenue-yielding schemes have led to a heavy debt, which amounted in 1912–13 to £62,776,724.

Victoria is the second most populous of the Australian states, and ranked first prior to 1891. The most rapid growth of population occurred between 1850 and 1860. In 1891 the population was 1,140,405, in 1901 it was 1,201,070, and in 1911, 1,315,551. The population of Victoria was estimated to be 1,431,000 in 1914. In 1911 there were only 643 aborigines. There is a large urban population. Melbourne, the second city of Australia, had with its suburbs in 1911 a population of 591,830. The principal other towns with their populations at the end of 1913 are: Ballarat, 42,093; Bendigo, 38,706; Geelong, 33,847.

There is no state church nor state assistance to any religion. The Church of England, the largest denomination, had 475,203 adherents in 1911. The adherents of the other denominations in the same year numbered as follows: Roman Catholics, 286,433; Presbyterians, 234,553; Methodists, 176,662; Baptists, 31,244; Independent or Congregational, 16,484; Lutheran, 11,682; Church of Christ, 16,511.

In 1891 nearly 96 per cent of the population over 15 years of age could read and write. School attendance is compulsory between the ages of 6 and 13. The public system is secular and the primary grades are free. In 1913 there were 241,042 pupils enrolled in 2127 state schools. The average attendance was 152,600. Secondary education is in the hands of private and denominational interests. In 1912 there were 48,391 scholars in attendance at private schools. The Roman Catholic schools contained over half of the total private school enrollment. The state encourages attendance at the grammar schools and universities by the awarding of scholarships. The higher educational institutions include the University of Melbourne, with its affiliated colleges of Trinity (Anglican), Ormond (Presbyterian), and Queen's (Methodist); also the School of Mines at Ballarat. There are also 19 technical schools, a college of domestic economy, a workingmen's college, two agricultural colleges, and a horticultural college. There are also several schools of art. For a comparison with other Australian states, see AUSTRALIA.

History. The coast of Victoria was sighted by Captain Cook in 1770, and the first explorations were made in 1798 by George Bass, who discovered Bass Strait. In 1802 Lieutenant Murray took formal possession of Port Phillip Bay, and in 1803 an unsuccessful attempt was made by the English government to establish a settlement. Exploring parties traversed the country from time to time, but the first permanent settlement was not made until 1834, and was then accomplished by the individual enterprise of one Henty. The settlement of the Henty family is usually regarded as the founding of Victoria. Henty and his seven sons were squatters on the shore of Portland Bay, where they set up a whale-fishing establishment, and also carried on sheep farming. That type of settlement had been a source of much vexation to the home government, and Henty was unable for some time to obtain any legal recognition. His settlement never grew, but was absorbed in the Port Phillip Association, led by John Batman, from Tasmania, in 1835, and reenforced during the year by colonists under a trader named Fawkner, who is jointly with Batman entitled to the credit of founding the colony. The settlers bought land of the natives. Such titles were not favored by Great Britain, but the colony at Port Phillip obtained such accessions of number that its recognition could not be avoided. It was incorporated within the territory of New South Wales in 1835, and formally opened for settlement in 1836. In 1837 the town of Melbourne was laid out, and in 1842 it received a city charter. The colony grew rapidly. In 1842 agitation began for separation from New South Wales. This was accomplished in 1850, although the new colony of Victoria was not formally organized until 1851. By this time the population had reached 77,000. Upon the discovery of gold Victoria had an extraordinary rush of immigration, the population increasing from 77,455 in 1851 to 540,322 in 1861. Discontent with the severe mining regulations imposed by the Legislature led to serious miners' riots at Ballarat in 1854 and to the enactment of more liberal laws. The period after 1855 witnessed the rise of a powerful democratic party, which entered into bitter conflict with the squatter or land-owning class on the question of a protective tariff for the purpose of encouraging home industries. The conservative attitude of the squatters, who were in control of the Upper House of the Legislature, kept back until after 1860 the full development of the agricultural resources of the colony. Like its sister colonies, Victoria during the last 10 years of the nineteenth century enacted many legislative measures of a decidedly democratic and even socialistic character. Among other things these acts provided for old-age pensions, and for every trade established mixed tribunals of employers and employees for the determination of a minimum wage. The people of Victoria were from the beginning overwhelmingly in favor of Australian federation (q.v.), and in 1898 ratified the first draft of the Federal constitution by a vote of five to one. See AUSTRALIA.

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nual Statistical Abstract, Quarterly Statistical Abstract, Official Year Book of Australia, Victorian Year Book, and other periodical government publications issued at Melbourne.

VICTORIA (Brazilian, *Nossa Senhora da Victoria*). A seaport, the capital of the State of Espirito Santo, Brazil, on the island of Espirito Santo, 275 miles northeast of Rio de Janeiro (Map: Brazil, K 8). The former Jesuit College, now used as the government palace, is the chief edifice. The harbor is good, with a lighthouse and batteries. It is the principal commercial centre of the state and exports sugar, coffee, rice, and manioc. The town was founded in 1535. Pop. (est.), 15,000.

VICTORIA. The capital of Hongkong (q.v.).

VICTORIA. A town of Luzon, Philippines, in the Province of Tárlac, situated 6 miles northeast of Tárlac, near the confines of Nueva Ecija (Map: Luzon, D 4). Pop., 1903, 14,945.

VICTORIA. A town of Venezuela, the capital of the state of Aragua, situated on the Aragua River, 45 miles southwest of Carácas, near Lake Valencia. Its favorable position gives it an extensive trade in coffee, sugar, cacao, and cereals. Pop., municipal (est.), 14,000.

VICTORIA. The capital of the Province of British Columbia, Canada, and of the Victoria district, at the southeast extremity of Vancouver Island, on the Strait of San Juan de Fuca, and the Esquimalt and Nanaimo, and the Victoria and Sidney railroads, 84 miles southwest of Vancouver (Map: British Columbia, D 5). It has extensive commercial interests, excellent harbor accommodation, which is (1916) being extensively improved, and regular steamship communication with all points on the northwest coast, Seattle, Alaska, San Francisco, the Sandwich Islands, China, Japan, India, New Zealand, and Australia. The imports in 1915 were valued at $4,879,880 and the exports at $1,532,782. Victoria's delightful climate, its beautiful surrounding scenery and many fine private residences, gardens, and public parks make it an attractive residential place. Victoria's public buildings include the fine government building, opened in 1897, comprising the Parliamentary chamber, a provincial museum, a library, and administrative offices. Other important edifices are the Anglican and the Roman Catholic cathedrals, the Metropolitan Methodist Church, the St. Andrews Presbyterian Church, the Provincial Royal Jubilee Hospital, St. Joseph's Hospital, the Provincial Library, and the Meteorological Office and Observatory. Among Victoria's many industries, its sawmills, brickyards, shipbuilding yards, ironworks, and furniture factories are the most important. Pop., 1891, 16,841; 1901, 20,919; 1911, 31,660.

VICTORIA. A city and the county seat of Victoria Co., Tex., 128 miles by rail southwest of Houston, on the Guadalupe River and on the Galveston, Harrisburg, and San Antonio, and the St. Louis, Brownsville, and Mexico railroads (Map: Texas, D 5). It is the seat of St. Joseph's College (Roman Catholic), and has the Nazareth Academy, the Bronte Library, an attractive courthouse, and a handsome city hall. Victoria is of considerable importance as a shipping point. The industrial establishments include a large planing mill, cotton gins, an oil mill, and manufactories of safes and locks, cigars, brooms, sugar, canned goods, and creamery products. Pop., 1900, 4010; 1910, 3673.

VICTORIA. A kind of carriage. See CARRIAGE.

VICTORIA (Neo-Lat., named in honor of Victoria, Queen of England). A genus of plants of the family Nymphæaceæ, resembling the common water lily. The best-known species is *Victoria regia*. This is said to have been first observed by Hänke, about 1801, but was not described until 1832, when Pöppig found it in the river Amazon. Its floating leaves are circular and attain a diameter of 5 to 6 feet; have the margin turned up about 2 inches, are purplish beneath, and exhibit prominent veins, furnished with prickles. The flowers rise among



BLOSSOM OF VICTORIA REGIA.

the leaves upon prickly stalks. They are more than a foot in diameter, white, internally rose-colored, and are very fragrant. The fruit is a capsule, almost globose, with a depression on the top, about half the size of a man's head, fleshy within, and divided into numerous cells, full of round farinaceous seeds, which are an agreeable article of food. The plant is called *maïs del agua*, or water maize, in some parts of South America. To the cultivation of the plant special hothouses have been devoted in some places in the United States and in Europe.

VICTORIA (1819–1901). Queen of the United Kingdom of Great Britain and Ireland, Empress of India. She was the daughter and only child of Edward, Duke of Kent, fourth son of George III. Her mother, Victoria Mary Louisa, fourth daughter of Francis, Duke of Saxe-Coburg-Saalfeld, and sister of Leopold, King of the Belgians, was married to the Duke of Kent in 1818, four years after the death of her former husband, the Prince of Leiningen. Victoria (baptized as Alexandrina Victoria) was born May 24, 1819, at Kensington Palace, whence her parents had temporarily removed from their home in Germany, in order that the child, a possible claimant for the British throne, might be born on English soil. The princess, left fatherless when eight months of age, was taught by her mother and the Duchess of Northumberland. She ascended the throne on the death of her uncle, William IV (q.v.), June 20, 1837. Her uncle, the Duke of Cumberland, became King of Hanover in virtue of the Salic Law, and thus terminated the connection which had lasted 123 years between the crowns of England and Hanover. Victoria was proclaimed June 21, 1837, and crowned at Westminster, June 28, 1838.

On her accession she found at the head of the Whig government Viscount Melbourne, by whom her early political course was largely influenced. Her long, prosperous, and comparatively peace-

ful reign included the administrations of Melbourne (till 1841), Peel (1841–46), Russell (1846–52 and 1865–66), Derby (1852, 1858–59, and 1866–68), Aberdeen (1852–55), Palmerston (1855–58 and 1859–65), Disraeli (1868, and as Earl of Beaconsfield, 1874–80), Gladstone (1868–74, 1880–85, 1886, and 1892–94), Salisbury (1885–86, 1886–92, and 1895 to the end of the reign), Rosebery (1894–95). Of the legislative record of her reign the most important events are the establishment of penny postage (1840), amendment of the poor laws of Scotland (1845) and Ireland (1847), repeal of the corn laws (1846), the Irish encumbered estates act (1848), repeal of the navigation laws (1849), the removal of the disabilities of the Jews (1858), the reform act of 1867, the disestablishment of the Irish church (1869), elementary education act (1870) and abolition of religious tests in the universities (1871), Irish land acts (1870, 1881), abolition of purchase in the army (1871), Scotch educational act (1872), and the franchise bill of 1884. Events of national and international importance were numerous in her long reign, among them being the rebellion in Canada (1837–38), Afghan War (1838–42), Opium War in China (1840–42), culmination of the repeal agitation in Ireland under O'Connell (1843), First Sikh War (1845–46), Irish famine (1846–47), chartist agitation (1848), Second Sikh War (1849), the establishment of a Catholic hierarchy in England (1850), Crimean War (1854–56), war with China (1856–58), Indian Mutiny (1857–58), transfer of India from the East India Company to the crown (1858), expedition to China (1860), complicated relations with the United States during the Civil War (1861–65), Canadian confederation (1867), Abyssinian War (1867–68), Ashanti War (1873–74), the assumption by Victoria of the title of Empress of India (1876), Afghan War (1878–80), Zulu War (1879), Transvaal War (1880), and the virtual establishment of British domination in Egypt (1882), the struggle for the reconquest of Nubia for Egypt (1884–98), the conquest of Burma (1885), Ashanti War (1896), South African War (1899–1902), Australian federation (1900–01). The reign of Victoria, the longest in English history, witnessed an extraordinary development of Imperial Britain as shown in the growth and political organization of the Canadian, Australian, and African colonies. For many years the agitation for home rule in Ireland was the main feature of internal politics. Victoria was preëminent among sovereigns by her personal character. She "for many years . . . exerted an almost unbounded moral control over the larger policies of the British Empire. She was industrious and methodical, patient and tactful, with a memory that was a great storehouse of knowledge of things past and present." The leading feature of the Victorian epoch was "the new conception of the British monarchy which sprang from the development of the colonies and dependencies of Great Britain, and the sudden strengthening of the sense of unity between them and the mother country. The crown after 1880 became the living symbol of Imperial unity, and every year events deepened the impression that the Queen in her own person typified the common interest and the common sympathy which spread a feeling of brotherhood through the continents that formed the British Empire." Her Diamond Jubilee in 1896 was marked by empire-wide rejoicing and a celebration such as London had never before seen.

Queen Victoria was married, Feb 10, 1840, to her cousin, Albert, Prince of Saxe-Coburg-Gotha, second son of the then reigning Duke. Although the union was not at the time greatly approved of by the Queen's advisers and subjects, it proved a most felicitous one, marked by a degree of mutual affection rarely found in marriages of state The Prince Consort died Dec 14, 1861, Victoria never ceased to mourn him. To them were born four sons and five daughters: The Princess Royal, Victoria, born Nov. 21, 1840, married Jan. 25, 1858, to Frederick William, who in 1888 became Frederick III, Emperor of Germany of brief reign (died 1901); Albert Edward, King of Great Britain, 1901–1910, born Nov. 9, 1841, married March 10, 1863, Princess Alexandra Caroline, eldest daughter of Christian IX, King of Denmark; Princess Alice, born April 25, 1843, married July 1, 1862, Prince Frederick William of Hesse (died 1878); Prince Alfred, born Aug 6, 1844, created Duke of Edinburgh, 1866, married Jan. 23, 1874, Marie, only daughter of the Emperor of Russia (died 1901); Princess Helena, born May 25, 1846, married in 1866 to Prince Christian of Denmark, Princess Louise, born March 18, 1848, married in 1871 to the Marquis of Lorne; Prince Arthur, born May 1, 1850, created Duke of Connaught, 1874, married in 1879 Princess Louise Marguerite of Prussia; Prince Leopold, born April 7, 1853, was created Duke of Albany, 1881, and married to Princess Helena of Waldeck in 1882 (died 1884), Princess Beatrice, born April 14, 1857, married, 1885, Prince Henry of Battenberg.

In her seclusion from public life after the death of the Prince Consort, and as later testimonials of her affection for him, Victoria supervised the publication in 1867 of *The Early Days of His Royal Highness, the Prince Consort;* published in 1868 *Leaves from the Journal of our Life in the Highlands,* supervised a second *Life of the Prince Consort* in 1874, adding in 1884 *More Leaves from the Journal,* etc. She died Jan. 22, 1901, at Windsor. See UNITED KINGDOM and articles on the statesmen mentioned in this article.

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VICTORIA, ADELAIDE MARY LOUISA (1840–1901), Princess Royal of England, and later known as the Empress Frederick. She was the oldest daughter of Prince Albert and Queen Victoria, and in 1858 was married to Crown Prince Frederick William of Prussia, subsequently the German Emperor, Frederick III (q.v.). She was of remarkable force of character, and strove to introduce English manners

and ideas at her court, but was opposed by the dislike of Bismarck. She devotedly attended Emperor Frederick in his illness After the Emperor's death she remained at her country place, Friedrichshof, near Cronberg, until her death

VICTORIA, Ciudad. See Ciudad Victoria.

VICTORIA, Ciudad de. See Durango (first article).

VICTORIA, Guadalupe (1789–1843). The first Mexican President, born at Durango. His name was Juan Felix Fernández, but he changed it to Guadalupe Victoria in 1822. He joined the revolutionary movement in 1810, was promoted to be general, and figured conspicuously in the revolt which deposed the Emperor Itúrbide in 1823. He was the successful candidate of the Federalist party in the presidential election of 1824. During his administration he secured the recognition of the Republic by England and the practical abolition of slavery. Although the last year of his administration was disturbed by the civil war between the Yorkino and Escoces parties, he held the office till the end of the term (1829). Afterward he was Governor of Puebla and senator. Consult H. H Bancroft, *History of Mexico*, vol. v (San Francisco, 1885).

VICTORIA, Tomás Luiz de (c.1540–c.1613). One of the greatest of the older Spanish composers, born at Avila in Castile. He is perhaps even better known by the Italianized form of his name, Tommaso Ludovico da Vittoria. While still very young he went to Rome, where his countrymen Escobedo and Morales, both singers in the Papal Chapel, were his teachers. In 1573 he became maestro di cappella at the Collegium Germanicum, and two years later at Sant' Apollinare. From 1589 till his death he lived in Madrid. As a composer he is classed with the masters of the Roman school, because his style resembles that of Palestrina, with whom he was an intimate friend. His greatest work, the *Requiem*, written in 1605 on the death of the Empress Mary, is ranked with the masterpieces of Palestrina. He wrote, besides, numerous masses, motets, psalms, and antiphonies. His complete works, edited by Felipe Pedrell, were published in eight volumes by Breitkopf and Härtel (1903–13). Consult H. Collet, *Le Mysticisme musical espagnol au XVIme siècle* (Paris, 1913).

VICTORIA AND ALBERT MUSEUM. See South Kensington Museum.

VICTORIA CROSS. The most highly prized decoration of the British military and naval services. It was instituted by royal warrant, dated Jan. 29, 1856, and promulgated in the official *Gazette* on February 5. It is a Maltese cross in shape, and is made from cannon captured in the Crimean War, principally at Sebastopol, the design on the obverse side consisting of the royal crest, a crowned lion, beneath which is the inscription "For Valour." Noncommissioned officers and men, and such commissioned officers as may have risen from the ranks, who have been awarded the Victoria Cross receive an annuity of £10, which, under special circumstances, may be increased to £50. The ribbon is blue for the naval service and red for the military. In 1911 native officers and men of the Indian army were made eligible for this decoration. Civilians acting in a volunteer capacity are eligible for the medal. Up to 1913, 522 crosses were awarded, and this number was considerably increased in the great war. Consult D. H. Parry, *The V. C., its Heroes and their Valour* (London, 1913). See Plate of Orders

VICTORIA EMBANKMENT. See Thames Embankment

VICTORIA FALLS (native name *Mosi-oa-Tunya*, Thundering Smoke) A magnificent cataract on the middle Zambezi in Rhodesia, a few miles below the Kwando confluence (Map: Africa, G 6). The river, here nearly a mile wide, suddenly plunges to a depth of 400 feet and within 200 feet of the falls the river suddenly narrows to a width of 100 to 400 feet. A dense cloud of vapor rises far above the falls, and as it condenses it darkens to the appearance of smoke, whence the native name. Below the falls, spanning the gorge, a railroad bridge, a marvel of engineering skill, was completed in 1905. The name Victoria was given to the falls by Livingstone, who discovered them in 1855.

VICTORIA GREEN AND ORANGE. See Coal-Tar Colors

VICTORIA INSTITUTE, The. A society founded in London in 1870 with the object of bringing together men of scientific attainments as well as those interested in the investigation of philosophy and science in the inquiry how far these may be found to harmonize with the great truths taught in the Holy Scripture; also by the discussion of these truths to test the faith of the members in "one eternal God." The results of such discussions are printed in the *Transactions* of the Institute. The membership is about 1000.

VICTORIA LAND. See South Victoria Land.

VICTORIAN GOTHIC. The general name commonly applied to those phases of the Gothic Revival in England which developed during the reign of Queen Victoria (1837–1902). It was characterized at first by the effort to attain archæological correctness of detail, to which the extensive restorations of mediæval buildings, especially by Sir G. Gilbert Scott (q.v), greatly contributed Later, in its adaptations to secular architecture, its leaders developed an increasingly free eclecticism. The most noted of these leaders were Sir G. Gilbert Scott, George Edmund Street, Alfred Waterhouse, and William Burges. Among its most noted productions are the Houses of Parliament (by Barry), the Manchester Town Hall and Courts, Exeter College Chapel at Oxford, and the New Law Courts, London. Consult Eastlake, *The Gothic Revival* (London, 1872).

VICTORIA NYANZA, nē-ăn'zȧ, or Ukerewe. The largest lake in Africa, and, next to Lake Superior, the largest sheet of fresh water in the world. It is 450 miles from the Indian Ocean and 175 miles northeast of Lake Tanganyika (Map: Africa, H 5). Its length from north to south is over 200 miles, its average breadth 150 miles, and its estimated area about 26,000 square miles. The lake occupies a broad depression, probably due to a series of faults in the ancient crystalline rocks of the East African plateau. Its surface lies at an elevation of 3775 feet. The shores, especially on the south and east, are very irregular, with numerous headlands and deep bays, and the lake contains several large and numerous smaller islands with an aggregate area of about 2300 square miles. The largest islands are Ukerewe, in the southeast,

and Sesse, in the northwest Some of the islands are densely wooded, some of them show fresh, green meadows with a number of villages, while others, even some of considerable size, are uninhabited and rocky. The west shore of the lake is high, steep, and rocky in the south, becoming lower and densely forested northward. The south shore is low and marshy, while the country bordering the lake on the east is mostly an open steppe region There are many fish in the lake and it abounds in mollusks. Crocodiles are numerous, and on the uninhabited islands there are many hippopotamuses. It receives the drainage of 92,000 square miles through many small streams, the largest of which is the Kagera, and discharges through the Victoria Nile to the Nile. The lake is comparatively shallow. Deeper soundings have been made inshore than near its centre. It was discovered by Speke in 1858, circumnavigated by Stanley in 1875, and subsequently explored at various times by him and others.

VICTORIA UNIVERSITY. An English university founded in 1880 by the union of Owens College, Manchester, University College, Liverpool, and Yorkshire College, Leeds. In 1903 the University of Liverpool (q.v.) became a separate institution, and in 1904 a charter was given to the University of Leeds (q.v.), and Owens College became the Victoria University of Manchester. See MANCHESTER, UNIVERSITY OF.

VICTORIAVILLE. A town in Arthabaska County, Quebec, Canada, on the Grand Trunk Railway (Map: Quebec, J 5). It possesses a Roman Catholic college, convent, and academy. Pop, 1901, 1693, 1911, 3028.

VIC'TORI'NUS, GAIUS MARIUS. A Latin grammarian, rhetorician, and philosopher of the fourth century. He was an African by birth, went to Rome about 300 A.D. to teach rhetoric, and in his old age became a Christian. St. Jerome was one of his pupils. His translations from the Greek of Plotinus (q.v.) and other Neo-Platonists were the indirect means of Augustine's introduction to that philosophical system. His commentaries on the Pauline Epistles and polemics against the Arians and the Manichæans are edited in Migne's *Patrologia Latina* (vol. viii); but his greater fame is as a grammarian. A commentary on Cicero's *De Inventione* (in Halm, *Rhetores Latini*, 1863), an *Ars Grammatica*, dealing almost entirely with prosody (edited with other grammatical fragments in Keil, *Grammatici Latini*, vol. vi, Leipzig, 1874), and a treatise *De Definitionibus* (edited by Stangl, 1888) are his chief works. Consult: R. Schmid, *Marius Victorinus Rhetor und seine Beziehungen zu Augustin* (Kiel, 1895); W. S. Teuffel, *Geschichte der römischen Literatur*, vol. iii (6th ed, Leipzig, 1913); Martin Schanz, *Geschichte der romischen Litteratur*, vol. iv (2d ed., Munich, 1914).

VIC'TORS, JAN (also called FICTOOR, VICTOORS, and VICTOR) (c.1620–c.1682). A Dutch genre and biblical painter, pupil, and follower of Rembrandt. He lived in Amsterdam, and his work is represented there and at Brunswick, Copenhagen, Prague, and St. Petersburg.

VICTOR VITEN'SIS (c.430–c.490). A Latin historian, of whose life little is known. As early as 455 he was a cleric in the Carthaginian church, and in 483 he was employed by Eugenius, Metropolitan of Carthage, to help the clergy made destitute by the persecution of the Arian Vandals. The *Historia Persecutionis Vandalicæ seu Africanæ sub Genserico et Hunnerico, Vandalorum Regibus* (edited in Migne's *Patrologia Latina*, vol lviii, and by Petschenig in the Vienna *Corpus*, vol. vii, 1881) is valuable for the information it gives of churches in Africa and of pagan superstitions.

VICTORY, THE. Lord Nelson's flagship in the battle of Trafalgar, Oct. 21, 1805.

VICUDA, vē-kōō'dȧ. One of the barracudas (*Sphyræna ensis*), about two feet long, and a food fish of some importance on the Pacific coast of Mexico and Central America.

VICUÑA, or **VICUGNA,** vē-kōō'nyȧ (Sp., from Peruv. *vicuña*, Mex *vicugne*). One of the Andean llamas (*Lama vicuna* or *vicugna*). In size it is intermediate between the llama and the alpaca. Its neck is longer and more slender; its wool finer, short, and curled It is of a rich-brown color, with patches of white across the shoulders and on the inner side of the legs The vicuña inhabits the most desolate parts of the Cordillera, at great elevations, and delights in a kind of grass, the ychu (*Stipa ychu*), which abounds there in moist places, but it seldom ventures to the rocky summits, for which its tender feet are ill adapted It is commonly found in small herds of from 6 to 15 females with one male. The vicuña is a very active and alert animal, like the wild goat or the antelope. The Indians seldom kill it with firearms, but set up a circle of stakes, about a mile in circumference, and so entrap it. It has never been domesticated. Compare ALPACA; GUANACO; LLAMA. See Plate of CAMELS AND LLAMAS.

VICUÑA-MACKENNA, vē-kōō'nyȧ mȧ-kĕn'nȧ, BENJAMIN (1831–86). A Chilean historian and politician, born at Santiago. He was educated in the National Institute and the University. For taking part in the revolution of 1851–52, he was imprisoned and condemned to death. He escaped to the United States and traveled there and in Europe Returning to Chile in 1856, he was elected to Congress, but was exiled in 1859 for his opposition to the government. While in Europe he made extensive historical investigations in the archives of Spain and France. Upon his return to Chile, he was elected to Congress (1867), chosen Senator (1871), and named intendant of the Province of Santiago (1872). He was editor of numerous periodicals and wrote many works upon the history of Chile. His writings include: *El ostracismo de los Carreras* (1857); *El ostracismo del General O'Higgins* (1862); *Historia de la administración Montt* (1862–63); *Historia de Santiago* (1868); *Historia de Valparaiso* (1868); *Francisco Moyen* (1868); *Historia de Chile* (1868); *Historia de las compañas de Arica y Tacna* (1881).

VIDA, vē'dȧ, MARCO GIROLAMO (c.1485–1566). An Italian Latinist poet, born in Cremona, Italy. He was educated at Padua and Bologna, and became a canon of St. John Lateran at Rome. In 1532 he was made Bishop of Alba. Vida has left three monuments of his Latinity and scholarship, the *Poeticorum Libri Tres*, the *Bombices* (on silkworms), the *Scacchiæ Ludus* (on chess), and an epic, the *Christias*, published in 1535 at the instance of Pope Leo X.

Consult: *Vidæ Poemata Omnia* (Padua, 1721, and London, 1732); Cichitelli, *Sulle opere poetiche di Gir. Vida* (Naples, 1904), bibliog-

raphy and biography, V. Osmo, in *Giornale storico della litteratura italiana* (Turin, 1911).

VIDA ES SUEÑO, vē'dȧ ās swā'nyō, LA (Sp, Life is a Dream) The best known of Calderón's romantic productions, written about 1630.

VIDAL, vē'dal', PEIRE A Provençal poet He was the son of a furrier of Toulouse and became a favorite in the courts of southern France and of Spain, being on terms of special intimacy with Barral, Viscount of Marseilles, whose wife he celebrated under the name of Vierna. He lived for a time in the East, in later life visited the Marquis of Montferrat and the King of Hungary, and probably went on a crusade with the former. His death occurred early in the thirteenth century. Among his poems are to be found some of the best specimens of Provençal literature. An edition of Peire Vidal's songs was published by Bartsch (Berlin, 1857), but it is now out of print. Consult Schopf, *Beitrage zur Biographie und zur Chronologie der Lieder des Troubadours Peire Vidal* (Breslau, 1887).

VIDAURRI, vē-dou'rē, SANTIAGO (1803–67). A Mexican general and statesman, born in the State of Nuevo León He began life as a lawyer, took part in the civil wars, attained the rank of general, and became Governor of Nuevo León in 1853 He assisted in the operations against Santa Anna, 1854–55. In 1856 he united Coahuila to Nuevo León by force and refused to recognize the government of President Comonfort. Thereupon a treaty was signed which left Vidaurri in a practically independent position. He was suspected of designing to establish an independent republic in northern Mexico. He supported Juárez in the "war of reform," 1857–60, and at first opposed the French domination, but after 1864 submitted and was made lieutenant of the Empire by Maximilian in 1867. Taken prisoner in the same year by the Liberal forces, he was shot as a traitor.

VIDOCQ, vē'dok', FRANÇOIS-JULES (1775–1857). A celebrated French criminal and detective. He was the son of a baker of Arras, where he was born July 23, 1775. When a boy he stole from his father and was imprisoned, but on release appropriated a sum of money. He was later an acrobat, and then entered the army. Returning home, he lived a disreputable life, and in 1796 went to the galleys for forgery. Escaping, he joined a band of highwaymen, afterward turned them over to the police, and soon acquired some note as a spy upon criminals. In 1812 he was made chief of a small detective force, the brigade de sûreté, which developed great efficiency in detecting crime and in creating crime to detect. His *Mémoires* (1829) are of doubtful authenticity and, if authentic, are unreliable.

VIEBIG, fē'bĭk, CLARA (1860–). A German writer of short stories and novels. She was born at Treves on the Moselle, and removed early to Düsseldorf. At the death of her father she went to Posen, and thence, to study singing, to Berlin. Here she began to write in 1894. In 1896 she married the bookseller and publisher Cohn. She published *Kinder der Eifel* (1897), *Vor Tau und Tag* (1898), collections of short stories of the Eifel region and the following novels: *Rheinlandtöchter* (1897); *Es lebe die Kunst* (1899); *Das Weiberdorf* (1900), widely read; *Vom Müller Hannes* (1903), tragically pessimistic; *Das Schlafende Heer* (1904), depicting a national struggle to the death between the Germans and the Slavs; *Absolvo te* (1907); *Das Kreuz im Venn* (1908), and *Die vor den Toren* (1910) *Die Rosenkranzjungfer* (1901) and *Naturgewalten* (1905) are late collections of excellent tales. Clara Viebig's best work lies in her short stories, depicting the life of her native Eifel, and in her earlier novels. The rest of her work has not reached the grade of her *Kinder der Eifel*. Some of her books passed through many editions. Her dramas have not been successful. See autobiography in *Als unsere grossen Dichterinnen kleine Madchen waren* (Leipzig, 1911).

VIE DE POÈTE, vē de pō'ȧt', LA (Fr., Poet's Life). An opera by Charpentier (q.v.), first produced in Paris, June 17, 1892.

VIEIL EVREUX. See EVREUX

VIEILLE, ve'ȧ'y', PAUL (1854–). A French engineer and inventor, born in Paris. He graduated from the Ecole Polytechnique of that city in 1875, and went into the government service as engineer in the department of explosives. In 1879 he was nominated assistant chief of the central laboratory of powders and saltpetre at Paris. There he conducted a series of investigations on projectiles which led to his invention in 1884 of a smokeless powder, which was adopted by the French army. (See EXPLOSIVES) For his scientific discoveries he was admitted to the Legion of Honor and was awarded (1889) by the Academy of Sciences the Lecomte prize of 50,000 francs.

VIEIRA, vē-ā'rȧ, ANTONIO (1608–97). A Portuguese preacher and missionary, born at Lisbon. He was taken to Brazil in 1615, was educated in the Jesuit schools of Bahía, and was ordained in 1635. He returned to Lisbon in 1641, and rose to be court preacher, in which post he exercised a great influence upon the economic and political conditions of the country and upon Portuguese diplomacy. He was sent by his order to Brazil in 1652 as director of the northern missions. There he was imprisoned by the colonists in 1661 and sent back to Portugal. On the charge of teaching doctrines condemned by the Church in 1665, he suffered imprisonment by the Inquisition for two years more, but was released finally without any demand upon him to retract. In 1681 he returned to Brazil, and died there as provincial of his order. His sermons (15 vols., 1679–1748) are considered examples of the best Portuguese prose. Among his other writings may be named the *Noticias reconditas do modo de proceder a Inquisição de Portugal com os seus presos* (1821). Consult Luiz Cabral, *Vieira, biographie, caractère, éloquence* (Paris, 1900); id., *Vieira pregador* (2 vols., Oporto, 1901).

VIELE, vē'lē, EGBERT LUDOVICKUS (1825–1902). An American soldier and civil engineer, born at Waterford, N. Y. He graduated at West Point in 1847; served under General Scott in Mexico; and became a first lieutenant in 1850, but resigned in 1853 He reëntered the army on the outbreak of the Civil War; became a brigadier general of volunteers in August, 1861; commanded the land forces in the capture of Fort Pulaski; was engaged in the advance on Norfolk, Va., and was military governor of that place from August, 1862, until October, 1863, when he resigned from active service. In 1883 he became commissioner of parks for New York City, and in the following year was made president of the department. In the same year he was

elected to Congress as a Democrat, but two years later was defeated in a contest for reelection He published: *Handbook for Active Service* (1861); *Topographical Atlas of the City of New York* (1865), *Report of the Board of Visitors to the United States Military Academy at West Point* (1886) For his sons, see VIELÉ, HERMAN K., and VIELÉ-GRIFFIN, FRANCIS

VIELÉ, vē'lā', HERMAN KNICKERBOCKER (1856–1908). An American author, painter, and engineer, born in New York City, where he studied civil engineering in the office of his father, Egbert L. Viele (q.v.). Painting and writing, which were at first his avocation, occupied more and more of his time, and by 1900 they had become vocations Though his paintings found some favor, he was more widely known as a novelist, His writings include: *The Inn of the Silver Moon* (1900); *The Last of the Knickerbockers* (1901); *Myra of the Pines* (1902), *Random Verse* (1903); *Heartbreak Hill* (1908), *On the Lightship* (1909); and a play, *The House of Silence* (produced 1906).

VIELÉ-GRIFFIN, vē'lā' grē'făN', FRANCIS (1864–). A French poet, whose name was originally Egbert Ludovicus Vielé. He was born at Norfolk, Va., but was educated for the most part in France He there allied himself with the group of literary men who were known, first among themselves and later to a wider circle, as Symbolists (q.v.) His publications include. *Cueille d'Avril* (1886), made up of verses which appeared in *Lutèce; Les cygnes* (1887), *Ancœus* (1888); *Joies* (1889), *Entretiens politiques et littéraires* (1890–92); with Paul Adam and Bernard Lazare, *Swanhilde* (1893); *Poèmes et poésies* (1895), *Phocas la jardinière* (1898); *La légende ailée de Wieland* (1900); *Sainte Agnès* (1901); *L'Amour sacré* (1900–03); *Plus loin* (1906); *Poèmes et poésies* (1907); *Sapho* (1911); *La lumière de la Grèce* (1912). Consult Thompson, *French Portraits* (Boston, 1900), and Van Bever and Léautaud, *Poètes d'aujourd'hui* (Paris, 1900). For his father see VIELE, EGBERT L.

VIEN, vē'ăN', JOSEPH MARIE, COUNT (1716–1809). A French historical painter. He was born in Montpellier, and studied under Natoire, in Paris. In 1743 he won the Prix de Rome, and after his return to Paris he became the head of an influential school, in which were trained David and the principal leaders of classicism in France. He became a member of the Academy des Beaux-Arts in 1754, in 1775 was made director of the French Academy at Rome, and in 1789 court painter to the King. His art represents the period of transition from the rococo to classicism. His masterpiece, "St. Denis Preaching to the Gauls," is in the church of St. Roch; "A Sleeping Hermit" and "St. Germain and St. Vincent" are in the Louvre, and he is represented in many French provincial museums.

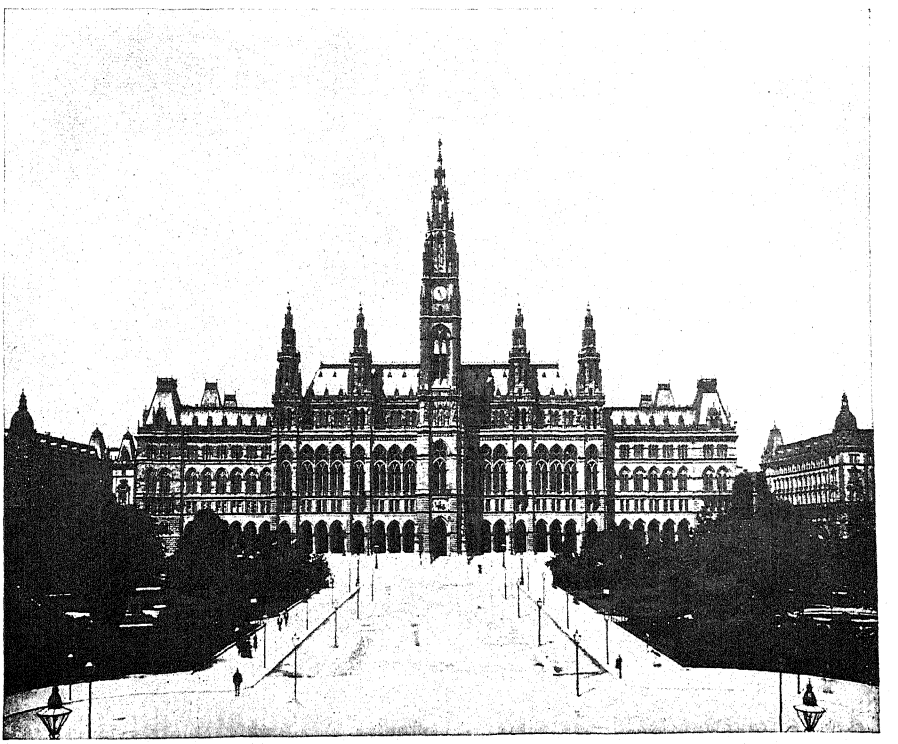
VIENNA, vē-ĕn'nà. The capital of Austria-Hungary, situated on the right bank of the Danube and intersected by an arm of the river called the Danube Canal, into which the small river Wien here empties (Map: Austria, E 2). It has a temperate climate, the mean annual temperature being 48 8° F. The annual rainfall is 23 42 inches; the altitude, from 560 to 655 feet. The last northeastern outliers of the Alps (Wiener Wald) here reach the Danube plain. Vienna is distinguished by an unusually large acreage of forests and meadows within its confines, the extent of the total area being much greater than that of Berlin

Description. Vienna is notable for the magnificent Ringstrasse lined with imposing Renaissance structures and beautiful public parks and squares, and for its general air of gayety, due to its genial, music-loving population In modern architectural development, both in extent and in artistic value, perhaps no city is its equal. The traditional Vienna baroque style, with its open-air embellishments in relief and in color, give everywhere a lively and varied aspect The modern improvements of every kind, especially in fine new streets, are remarkable. This modernization of the city has been continuous since 1857. The old inner city, which still has many Durchhauser, or short-cut passages through the courts of houses, is encircled by the Ringstrasse, marking the site of the interior fortifications finally demolished in 1857. The southwest section of the inner city is occupied by the Imperial Hofburg, and by the Volksgarten and the Hofgarten, with the extensive square lying between. The Burg, or Imperial residence, has been the official home of the Hapsburgs since they obtained possession of the city in 1276. Built, renovated, and added to from the thirteenth century until the beginning of the twentieth, it is a vast, confused, and generally somewhat uninteresting group of buildings, containing many reminiscences of former rulers. Splendid in architectural decoration is the Knights' Hall in the Residenz. In the spacious inner court, the Franzenplatz, stands an elaborate monument to Francis I (by Marchesi, 1846). Through a portal on the east may be entered the Josefsplatz with the equestrian bronze statue of Joseph II (by Zauner, 1806). Here rises the splendid Imperial library, dating from 1722, crowned by a great frescoed dome, and a long, handsomely embellished gallery, with statues. The library contains over 600,000 volumes. There is also an immense and invaluable collection of engravings (over 350,000). In the Outer Burgplatz, which separates the Burg from the Ringstrasse, are two fine equestrian statues by Fernkorn—one to Archduke Charles (1860), the other to Prince Eugene of Savoy (1865). Here on the Ringstrasse is the Burgthor, with five passages, formed by Doric columns. Two immense wings by Semper connect this gate with the old palace. The attractive and popular Volksgarten dates from 1824 and contains the notable modern Grillparzer monument (1889), of elaborate design.

Passing from the Hofgarten northward farther into the former inner city, the Augustiner Kirche (1339) is noted, in the vicinity of various government palaces and offices. It is a mediæval Gothic building and contains besides other well-known monuments Canova's famous monument to the Archduchess Maria Christina. Near by, on the Augustiner Bastei, one of the few remnants of the old bastions, stands the palace of the Archduke Friedrich, containing the Albertina Library with its famous collections of drawings and engravings. Of the latter there are more than 220,000.

The Imperial Opera, in the style of the Renaissance, situated on the Opern-Ring, is one of the superb modern art temples of Europe. It was completed in 1869. The luxurious interior is adorned with frescoes, statues, busts, etc., of





VIENNA

THE OPERA HOUSE (UPPER)

THE CITY HALL (LOWER)

great excellence. The vicinity is the fashionable centre of the capital, and hence the spacious Kärntnerstrasse, one of the busiest thoroughfares of the city, leads northeast past the Neuer Markt, to the cathedral The spacious Neuer Markt contains a fine fountain, by Raphael Donner In the Capuchin Church (1622) here is the Imperial vault. In this section palaces and governmental establishments abound.

A little distance to the north, near the centre of the inner city, towers the cathedral of St. Stephen. It is the most famous structure in Austria. Founded in 1144, the present edifice dates mainly from 1300 to 1510. Its shape is that of a Latin cross. It is 355 feet long, and has been partially restored in recent times. Great catacombs are beneath it, also the old Imperial burial vault. From its impressive steeple, whose cross is 453 feet high, a magnificent view of the city and the surrounding country may be had. Between the cathedral and the Burg extends the wide modernized Graben northwest and southeast, a fashionable business street. In the northeast section of the inner city is found the baroque university, or Jesuit church (1631), with the Academy of Sciences (1846) near by in the old university. In the extreme northeast corner of the old city are the post office and the Imperial Ministry of Commerce. The Greek Church is seen to the west, and to the south are the Horticultural Society building and the splendid Renaissance palace of Archduke Eugene.

Entering the northwest section of the inner city from the Graben, the Austrian Kunstverein is noticed. It holds a permanent exhibition. To the northeast is the square called Hoher Markt, said to be the site of the forum of the ancient Vindobona. This is the most ancient part of the town. In the centre of the square rises a votive monument by Fischer von Erlach. West is the spacious square Am Hof, where dwelt the ancient rulers of the Babenberg family. Farther northwest, on the Freiung, is the Harrach Palace, containing a fine picture collection of some 400 canvases. Near by is the far less valuable Schönborn collection. In the vicinity are the Schotten cloister and church (1638–62). Southward in the general direction of the Volksgarten are the fine Hofburg Theatre (1889), containing a valuable collection of actors' portraits; the imposing Landhaus of the Lower Austrian Diet (1838, housing the Museum of the Imperial Agricultural Society); the Minorite Church, finished 1330, with Raffaeli's splendid mosaic of Da Vinci's "Last Supper" done at the command of Napoleon I; and the notable Kultus Ministerium. Near the northwest corner of the inner city is the splendid modern Renaissance stock exchange (1877). It holds the valuable Museum of Trade, collections of industrial products, etc.

Beginning here at the northwestern end of the Ringstrasse, by the river Wien, there may be mentioned conveniently in succession the objects of interest lining the street. The Stiftungshaus, a benevolent establishment, has an expiatory chapel built by Francis Joseph on the spot where the Ring Theatre was destroyed by fire in 1881 with great loss of life. To the west is the striking Gothic Votivkirche, one of the chief modern ornaments of the city, completed in 1879 with a beautiful façade, towers, and a resplendent interior. In this region is the excellent Liechtenstein picture gallery, with over 800 good canvases Rubens's "History of Decius" and "Two Sons" and Van Dyck's famous portrait of Maria Louisa de Tassis are here A park and a fine new palace of Prince Liechtenstein are near by. On the south of the Votivkirche extends the wide Universitatsstrasse, entering the Ringstrasse, and having the university on the south This is the most superb part of the Ringstrasse The immense quadrangular university building, exhibiting the Tuscan Renaissance, was completed in 1884, and contains the famous college collections, library, etc See VIENNA, UNIVERSITY OF.

South of the university extends the Rathaus Park, opposite the Hofburg Theatre, and with the sumptuous Rathaus on the west This unsurpassed Gothic town hall was completed in 1883, at a cost of $6,000,000. It abounds in statuary and frescoes. Its majestic tower rises 320 feet. It holds the valuable historical museum of Vienna, the municipal library (over 78,000 volumes), and the municipal collections of weapons. The first is rich in antiquities, costumes, and objects of personal interest On the south of the Rathaus Park and opposite the Volksgarten rise the imposing Houses of Parliament, designed in the Greek style, by Hansen. They are approached by a columned portico. About a hundred yards farther south is the fine Palace of Justice, in German Renaissance, finished in 1881. South of it stands the attractive Deutsches Volktheater (1889) in Italian Renaissance. To the east are the celebrated natural-history and art-history museums in two spacious and imposing edifices flanking the Maria-Theresiaplatz opposite the Burgthor. Here is to be seen the colossal bronze Maria Theresa monument, erected in 1888 by Zumbusch.

The museum buildings are twin, domed edifices in the Italian Renaissance, and were completed in 1889. They are abundantly decorated with symbolic and portrait statuary, and in the interior with frescoes and marbles by great artists. The natural-history collections, among the most famous in the world, date from 1748. The equally celebrated art museum includes the art treasures of the Imperial House. In this section is one of the principal military institutions, known as the Military Geographical Institute.

Southeast of the art museum, near the Ring, is the Schillerplatz, with Schilling's fine bronze Schiller monument (1876). The square is flanked on two sides by the Palace of Justice (1881) and the Academy of Art (1877). The Goethe monument, by Hellmer (1904), is to the north, in the Hofgarten In this vicinity, facing south on the river Wien, which from this point to the Stadtpark has been covered and runs underground, are the Commercial Academy (1862), the Künstlerhaus (1881) with a permanent exhibition of modern pictures, and the Renaissance building of the Musikverein. In the last are the Vienna Conservatory of Music (1870), with a musical library of over 20,000 works, and a museum.

In the district of Wieden is the Polytechnic Institution (1815), with collections and a laboratory. Turning northeast from the Wieden district, along the exterior side of the Ring, we pass the Schwartzenberg monument (by Hähnel, 1867), the Academic Gymnasium, and the bronze statue of Beethoven, by Zumbusch, erected in 1880. The charming little Stadt-Park farther on has an attractive Kursalon. Here are

the fine monuments to Schubert, by Kundmann (1872), to the painter Hans Makart (1898), by Tilgner, and to the painter Schindler (1895), by Hellmer. Beyond are the Austrian Museum of Art and Industry (1871) and the Art Industrial School (1877)—both in sightly brick Renaissance edifices, embellished with attractive features, and connected by a passageway. These institutions are models of their kind. Extensive quays along the Donaukanal, which is spanned in this section by the Aspern, Ferdinand, Marien, Stephanie, and Maria Theresa bridges, connect the extremities of the Ring.

East of the Wien, just above its mouth, into the Donaukanal, stretches the Landstrasse district, with the customhouse, the central markets, the mint, the geological institution, the botanic garden, and the Metternich Palace South from this section extends the Belvedere Garden, with a palace at either end. Immediately to the west are the Schwarzenberg Palace and Gardens. The district northeast of the Danube Canal, opposite the old city, is the Leopoldstadt. Adjoining this section on the north is the Augarten Park. The main artery of the Leopoldstadt is the fine and broad Praterstrasse, stretching northeast to Prater. The International Exhibition of 1873 was held here

Among ecclesiastical buildings not hitherto mentioned are the Karlskirche, erected 1736–37 by Fischer von Erlach, in the district of Wieden, and the church of Maria Stiegen (Maria am Gestade) in the inner city, dating from 1340 The inner city also contains the church of St. Michael, originally erected early in the thirteenth century The Altlerchenfeld Church, in the district of Neubau, is a fine modern brick edifice, in the Italian mediæval style (1861). In the Leopoldstadt is the handsome modern Jewish synagogue, in the Moorish style (1858), and in the Seitenstettengasse the older synagogue (1826) One of the most striking of secular buildings is the Artillery Arsenal (1854), in the southeastern section, with its fine army museum. Near it are the stations of the Southern and State railways. The finest railroad station is the Nordbahnhof, near the entrance to the Prater. Among places of burial, the large Central Cemetery, with its fine monuments, claims attention.

A new quarter of the city, called the Donaustadt, has sprung up on both sides of the Danube, northeast of the Leopoldstadt, as a result of the Danube improvement works, which have provided a broad new channel for the river and done away with the inundations formerly so destructive. An even more remarkable triumph of engineering skill was the regulation of the Wien, which in the centre of the city flows partly underground.

The environs of Vienna have much of interest and charm. On the northwest rise the Kahlenberg and the Leopoldsberg, whose summits, about 1400 feet above the sea, present an impressive view of mountains, city, and the Danube plain. A mountain railway leads to the top of the Kahlenberg. The historical Schönbrunn Palace (q.v.) is on the southwest of the city, and the battlefields of Aspern and Wagram lie on the Marchfeld plain to the east, with the island of Lobau. South of the city is the picturesque Brühl—a ravine converted into beautiful pleasure grounds.

Industries and Commerce. Vienna is a great and growing centre of manufactures which are characterized by their taste and artistic ingenuity, the city is noted for its elegant shops and its objects of art It produces also machinery, metal wares, fine furniture, textiles, chemicals, pottery, clothing, millinery, musical instruments, etc. The product of the great Vienna breweries is celebrated Among the chief articles of commerce are grain, cattle, wine, textiles, coal, iron, flour, wood, furniture, chemicals, clothing, shoes, leather goods, books, and art publications.

Administration. Administratively the city is subject to the Diet and Governor of Lower Austria, and its burgomaster must be approved by the Emperor. It is, however, virtually autonomous. The modern sanitary reforms have greatly diminished the annual death rate. It was not until 1874 that the city was first supplied with good drinking water by an aqueduct, and this supply has been greatly increased and improved. Vienna is surpassed by many cities with respect to lighting and facilities of intercommunication. It can, however, now boast of an admirably constructed metropolitan railway. The finances are on the whole on a good footing. In 1903 the total municipal revenue and expenditure amounted to about $64,978,000. The expenditure on account of education was nearly $4,352,000. The great increase in these figures in late years has been due naturally to the extensive improvements of every nature. The city owns the gas and electricity works, and the tramway system.

Population, Education, and Charities. The population in 1910 was 2,031,498, Vienna being the largest city in Austria-Hungary and the fourth largest in Europe. About three-quarters of the population are Germans and Roman Catholics Great advance has been made in the educational facilities. The Grand Opera is second to none in the world, and the acting at the Hofburg Theatre is scarcely surpassed anywhere. In addition to the educational institutions already mentioned, and including the famous conservatory of music, the Oriental Academy (a school for training in diplomatic service, dating from 1754) claims particular attention. The government printing establishment is one of the most complete of its kind. Among the charity institutions not already mentioned are the soldiers' asylum, famous institutions for the blind and the deaf and dumb, the general hospital, the largest in Europe, with 2000 beds, and several other large hospitals, asylums for the insane, night asylums, etc.

History. Vienna is the Vindobona of the Romans, under whom it was strategically important. It was made a municipium, but declined in importance in the later Empire and during the migrations was occupied by Huns and Avars. At the close of the eighth century it passed from the possession of the latter to that of the Franks. In the twelfth century it became the residence of the Babenberg dukes of Austria. The traffic which arose in connection with the Crusades caused Vienna to prosper. Ottokar of Bohemia, in the middle of the thirteenth century, enlarged the bounds of the city. Soon afterward it became the capital of the Hapsburg rulers of Austria. In 1365 the university was founded From the fifteenth century the Hapsburgs permanently occupied the Imperial throne of Germany, which added greatly to the importance of Vienna. In 1477 it resisted a siege by the Hungarians, but was taken by Matthias

Corvinus in 1485 The Turks twice besieged it without success, in 1529 and 1683 The second time, when it was heroically defended by Starhemberg, it was on the point of falling into the hands of the Mussulmans, when it was rescued by the splendid victory of the Polish King, John Sobieski, and the German princes, achieved before its walls (Sept. 12, 1683). In 1735 and 1738 treaties were concluded here in connection with the War of the Polish Succession. (See SUCCESSION WARS.) Vienna was greatly embellished by Maria Theresa and her sons. The city was for a brief period occupied by Napoleon in 1805 and 1809, and the battles of Aspern and Wagram were fought in its environs, the latter followed by the Treaty of Schonbrunn (1809). The famous Congress of Vienna was held in 1814–15. The city was the scene of a revolutionary movement in 1848, which ended in bloodshed (See AUSTRIA-HUNGARY.) Under Francis Joseph Vienna has undergone an unparalleled transformation, and has become architecturally one of the most imposing capitals of the world.

Consult: Moritz Bermann, *Alt- und Neuwien* (2d ed., 2 vols., Vienna, 1903–04); *Oesterreich in Wort und Bild* (ib., 1886); Karl Weiss, *Geschichte der Stadt Wien* (ib., 1882), containing bibliography, Eugene Guglia, *Geschichte der Stadt Wien* (ib., 1892); Heinrich Zimmermann, *Geschichte der Stadt Wien* (2 vols, ib., 1897–1900).

VIENNA, CONGRESS OF. A convention of the representatives of the European nations, held for the purpose of settling the affairs of Europe after the Napoleonic wars (September, 1814–June, 1815). The work of readjusting the map of Europe after Napoleon's downfall presented many difficult and complicated problems The boundaries of European states had been altered with bewildering rapidity. Old states had been destroyed and new ones created. Historic dynasties had been overthrown and the social and legal systems in most of the states of western Europe had undergone a radical transformation.

The Congress was one of the most brilliant assemblages of crowned heads and prominent diplomats and statesmen that had ever gathered in the history of Europe. Of the sovereigns of Europe there were in attendance the Czar of Russia, the Emperor of Austria, and the kings of Prussia, Denmark, Bavaria, and Württemberg, besides a large number of the princes of the smaller German states. Among these royal visitors the Czar Alexander I was the most conspicuous. He was one of the few liberal-minded men at the Congress. He had interested himself in the democratic development of Swiss institutions He sympathized with Stein's schemes for unifying the German states and set his heart on the restoration of the Polish nation under a liberal constitutional government.

Of the diplomats, Prince Metternich, the Austrian Minister of State, who acted as President of the Congress, played perhaps the most prominent part in the work of the Congress Undoubtedly the most astute of the representatives was the French diplomat, Prince Talleyrand. When he arrived at the Congress he found that the representatives of the four Powers—Great Britain, Russia, Prussia, and Austria—had agreed that neither France nor Spain, nor any of the smaller Powers should take part in the deliberations, but that all decisions should be made by the four Great Powers. Talleyrand soon showed that this arrangement was contrary to the agreement for calling the Congress and succeeded in securing for France a share in the deliberations on an equal footing with the other Powers Among the other prominent diplomats and statesmen in attendance were Castlereagh and Wellington from Great Britain, Hardenberg and Humboldt from Prussia, and Nesselrode from Russia.

Certain questions had been decided in principle in the first Treaty of Paris, immediately after the overthrow of Napoleon, and the Congress of Vienna simply arranged the details of this settlement France was deprived of all of the territory conquered by Napoleon Holland and Belgium were united into a single kingdom under the house of Orange in order to provide a stronger buffer state to the north of France. Norway and Sweden were joined under a single ruler, one of Napoleon's generals, Bernadotte. The independence and neutrality of Switzerland were guaranteed, and the union of the cantons was reconstituted as a loose confederation.

As a result of Napoleon's work the 300 states which had constituted the old Holy Roman Empire had been consolidated into 38 sovereign states, and the Congress made no effort to restore the former petty sovereignties. In regard to the organization of the surviving states there were two views in the Congress The national party, headed by the Prussian statesman Stein, demanded a close federal union, while Metternich, who feared that a strong united Germany would not be in the interest of Austria, advocated a loose confederation. With the aid of the other German states, Metternich was able to carry through his plan. The confederation which was provided by the Congress was not a union of the countries but of "The Sovereign Princes and Free Towns of Germany." Moreover, there were included in the confederation two non-German sovereigns, the King of Denmark for Holstein and the King of the Netherlands for Luxemburg, while a considerable part of the possessions of Prussia and Austria were not included.

In dealing with Italy the Congress did not see fit to recognize the consolidations which had been made by Napoleon, as it had done in the case of Germany. All of the old governments were restored with the exception of the Republic of Genoa, which was given to Sardinia to strengthen that state against France, and the Republic of Venice, which was given to Austria to compensate her for the loss of the Austrian Netherlands.

Serious trouble developed in the Congress over the distribution of the territories of Poland and Saxony. As has been noted, the Czar was determined to restore the old Polish Kingdom as an autonomous monarchy under the control of Russia. Prussia was willing to relinquish her Polish territory, but demanded in return the whole of the Kingdom of Saxony, whose King was to be deprived of his dominions for remaining faithful to Napoleon to the end of his career. Both Austria and England opposed this arrangement, and Talleyrand, taking advantage of the split between the four Great Powers to improve the position of France, offered to come to the aid of Austria and England with a French army, if necessary, to oppose the claims of Russia and Prussia. A compromise was finally reached by which Prussia received about half of Saxony and some territory on the left bank of the Rhine, while Russia received the

larger part of the Duchy of Warsaw, which was erected into the Kingdom of Poland. In addition Russia received Finland from Sweden

Great Britain found her compensation in the extension of her colonial possessions During the Napoleonic wars she had seized a number of the colonial possessions of France, and of the allies and dependencies of France, particularly Holland. Most of these she retained, including the island of Helgoland in the North Sea, Malta and the Ionian Islands in the Mediterranean, Cape Colony in South Africa; Ceylon, Mauritius, Demerara, St. Lucia, Tobago, and Trinidad.

Such were the chief territorial readjustments made by the Congress of Vienna In making these arrangements no consistent principle was followed. The principle of "legitimacy" so strongly urged by Talleyrand was adopted only so far as it suited the convenience of the Great Powers which dominated the Congress Even more ruthlessly did the Congress disregard the principle of nationality. Belgium was joined with Holland despite the fact that the people of the two countries differed in race and religion Norway was turned over unwillingly to Sweden The hopes of the German Nationalists were not realized, while Italy became in the words of Metternich "a geographical expression." Such flagrant violations of the growing spirit of nationality could not be considered a permanent settlement, and during the nineteenth century many of the ill adjustments made by the Congress were corrected

While the Congress is chargeable with many shortcomings, and some of its decisions were certain not to remain permanent, it did achieve much important work. It reëstablished a real balance of power among the states of Europe, and it paved the way for a concert of the Great Powers which succeeded in maintaining the peace of Europe practically undisturbed for 40 years. The Congress, moreover, took a noteworthy step forward in condemning the slave trade and in providing for the freedom of navigation of rivers traversing several states or which formed the boundaries between states. Consult: *Cambridge Modern History*, vol. ix, chaps. xix, xxi (New York, 1909); Andrews, *Historical Development of Modern Europe*, vol. i (ib., 1906); Hazen, *Europe since 1815* (ib., 1910); Robinson and Beard, *Development of Modern Europe*, vol. i (ib, 1908); Hertslet, *Map of Europe by Treaty* (London, 1876–91); Lavisse and Rambaud, *Histoire générale*, vol. x (Paris, 1898).

VIENNA, University of. One of the oldest and most famous universities of Europe, founded by Duke Rudolph IV in 1365. Under its first rector it maintained but a precarious existence. Duke Albert III obtained in 1384 from Pope Urban VI the right to add a theological faculty to the three secular ones. At the same time the university was divided into four nations, modeled after those of Paris In 1623 Ferdinand II transferred the university to the Jesuits, who erected a number of buildings, some of which still exist. By the beginning of the reign of Maria Theresa it had lost what prestige it acquired during the humanistic awakening. Gerard van Swieten, however, succeeded in rescuing the medical faculty from the general ruin, and it has since maintained an almost unrivaled position in the European medical world. Joseph II reorganized the university as a practical state institution and deprived it of academic freedom. Reforms in 1848–50 introduced again the era of free academic life, and henceforth it regained its former renown The magnificent new university building designed by the famous architect Ferstel was dedicated in 1884.

The university consists of the following faculties: (1) law and political science; (2) theology; (3) medicine, (4) philosophy The attendance in 1913 was 8784, including 655 women The university departments include, besides a large number of seminaries, museums, and laboratories in art and sciences, three medical clinics, two surgical clinics, two lying-in clinics, two for psychiatry, one each for diseases of women, skin diseases, children's diseases, etc. These clinics have attained a world-wide reputation, due to the eminent specialists conducting them The university library, founded in 1775 by Maria Theresa, has received since 1808 a copy of every work printed in Lower Austria. It includes over 857,000 volumes and 900 manuscripts. Notable also are the observatory, botanical garden, and Central Institute for experimenting in meteorology and terrestrial magnetism. Consult K. Schrauf, *Geschichte der Wiener Universitat in ihren Grundzugen* (Vienna, 1901), and C. F. Thwing, *Universities of the World* (New York, 1911).

VIENNA WHITE. A name applied to white pigments exported from Austria, which are mixtures of lead carbonate and barium sulphate.

VIENNE, vē'ĕn'. An interior department of west France, forming the eastern part of the former Province of Poitou, and situated south of the Loire (Map: France, N., F 6). Area, 2711 square miles. The surface is mostly level, watered by the Vienne, a tributary of the Loire. Five-sixths of its area is cultivated, producing crops of wheat, oats, barley, potatoes, and beets. Large numbers of sheep are raised. Vineyards occupy about 72,000 acres, with an annual productive value of about $3,500,000. The chief manufactures are cutlery, paper, and alcohol. Pop., 1901, 336,343; 1911, 332,276. Capital, Poitiers.

VIENNE. The capital of an arrondissement in the Department of Isère, France, on the left bank of the Rhone, 20 miles by rail south of Lyons (Map: France, S., J 3). The Rhone, spanned here by a suspension bridge, is joined by the Gère, which flows through the town. Vienne is picturesquely situated among low hills, but poorly built and ill kept. The ancient ruins and antiquities are numerous. The Roman aqueducts, restored in 1822, supply the town with water The remarkable Corinthian temple of Augustus and Livia, rebuilt in the second century, resembles the Maison-Carrée at Nîmes. It is 88 feet long and adorned with columns. The town has also some immense arches, now thought to belong to a Roman edifice. The Plan d'Aiguille, a pyramidal structure resting on arches, was formerly pointed out as Pilate's tomb, but is now recognized as a probable goal of an ancient circus. The Gothic cathedral of St. Maurice (twelfth to sixteenth century), with its two towers, façade, and balustrade, produces an attractive effect. The ruins of the Château de la Bâtie are picturesque. There are a library and a museum (rich in Roman remains), a Musée Lapidaire, and a handsome modern Hôtel de Ville. The value of the annual production of textiles is about $4,000,000. Gloves, cutlery, glass, paper, woolen caps, bricks, and leather are

manufactured and there are foundries and brass works The trade by rail and river is important, especially in wine, and there are iron and silver mines near. Pop., 1901, 24,619; 1911, 25,711.

Vienne, the capital of the Allobroges, became a Roman colony in 47 B C., and was the earliest centre of Christianity in Gaul It was the capital of the first and second Burgundian kingdoms. In 1349, when the rest of Dauphiné passed to France the city was left under the rule of its archbishops who did not cede their rights to France till 1449. The ecumenical council which abolished the order of the Knights Templars was held here in 1311–12.

VIENNE, HAUTE-. A department of France. See HAUTE-VIENNE.

VIEQUES, vyā'kās, ISLA DE, or CRAB ISLAND. A small island belonging to Porto Rico, geographically one of the Virgin Islands. It lies 7 miles from the east extremity of Porto Rico, and is 19 miles long, with a breadth of three miles (Map: Porto Rico, G 5). The surface is low, but hilly. On the south coast there are several spacious and landlocked harbors accessible for large ships. The soil is fertile, and sugar is cultivated, while many cattle are also raised. With the neighboring island of Culebra, Vieques forms a district of the Department of Humacao, and has a population of about 6800.

VIERECK, fēr'ĕk, GEORGE SYLVESTER (1884–) A German-American editor and poet, born in Munich, Germany. He went to America in 1895, graduated from the College of the City of New York in 1906, and then became editor of *The International* (magazine), and associate editor of *Current Opinion.* After the outbreak of the European War in 1914 he assumed the editorship of the *Fatherland,* a paper devoted to pro-German propaganda in the United States. Viereck lectured at the University of Berlin on American poetry in 1911. His publications include: *A Game at Love, and Other Plays* (1906); *America—A Litany of Nations* (1906); *Nineveh, and Other Poems* (1907; Ger. ed., 1906); *The House of the Vampire* (1907; Ger. ed., 1909), which was dramatized and produced as *The Vampire* in 1909; *Confessions of a Barbarian* (1910; Ger. ed., 1911); *The Candle and the Flame* (1912).

VIERGE, vyâr'hā, DANIEL (1851–1904). A Spanish illustrator. He was born in Madrid, the son of Urrabieta Ortiz, a well-known draftsman, but adopted his mother's name. He studied under his father, and at the Madrid Academy under Madrazo and others. In 1867 he went to Paris, where he first made a name by his drawings of events of the Commune. He worked principally for the *Monde Illustrée* and *La Vie Moderne,* supplying both these and other journals with a great number of sketches. He also illustrated works of Victor Hugo, Zola, Poe, Michelet's *Histoire de France,* and Quevedo's *Pablo de Segovia* (1882). The two latter are masterpieces of illustration and remarkable, as all his work is, for the drawing of scenery and architecture. His last and perhaps most noteworthy achievement is the 260 illustrations for *Don Quixote,* published in London in 1907. After his right side became completely paralyzed, when he was 30 years old, he learned to draw equally well with his left hand. The art of illustration owes much to Vierge, his influence being particularly strong on American draftsmen. He worked chiefly in pen and ink, of which he may be said to have made a new art, but he also essayed pastel, water color, and etching. Consult the monograph by Marthold (Paris, 1905).

VIERORDT, fēr'ôrt, KARL VON (1818–84). A German physiologist, born at Lahr (Baden). He studied at Heidelberg, Gottingen, Berlin, and Vienna (M D, 1841), and after holding several less important posts in the University of Tubingen became, in 1855, professor of physiology Through his *Lehre vom Arterienpuls* (1855) he became the founder of sphygmography (see SPHYGMOGRAPH). Among his works is also *Grundriss der Physiologie* (1860; 5th ed., 1877)

VIERSEN, fēr'zen. A town in the Rhine Province, Prussia, 18 miles west of Dusseldorf (Map: Prussia, B 3). It has a mediæval, late Gothic church and a charming park. Viersen manufactures silks, umbrella covers, cottons, damask, linens, ribbons, and plush on a large scale, and has machine works and tanneries. Pop., 1900, 24,797; 1910, 30,172.

VIERZON-VILLE, vyĕr'zôN'-vēl. A town of the Department of Cher, France, 20 miles by rail northwest of Bourges, on the Cher and the Canal du Berry (Map: France, N., H 5). The manufacture of porcelain and the furnaces and steel refineries are of importance. Pop., 1901, 11,796; 1911, 11,856.

VIETA, vē-ā'tà. See VIÈTE, FRANÇOIS.

VIÈTE, vē'ât' (Latin form, VIETA), FRANÇOIS (1540–1603). A French mathematician, born in Fontenay-le-Comte He was educated for the law, and practiced this profession until the opening of his political career. In 1580 he was appointed as maître des requêtes under the Parliament at Paris Viète was attached to the court of Henry IV during the war with Spain, and rendered his government valuable service by deciphering the secret messages dispatched by the Spanish court to the Governor of the Netherlands Viète was the foremost French algebraist of the sixteenth century. His chief works are: *In Artem Analyticam Isagoge* (1591), to which were subsequently added the supplements *Logistice Speciosa* and *Zeticorum, Supplementum Geometriæ* (1593); *De Numerosa Potestatum* (1600). A collection of Viète's works was published by Van Schooten (Leyden, 1646).

VIEUSSENS, vyē'sän', RAYMOND (1641–1716). A French anatomist, born in Rouergue, and educated at Montpellier, where he became professor of neurology in 1671. He was well known for his anatomical studies of the brain, practical anatomy being then in its infancy, and it was stated that he had made over 500 dissections. His *Neurographia Universalis* (1685), with an account of his important researches on the anatomy of the brain and of the spinal column, won him membership in the French Academy of Sciences and in the Royal Society of London. The "valve of Vieussens" is a name still applied to the superior medullary velum, which he discovered.

VIEUXTEMPS, vyē'tän', HENRI (1820–81). A Belgian violinist and composer, born in Verviers. Before five years of age he began to study the violin under a local teacher named Lecloux. Two years later, accompanied by his master, he made a tour of the principal towns of Belgium, and in Brussels met De Bériot, who gave him instruction for several months. In 1833 he made a tour of Germany, and in Vienna became a pupil of Simon Sechter, the court organist. Later he was received with great enthusiasm at Moscow

and St. Petersburg Other successful tours followed, notably those of America (1844–45, 1856, and 1870). In 1846 he was appointed solo violinist to the Emperor of Russia, and in 1871 was made first professor of the violin, in the place of De Bériot, at the Brussels Conservatory In 1873, after he sustained a stroke of paralysis, he devoted himself to composition entirely. He died in Algeria. Vieuxtemps ranks with the greatest violin virtuosi of the world. As a composer for the violin he holds a high place His compositions include six violin concertos. solos, duets, études, variations, fantaisies, transcriptions, and caprices. Consult Th. Radoux, *Henri Vieuxtemps, sa vie et ses œuvres* (Paris, 1891).

VIGAN, vē'gan. The capital of the Province of Ilocos Sur, in Luzon, Philippine Islands, 210 miles northwest of Manila, near the right bank of the Abra River and not far from the coast (Map: Philippine Islands, C 2). It has a number of fine public buildings. The surrounding country produces rice, indigo, cotton, sugar cane, and live stock. In the town there are fisheries, brick and tile kilns, and yards for the construction of small coasting vessels. There is an extensive traffic up the Abra River The town, formerly called Villa Fernadina, has been the seat of the bishopric of Nueva Segovia since 1755, and has a fine cathedral. It has a monument erected to the memory of Juan de Salcedo, the conqueror of the province. Pop, 1903, 14,945.

VIGÉE-LEBRUN. vē'zhā'-le-brŭn', Marie Anne Louise Elisabeth (1755–1842). A French portrait painter She was born in Paris, and received her first instruction from her father. She was more influenced by Greuze, however, and at an early age had established herself as a portrait painter of note In 1775 she was elected member of the Academy of St. Luke, at Rome. In 1776 she contracted an unfortunate marriage with the painter and art critic Jean B. P. Lebrun, a spendthrift and a man much older than herself. In 1783 she was elected to the Académie des Beaux-Arts. She became a great favorite of society, and was appointed painter in ordinary to Marie Antoinette, of whom she painted about 30 portraits. At the time of the Revolution (1789) she fled to Italy, where she remained three years, then visited Vienna, Prague, Dresden, and St. Petersburg She was everywhere received with high honor, admitted to membership in the principal academies, and abundantly employed. In 1802–05 she lived in England. Later she visited Holland, Belgium, and Switzerland, making her home alternately in Paris and Louveciennes. She died in Paris, at the age of 87.

Madame Lebrun's figures are well posed, and although the composition is sometimes conventional her presentation is always charming. Her technique is careful in finish, her drawing good, and the color pleasing. Among the best of her portraits are two of the artist and her daughter (Louvre); self-portraits in the Uffizi, Florence, the National Academy, London, and St. Luke's Academy, Rome; Jean Paesiello; the painter Hubert Robert, Joseph Vernet (Louvre); Madame Molé-Raymond; Lord Byron; Marie Antoinette and her three children (Versailles Museum); Marquise de Laborde, Morgan collection, Metropolitan Museum, New York. Consult Madame Lebrun's *Souvenirs de ma vie* (Paris, 1869; Eng. trans., New York, 1903); J. J. Foster, in *French Art from Watteau to Prud'hon* (London, 1906); the biography by Pierre de Nolhac (Paris, 1908), W. H. Helm, *Vigée Lebrun* (Boston, 1915).

VIGER, vē'zhā', Denis Benjamin (1774–1861). A Canadian statesman He was born and educated in Montreal, and for some years practiced law in that city. In 1808 he was elected a member of the Lower Canada (Quebec) Legislative Assembly Viger became a leader of the French Canadians in the province, and twice (1828, 1831) went as a delegate to London to state their views and grievances to the British government. During the rebellion of 1837 he was arrested for sedition, but was shortly afterward set free. After the union of Upper and Lower Canada in 1841 he sat in the Canada Legislative Assembly. In the earlier part of his career he sympathized with the cause of popular rights, but in 1843 he supported Sir Charles (afterward Baron) Metcalfe (q.v.), a reactionary Governor of Canada, and became premier of an administration opposed to responsible government. In 1846 he resigned, and in 1848 was appointed a member of the Legislative Council. Consult J. C. Dent, *The Last Forty Years* (Toronto, 1881).

VIGFÚSSON, vig'fus-son, Gudbrandur (1827–89). An Icelandic philologist and author. He was born at Litli Galtardalur, Iceland, studied at the University of Copenhagen, and in 1864 was called to England to complete and publish the Icelandic-English dictionary, left unfinished by Richard Cleasby at his death This was published in 1869–74, and is Vigfússon's most important work in English. It is still the only dictionary of its kind which approximates completeness. Its etymologies, however, are fantastic and untrustworthy Vigfússon became in 1884 professor of the Old Norse-Icelandic language and literature at Oxford. He was a skilled reader of the saga manuscripts Among his principal works, in addition to his *Dictionary*, are *Um Tímatal í Islendinga Sogum* (1855); *Icelandic Sagas* (2 vols., 1887); and, in cooperation with F. York Powell, an edition of the *Sturlunga Saga* with *Prolegomena* (2 vols., 1878); *An Icelandic Reader* (1879), *Corpus Poeticum Boreale* (2 vols., 1883); and *Origines Islandicæ* (2 vols., 1905). He likewise published editions of the *Biskupa Sogur* (1856–62); *Bárdar Saga Snæfellsás* (1860); *Viglundar Saga; Fornsögur* (1860); *Eyrbyggja Saga* (1864); and the *Flateyjarbók* (3 vols., 1860–68), with C. R. Unger.

VIGIER, Countess. See Cruvelli, Sophie.

VIGIL (OF. *vigile*, Fr *vigile*, from Lat. *vigilia*, watch, from *vigere*, to be lively). In the early church, the watch kept in a church or cemetery on the night before a feast, the time being occupied in prayer. In the eleventh and twelfth centuries the vigil took the form of a preparatory time of devotion which went before the more solemn festivals of the church year, and especially Christmas, Easter, Pentecost, and the principal martyrs' days. The observance of vigils is still retained in the Roman Catholic church, by the use of a special office and in the case of some great festivals by a strict fast. In the *English Book of Common Prayer* the vigils or evens of the chief festivals are retained in the calendar as days of fasting, but they have no special observance appointed for them.

VIGILANCE COMMITTEE. In the United States an unauthorized organization of citizens for the purpose of administering summary justice in the absence of a regular judiciary or when

the courts are prevented from exercising their accustomed functions. In times of civil strife or other public emergency, vigilance committees are frequently formed for the purpose of ascertaining the loyalty of suspected persons and for enforcing against disloyal ones the punishment fixed by public opinion. Thus, during and immediately preceding the American Revolution, vigilance committees were formed in many communities to enforce the nonimportation agreements and to ferret out Tories. These bodies were not very different from the Colonial Committees of Safety and of Correspondence, except that their methods were less open and they were usually self-constituted. In the Southern States prior to the Civil War vigilance committees were sometimes formed to enforce the will of the community against abolitionists or other persons suspected of disloyalty to the South, or to prevent the circulation of abolition literature. During the disorder and confusion of the Reconstruction period similar committees were often formed to warn Carpetbaggers, Scalawags, and obnoxious negro politicians. (See KU-KLUX KLAN.) The most notable instance of the employment of the vigilance committee as a governmental improvisation occurred in California during the years 1848 and 1849. Thousands of adventurous characters had immigrated to this region on account of the discovery of gold, and, as no legal government had yet been organized, the law-abiding citizens supplied the deficiency by the organization of vigilance committees, which undertook the task of administering justice and punishing criminals.

VIGILANTIUS, vĭj'ĭ-lăn'shĭ-ŭs. A Gallic writer and presbyter of the last years of the fourth century. Born in Calgurris (modern Cazères), in western Gaul, he became an inn keeper, but about 395 he made the acquaintance of Sulpicius Severus, who recommended him to Paulinus of Nola. After Vigilantius's ordination, probably in 395, he went to visit St. Jerome in Bethlehem, but immediately quarreled with him, attacking his personal beliefs and especially his study of Origen, and in turn being sharply assailed by Jerome's *Contra Vigilantium*, a pamphlet from which we gather that the Gallic presbyter, who probably returned to Gaul or to a charge in Barcelona, objected to the worship of relics, to invocation of saints, to celibacy of the clergy, and to monasticism. He resembled Jovinian (q.v.), but was little of a theologian and showed a lack of any grasp of fundamental principles. Consult Lindner, *De Jovniano et Vigilantio* (Leipzig, 1840), and Gilly, *Vigilantius and his Times* (London, 1844).

VIGILIUS, POPE c.537–555. He was a Roman by birth, of an old senatorial family. He appears first as a deacon in 531 and represented the papacy at Constantinople during the pontificate of Silverius, to procure whose imprisonment and exile he was sent to Rome by Theodora, wife of the Emperor Justinian. Vigilius was elected to succeed him by the Roman clergy under the orders of Belisarius, but was not acknowledged as lawful Pope until after the death of Silverius. In 545 he was summoned by Justinian to Constantinople, that he might there condemn the Three Chapters. (See CHAPTERS, THE THREE.) At first, considering the document orthodox, he refused to condemn it; but subsequently, under pressure, yielded to the Emperor's wishes, and then was allowed to return to Rome. On the way, however, he fell ill and died at Syracuse. Consult Savio, *Il papa Vigilio* (Rome, 1904).

VIGNALI, vē-nyä'lē, JACOPO (1592–1664). An Italian painter, born at Prato. He was a pupil of Matteo Roselli in Florence and belonged to the Florentine Mannerists. A large number of his works, both oil and fresco, survive, principally in Florentine churches. Vignali appears to greatest advantage in the frescoes of the Capella Buonarotti, Florence.

VIGNAUD, vē'nyō' (JEAN) HENRY (1830–1923). An American diplomat and writer, born of Creole stock in New Orleans. He was early a teacher, journalist, and Confederate captain in the Civil War, and in 1863 became connected with the Confederate agency in Paris. He was translator to the Alabama Claims Commission, which met at Geneva in 1872, and was Second Secretary (1875–82) and First Secretary (1882–1909) of the American Legation (later Embassy) at Paris. His publications include: *Toscanelli and Columbus* (1902; Fr ed., 1901); *Letters to Sir Clements R. Markham and C. Raymond Beazley* (1903); *La maison d'Albe et les archives Colombiennes* (1904); *Etudes critiques sur la vie de Colomb* (1905); *Histoire critique de la grande entreprise de Christophe Colomb* (2 vols., 1911); *Henry Harrisse: étude biographique et morale, avec la bibliographie de ses écrits* (1912).

VIGNOLA, vē'nyō-lä, GIACOMO BAROZZIO DA (1507–73). An Italian architect, born at Vignola, near Modena. He studied painting at Bologna and architecture at Rome, and was charged by Primaticcio with some commissions for Francis I which led to a visit to France. He returned to Bologna, and was chosen as the architect of the Portico dei Banchi, several palaces, and public buildings. In 1550 he was made papal architect by Pope Julius III, and the latter part of his life was spent in Rome, where he designed the casino of the villa of Papa Giulio and the church of the Jesuits (il Gesù, 1558–68). His masterpiece is probably the famous Caprarola palace and villa near Viterbo. He became the architect of St. Peter's after the death of Michelangelo, and designed the two lateral cupolas. He was the author of *Regole delle cinque ordini d'architettura* (Rome, 1563) and *Le due regole della prospettiva prattica* (ib., 1583). The treatise on the orders has been translated into nearly all modern languages and is still considered a classical standard. Like other works of the same class and time, it was based on Vitruvius (q.v.), and represented not, as is so often assumed, an arbitrary cast-iron rule of proportions for the five orders, but the author's ideal form for each of them—an ideal which Vignola himself never followed textually. (See ORDERS OF ARCHITECTURE.) This ideal system he based upon the module (q.v.) or half diameter of the shaft as the unit of proportion.

VIGNOLES, vē-nyōl', CHARLES BLACKER (1793–1875). A British engineer, born at Woodbrook County, Wexford, Ireland. He served under Wellington in the Peninsula and retired from the army in 1833. The Vignoles or flat-based rail was introduced by him into Europe from the United States. He built the Dublin and Kingstown (1832–34), the Sheffield and Manchester (1835–40), and the London, Chatham, and Dover (1855–64) railways, and carried out important works in Russia, including the great suspension bridge across the Dnieper at Kiev. He was professor in University College,

London (1841–43), and published *Observations on the Floridas* (1823, with valuable map)

VIGNY, vē'nyē', ALFRED, COUNT DE (1799–1863). A French poet and novelist, born at Loches, Indre-et-Loire. He was educated in Paris and served in the army 12 years. His *Poèmes* (1822) and *Poèmes antiques et modernes* (1824–26) contained grandiose poetic evocations of the Middle Ages and were among the first attempts (*Le cor* and *Moise*) to treat philosophic subjects in epic form. The epic *Eloa* (1824) served Lamartine as a model for his *Chute d'un ange* and marks the influence of Hugo, whom it influenced in turn, as *Le cor*, inspired by the bloodless Spanish campaign of 1823, did Musset's *Contes d'Espagne et d'Italie* In 1826 Vigny published a long historic novel, *Cinq-Mars*. Though a falsification of history, the novel attained immediate and great success; it has the merit of having been first in a field where Hugo and Dumas were to gather brighter laurels. In 1832 Vigny applied his unique historic method in *Stello* to André Chénier and Gilbert and to the English poet Chatterton. *Servitude et grandeur militaires* (1835), three military stories, contains his best work in fiction. Meanwhile he had borne his part in the romantic rejuvenation of the drama by translating Shakespeare's *Othello* (1829), and writing an insignificant comedy, *Quitte pour la peur*, an historic drama, *La maréchale d'Ancre* (1830), and *Chatterton* (1835), his strongest drama, in spite of its pessimistic gloom. But Vigny saw the limitations of romanticism in drama and never pursued his success. Indeed, he published no more, though the posthumously gathered *Destinées* (1864) and the *Journal d'un poète* (1867) show him at the height of his lyric power.

Vigny's *Works* were collected in 1863–66, in 1868–70, and in 1883–85. There are *Lives* by A. France (Paris, 1868), Paléologue (1891), and Lauvrière (1909). Consult· Montégut, *Nos morts contemporains*, vol. i (Paris, 1882); Caro. *Poètes et romanciers* (ib., 1888); Emile Faguet, *Dix-neuvième siècle* (ib., 1890), Sainte-Beuve, *Portraits littéraires*, vol. iii (ib., 1893); E. Lauvrière, *Alfred de Vigny* (ib., 1910); L. Séché, *La vie littéraire politique et religeuse; la vie amoureuse d'Alfred de Vigny* (ib., 1913).

VIGO, vē'gō. A town of the Province of Pontevedra, Spain, 72 miles north of Oporto, on Vigo Bay (Map: Spain, A 1). It has a good harbor and has had a comparatively rapid growth. The tunny and sardine fisheries give employment to a large element of its population. There are iron foundries, machine shops, paper, flour, and saw mills, petroleum and sugar refineries, chocolate, soap, leather, and pasta factories, and cognac and alcohol distilleries. The building of small steamers and the manufacture of cordage are also important industries. The chief exports are wines, cattle, sardines, dried fish, pastas, and agricultural products. Pop., 1900, 23,144; 1910, 41,500. The town of Vigo was attacked by Drake in 1585 and 1589; by a combined Anglo-Dutch fleet in 1702; and by Lord Cobham in 1719.

VIGORITE. See EXPLOSIVES.

VIGOUROUX, vē'gōō'rōō', FULCRAN GRÉGOIRE (1837–1915). A French biblical scholar, born at Nant. He began teaching at Autun, but for many years was stationed at the Paris seminary. Vigouroux, after he was made secretary of the commission created by Pope Leo XIII in 1902 to settle moot biblical questions, lived in Rome. His works, showing great erudition combined with power of logical presentation, include: *La bible et les découvertes modernes en Palestine, Egypte et Assyrie* (1877), *Manuel biblique* (1879; 13th ed, 1913, It and Span. trans.); *Les livres saints et la critique rationaliste* (1886); *Nouveau testament et les découvertes archéologiques modernes* (1890); *La sainte bible polyglotte* (8 vols, 1900–08); *Dictionnaire de la bible* (5 vols, 1890–1912), probably his most important publication.

VIHĀRA, vē-hä'ra (Skt, recreation, walking for diversion). A designation for a pleasure garden in early India, more especially of the temple precincts and monastic grounds of the Buddhist and Jain religions. Originally the word designated the hall or halls where Buddha and the priests by whom he was accompanied used to meet. Adjoining the sanctum there is usually a narrow room, in which are images and paintings; and opposite the entrance there is another door, protected by a screen; and when this is withdrawn, a very large image of Buddha is seen with a table or altar before it, upon which flowers are placed. In front of the temple stands a sacred bo-tree, regarded as the descendant of the original bo-tree (q.v). The best examples of the old Vihara are still to be seen in Ceylon, but the finest specimens in India itself are those at Ajunta, Ellora, Salsette, and Junir. Consult Fergusson, *History of Indian and Eastern Architecture* (London, 1876; new ed., 2 vols., 1910); A Foucher, *L'Art gréco-bouddhique du Gandhâra* (2 vols., Paris, 1905–08).

VIJANAGARA, vē'jä-na-gä'rä, or **BIJAYANAGAR** (Skt., city of victory). A city of southeastern India, famous for its architectural remains It was the capital of a dynasty of Hindu rulers that formed a bulwark against Mohammedan invasion and flourished c.1336–1565. The most noted of its architectural remains is the temple built in the style of southern India (c 1529–42) and dedicated to Vitoba, a manifestation of the god Vishnu. The structure is in ruins, but its sculptures, wholly in granite, are carved with great boldness and expression. The finest architectural remains of the Vijanagara dynasty, however, are 100 miles to the south, at Tarputry, where two temples are situated. Near by are two gopuras (ornamental gateways) belonging to a deserted temple, more exquisitely carved than any others in the Dravidian style. Vijanagara is also interesting because of its importance in connection with Sanskrit literature. Here, in the fourteenth century, Sayana (q.v.), the great Vedic commentator, flourished at the court of King Bukka, whose prime minister Madhava (q.v.) was the learned scholar's brother. See INDIAN ART. Consult B. S. Row, *History of Vijayanagar* (Madras, 1906).

VIKINGS, vī'kĭngz *or* vē'kĭngz. See NORMANS.

VIKOVÁ-KUNĚTICKÁ, vē'kō-vä-kōō'nyĕ-tĕts-kä, BOŽENA (1863–). A Czech novelist and advocate of woman's rights, the first woman to be elected a deputy to the Bohemian Diet. Her first novels and short stories, chiefly published in the periodicals *Lumír*, *Svetozar*, and *Květy*, were followed by a series of novels in which the plot was subordinated to the expression of her ideas of sex equality. The best known include: *Medřická* (1895), *Revolt* (1900–

01), and *The Lord* (1906). She also wrote several dramas and, under the pseudonym "Ignota," *Má Láshko* ("My Love," 1909).

VIKRAMA, vĭk'ra-ma, or VIKRAMĀDITYA. The name of a famous king or kings of India, after whom the Vikrama, or Samvat (q.v.) era is called. This was the golden age of Sanskrit literature. Much uncertainty prevails with regard to his precise date. Tradition ascribes it to 57 B.C., but later scholarship sought to prove that the Samvat era was established by Vikrama in 544 A.D. and its commencement dated back 600 years to 57 B.C. Additional support for this was sought in the accepted date of the Hindu astronomer Varahamihira (q.v.), together with Kalidasa (q.v.), Amarasinha (q.v.), and others. But recent researches have shown that the Vikrama era was previously called the Malava era, and the coins and inscriptions of Chandragupta II, named Vikramaditya, belong to a period of about 400 A.D. The present tendency, therefore, is to date the reign of Vikrama in the beginning of the fifth instead of in the middle of the sixth century. Consult: Macdonell, *Sanskrit Literature* (London, 1913); Duff, *Chronology of Ancient India* (Westminster, 1899); Sewell and Dikshit, *The Indian Calendar* (London, 1896); and Sewell, *Indian Chronography* (ib., 1912).

VILÁGOS, vĭl'a-gŏsh. A commune of Hungary, in the County of Arad, about 16 miles northeast of the city of Arad. Pop., 1900, 6694; 1910, 6378. It is noted as the scene of the surrender of the Hungarian army under Görgey to the Russians, Aug. 13, 1849, marking the collapse of the national Hungarian movement. See AUSTRIA-HUNGARY.

VILAN, vē-län', or **BULNAN**. See BILA-AN.

VILAS, WILLIAM FREEMAN (1840–1908). An American lawyer, soldier, and political leader, born at Chelsea, Vt. In 1851 he removed with his family to Madison, Wis., and in 1858 he graduated at the State University there. He graduated at the Albany Law School in 1860 and practiced for a time, but in 1862 entered the Federal military service, in which he rose to the rank of lieutenant colonel. He served during the siege of Vicksburg, but in 1863 resigned his commission and returned to Madison. From 1868 to 1885 he was a professor in the law school of the University of Wisconsin, and became interested in politics, being a member of the Democratic National Committee (1876–86). He was a member of the Wisconsin Legislature in 1885, was permanent chairman of the National Democratic Convention in 1884, was United States Postmaster-General from 1885 to 1888, was Secretary of the Interior from January, 1888, to March, 1889, and United States Senator from 1891 to 1897. When W. J. Bryan was nominated for the presidency, on a free-silver platform, by the Democratic party in 1896, Vilas was one of those who helped to organize the National (gold) Democrats.

VILAYET, vē'lä-yĕt' (Ar. *vilāyat*, province, government, from *valiya*, to rule, govern), or EYLAYET. The largest and most important of the administrative divisions of the Turkish Empire. Each vilayet is administered by a pasha, who is governor, and the general name for whom is *vali*, or viceroy. He is assisted by a provincial council. The vilayets are subdivided into *livas* or *sanjaks*.

VILJOEN, vĭl'yōōn, BEN (JAMIN) J (OHANNIS) (1868–1917). A South African soldier, of French Huguenot descent. As a general of the Transvaal he fought at Elandslaage, took part in the operations against Ladysmith, and was taken prisoner and sent to St. Helena. He served as a member for the Witwatersland Gold Fields in the Second Volksraad of the South African Republic. Viljoen was author of *Under the Vierleur* (1904), *My Reminiscences of the Anglo-Boer War* (1905); *An Exiled General* (1906).

VILKITSKY, vĕl-kĭts'kĭ, BORIS ANDREEVITCH (c.1870–). A Russian naval officer and Arctic explorer. Occasionally he has been confounded with his father, Maj. Gen. A. I. Vilkitsky (died 1913), himself a distinguished explorer who served as the chief hydrographer of the Imperial Russian navy. The son was unusually successful, while commanding a squadron of ice breakers, in surveys of the ice-clad waters of the Siberian ocean. (See POLAR RESEARCH.) His original discoveries not only added two islands to the New Siberian Archipelago (see NEW SIBERIA ISLANDS), but also Nicholas II Land, an arctic archipelago which extends from 30 miles north of Cape Chelyuskin to 81° N. lat., 96° E. long. Between July, 1914, and September, 1915, he made the Northeast Passage from Bering Strait to the White Sea, wintering en route in Taimyr Bay. It is the first such voyage in history made from east to west. Vilkitsky became a captain in the Imperial Russian navy, and an aid-de-camp to the Czar.

VILKOMIR, vĕl-y'-kō-mĕr' (Polish *Wilkomierz*). A district town in the Government of Kovno, west Russia, 43 miles northeast of Kovno (Map: Russia, B 3). Its fourteenth-century church is one of the first Roman Catholic churches founded in Lithuania. Its chief manufactures are leather, brick, and pottery. Pop., 1911, 14,780, of whom the Jews constitute over one-half. The town was founded in the tenth century.

VILLA (Lat., country house, farm). A somewhat extensive country estate, occupied for rest and pleasure for a part of the year; the house and grounds together are generally indicated. It is not used of farms, nor of rural or suburban estates occupied the whole year. The villa originated with the ancient Romans, and received its highest development in Italy in the sixteenth and seventeenth centuries. The villas of the Romans were extensive estates; residence buildings covered a large area and provided apartments for eating, sleeping, recreation, study, exercise, and bathing, set in and combined with grounds laid out with the highest art. Pliny had five villas; Cicero at least as many; and that of Hadrian at Tivoli covered nearly a square mile of territory. The Italian villas of the Renaissance were due in large measure to the splendor of the papal court. They were intended as places for brief sojourn and recreation. They are generally smaller, and the buildings less important than dwellings of the ancients. The grounds reproduce in little, and with consummate skill, characteristic features of the antique gardens. Some, like that at Castel Gandolfo, are built on the ruins of ancient villa terraces. The villas Pamfili, Borghese, Albani, Medici, Madama, and Papa Giulio, at Rome, those at Frascati, the Villa d'Este at Tivoli, the Palmieri and Castello at Florence, the Imperiale (Rovere) at Pesaro, and the Villa Lante at Bagnaia, near Viterbo, are among the best known. They represent a type of formal landscape gardening and architecture seen in the same per-

fection nowhere else. Villas of more modern date in Europe and America borrow from the Italian many suggestions as to landscape architecture and detail, but, being intended for a season's residence, the dwelling presents a more permanent character than the casino of the Italian villas, and is accompanied by dependencies, as stables, lodges, tennis courts, and kitchen gardens, which are foreign to the purposes of the Italian villa See CASINO. Consult Percier and Fontaine, *Maisons de plaisance de Rome* (Paris, 1824); Letarouilly, *Edifices de Rome moderne* (Paris, 1860); Reynolds, "Italian Villas," in *Architectural Record*, vol vi (New York, 1906–07); Pliny, *Letters*, Patzak, *Die Renaissance und Barockvilla in Italien* (3 vols., Leipzig, 1908–13).

VILLA, vēl'yä, FRANCISCO (PANCHO) (1877–1923) A Mexican revolutionary general, born at Las Nieves His name was Doroteo Arango and he took the name of Villa after joining the Madero revolt. He received no education and at an early age became an outlaw and bandit, after killing an official who had outraged his sister. Many deeds of cruelty and daring were ascribed to him and a price was put on his head by the Díaz administration. Upon the outbreak of the revolution in 1910 Villa offered his services to Madero (q.v.) in return for pardon. During Madero's administration he served under Huerta (q.v.) against Orozco (q.v.), in 1914 joined Carranza in the revolution against Huerta, and later in the same year himself headed a revolt against Carranza. For his career from 1910 to June, 1915, see MEXICO, *History* In response to President Wilson's note of June 2, 1915, Villa agreed to treat with Carranza to settle the difficulties of the country, but the latter refused. Upon receipt of the identic note of the Pan-American states (Aug. 11) he again accepted the peace overtures; but this was of no avail, since Obregon was now gradually forcing him towards the border. In October, 1915, Villa controlled only portions of the states of Sonora, Chihuahua, and Sinaloa, and on November 2 he suffered a severe defeat at Agua Prieta. In December, representatives of Carranza and Villa met in El Paso and endeavored to arrange a surrender of the Villistas. Carranza insisted on giving no guarantees to Villa and declared him an outlaw. This resulted in the failure of the peace movement and Villa continued the struggle. He was considered responsible for the Santa Isabella massacre (January, 1916) and was reported to be hostile towards the United States. On March 9 he crossed the border and attacked the town of Columbus, New Mexico, killing a number of citizens and destroying a portion of the town. The purpose of this invasion was supposed to be to embroil the United States and Carranza The United States immediately dispatched a punitive expedition to Mexico to capture Villa and disperse his forces. Villa escaped into the mountains and the United States was soon brought into conflict with the Carranza administration. American soldiers were fired on in the town of Parral by a mob and by Carranza troops, who wished to see Villa captured by their chief and not by the Americans.

VILLA ALBANI, vēl'lä, äl-bä'nē. See ALBANI, VILLA

VILLA ALDOBRANDINI, äl'dō-brän-dē'nē. A handsome villa with extensive grounds, at Frascati, 15 miles from Rome. It was built by Giacomo della Porta for Cardinal Pietro Aldobrandini, whose uncle was Clement VIII, towards the end of the sixteenth century It contains a fine collection of the works of Cavaliere d'Arpino.

VILLA BOA DE GOYAZ. See GOYAZ.

VILLA BORGHESE, bōr-gā'zā. See BORGHESE, VILLA.

VILLACH, fil'läk A town in Carinthia, Austria, 24 miles west of Klagenfurt, situated, at an altitude of 1665 feet, on the right bank of the Drave (Map. Austria, C 3). The manufactures include colors and other chemical products, cement, wood products, and articles of lead and other metals from the mines at Bleiberg, 9 miles distant. There are a Gothic church (fifteenth century), Gymnasium, and theatre. Just to the southwest are the Villacher Alps (Dobratsch, 7110 feet). Pop, 1900, 9360; 1910, 10,265. From 1007 to 1759 Villach was under the rule of the bishops of Bamberg. It was the commercial centre of Carinthia and had especial prominence in the trade between Germany and Venice Here in 1492 the Germans under Khevenhuller defeated the Turks under Ali Pasha. In 1759 Villach went by purchase to Austria. A conflict took place here in 1813 between Frimont and the Viceroy of Italy.

VILLA CLARA. See SANTA CLARA.

VILLA CONCEPCIÓN. See CONCEPCIÓN (Paraguay).

VILLA D'ESTE, vēl'lä dēs'tä. One of the most important of Italian villas, situated on a steep slope at the edge of the town of Tivoli, 18 miles from Rome. It was laid out in 1549 by Pirro Ligorio for the Cardinal Ippolito d'Este, and is remarkable for the skill with which the steep slope and the more level lower portion were treated, and for the extent and variety of its water works, cascades, grottoes, and fountains. These were in part the work of later architects, Carlo Fontana perhaps among them. The casino, really a vast palace with paintings by Zuccheri, was never completed externally. It became the property of the Austrian Crown Prince,. but was requisitioned (1915) by the Italian government for use as a barracks. Consult Patzak, "Die Villa d'Este in Tivoli," in *Zeitschrift für bildende Kunst;* new series, vol. xvii (Leipzig, 1905–06).

VILLAFRANCA DI VERONA, vēl'lä-fraŋ'ka dē vā-rō'nä. A town in the Province of Verona, Italy, on the Tione, 14 miles by rail north of Mantua (Map: Italy, C 2). The preliminary treaty of peace between France and Austria, which ended the War of 1859, was signed here July 11, 1859. Pop. (commune), 1901, 9461; 1911, 11,756.

VILLAGE COMMUNITY (OF., Fr. *village*, from Lat. *villaticus*, relating to a country house or farm, from *villa*, country house). The name given to the organized agricultural community of primitive times. About the middle of the nineteenth century historians held that the political unit among the early Germans, if we except the family, was a form of village community known as the mark (q.v.). It was also believed that the organization of early Anglo-Saxon society was similar to that existing in Germany. These views were promulgated by men like Waitz, Von Maurer, Nasse, and Kemble; and Maine sought analogies in the village communities of modern India to support this theory. All these views were attacked by Fustel de Coulanges and Seebohm, who held that the

village communities of Germany and England were not free communistic organizations, as the mark theory would have them, but that the villages were inhabited by serfs In recent years many writers, especially Maitland and Vinogradov, have put forth a modified form of the old view. A primitive form of village community, which is known as the mir (q.v.), still exists in Russia. For a complete bibliography, see SERF

VILLAGE INDIANS. See PUEBLO

VILLA GIULIA, jōō'lī-a. A palace near Rome, built by Pope Julius III (1550–55). It forms part of a complex of buildings, the *Vigna di Papa Giulio,* just to the north of Rome, near the Via Flaminia, and is one of the best examples of the High Renaissance at Rome. The villa is probably due in the main to Vignola, who may have worked out ideas suggested by Michelangelo and Vasari, so that Vasari's claim to its authorship is probably not warranted. The gardens have long ago disappeared The building comprises a main court surrounded by a semicircular Ionic colonnade, and a lower court built about a fountain. The façade, showing Vignola's characteristic details, is an excellent example of the restrained simplicity of the Roman High Renaissance. In the interior are fine frescoes by the brothers Zuccheri. After the death of Julius III the building sank into decay, but it has been restored, and is now a museum of Etruscan antiquities found outside of Rome, chiefly at Falerii.

VILLAGRAN, vēl'yä-grän' (or VILLAGRA), FRANCISCO DE (?1507–63). A Spanish colonial administrator, born at Astorga, León. He served conspicuously with Valdivia in Peru during the conquest of Chile (1540–45), and succeeded him as Governor when Valdivia was killed in the Araucanian revolt (1553–54). In 1557 he was superseded by the new Governor, Mendoza, but replaced him in turn in 1561. Although a second Araucanian uprising took place before Villagran's death in 1563, he succeeded in carrying the Spanish flag beyond the Andes.

VILLA LANTE. See LANTE, VILLA.

VILLALOBOS, vēl'yä-lō'bŏs, FRANCISCO LÓPEZ DE (c.1473–c.1549). A Spanish physician and author, born in Toledo, of a Jewish family. He studied medicine, became a convert to Christianity, and became physician to Ferdinand the Catholic and to Charles V. His works include a translation of Plautus's *Amphitruo;* the volume (1543) containing the didactic works *Problemas* and *Tratado de los tres grandes vicios;* and the poem *El sumario de medicina* (1538).

VILLA MEDICI, mā'dē-chē. A villa near the southern gate of the Pincio, Rome. It was built in 1540 by Annibale Lippi, and Cardinal Alessandro de' Medici became its owner about 1600; it then came into possession of the grand dukes of Tuscany, and in 1801 was the headquarters of the French Academy of Art. The walls of the garden façade are adorned with antique reliefs. Galileo was imprisoned here between 1630 and 1633 by the Inquisition.

VILLA NAZIONALE, nä'tsē-ō-nä'lā (It., national villa). An extensive park, formerly the Villa Reale, bordering the Chiaja in Naples and forming a fashionable promenade. It was laid out in 1780 and has since been considerably enlarged. It contains the Naples Aquarium and Marine Biological Station.

VIL'LANEL'LA (It., rustic). A rustic Italian part song without accompaniment. It was originally a country dance accompanied by singing, but the singing gradually displaced the dance and became a separate art form. As a part song, the villanella was like the canzonetta and the ballata. It was of loose construction, although the villanelle of the Neapolitan school of the seventeenth century are charming compositions. Kapsperger, Nenna, and Stefano Felis wrote admirable villanelle. The villanella and the villotte, a rustic composition in counterpoint, were the precursors of the madrigal (q.v.).

VILLANI, vēl-lä'nē, GIOVANNI (c.1275–1348). An Italian historian, born in Florence. He held many offices in Florence and wrote a history of that city, in the vernacular, consisting of 12 books, extending to 1348. His work included the history of other countries, and is sometimes called *Chronicon Universale.* For the history of Villani's own time in Italy it is of great value. A continuation to 1363 in 11 books was written by his brother, Matteo. The eleventh book was continued by Matteo's son, Filippo, to 1364. Giovanni's work is noteworthy for its excellent style Parts of it have been translated into English by R E. Selfe (2d ed., London, 1896). Consult Ugo Balzani, *Early Chronicles of Europe: Italy* (London, 1883); August Potthast, *Bibliotheca Historica Medii Ævi,* vol. ii (Berlin, 1896), which gives a list of editions and a bibliography.

VILLA-NOVA, or **VILLANOVA,** vēl'lä-nō'vä. The name given by archæologists to a cemetery discovered near Bologna (q.v.), in which were found, in great quantity, important remains of the earliest Iron age of Italy. These remains, and similar relics discovered widely elsewhere over northern Italy in cemeteries at Este, Golasecca, Rivoli, Trezzo, and Oppiano, show a marked advance, in the power to work metals, over the civilization represented by the Terramare (q.v.). In one view, the Terramare civilization was Ligurian (see LIGURIA; LIGURIAN), the Villa-nova, Umbrian. The Villa-nova remains include cist graves, whose four sides are often of flat, unhewn stones; in each grave was an urn, containing the ashes of the dead. The urns show incised linear ornament. Articles of many kinds, in bronze and iron, especially many varieties of brooches, appear. So do figures of animals, which may have been votive offerings; these bear repoussé work in geometric designs. Consult T. E. Peet, *Stone and Bronze Ages in Italy and Sicily* (Oxford, 1909); A. Grenier, *Bologne villanovienne et étrusque viii–iv siècle avant notre ère* (Rome, 1913).

VIL'LANOVA'NUS, ARNOLDUS (1235–1313). A Spanish-Italian alchemist, whose real name was Arnoldo Bachuone. He was born at Villanova, Aragon, and was educated at Barcelona. Afterward he lived successively in Spain, France, and Italy, and was subjected to ceaseless persecution by the clergy because of his astrological pretensions. In his numerous writings, as the *Tractatus Chemicus,* for example, he calls attention for the first time to the potency of the philosopher's stone and the potion known as *Aurum Potabile.* His chief work is the *Rosarius Philosophorum.*

VILLANUEVA, vēl'yä-nwā'vä, JOAQUÍN LORENZO (1757–1837). A Spanish author and patriot, born at Játiva, near Valencia. He went into the Church and rose to be court preacher and royal confessor. He was elected to the Cortes in 1813, and was imprisoned for six years

after the restoration of 1814. In 1820 he re-entered the Cortes, was sent in 1822 by the Constitutional Party on a mission to the Pope, and upon the second return of Ferdinand VII in 1823 fled to Ireland, where he died His works include: *El año cristiano de España* (19 vols, 1791–1803); *Las angélicas fuentes, ó el tomista en las Cortes* (1811–13), *Viaje literario á las iglesias de España* (22 vols., 1803–52, vols. i–iii reprinted 1902), with his brother Jaime, his autobiography *Vida literaria* (London, 1825); *Ibernia Phœnicæ, seu Phœnicum in Ibernia Incolatus* (1831, Eng trans., *Phœnician Ireland*, 1832).

VILLA NUEVA DE LA SERENA, dā là sā-rā'nā A town of the Province of Badajoz, Spain, 150 miles southwest of Madrid, near the southern bank of the Guadiana River (Map: Spain, C 3). The town is clean and well built, with well-paved streets The surrounding country is a fertile plain with extensive productions of cereals, fruit, wine, hemp, and live stock. The town is noted as the birthplace of De Soto the explorer. Pop, 1900, 13,500, 1910, 14,573

VILLARD', Henry (1835–1900). An American journalist and financier, born in Speyer, Rhenish Bavaria, and educated at the universities of Munich and Wurzburg. His father was judge of the district court of Munich. Henry Villard's name was originally Hilgard (for his cousin, see Hilgard, Eugene W.), but he changed it to Villard upon coming to the United States in 1853. During the Civil War he won distinction as a war correspondent with the Federal armies, and during the brief Austro-Prussian War of 1866 was correspondent for the New York *Tribune*. After the financial panic of 1873 he was made the representative of several committees of German bondholders in connection with the Pacific Coast railroads He at once went to the Pacific Northwest, where he eventually bought the interests of various European investors and organized the Oregon Railway and Navigation Company. He formed a syndicate which obtained control of the Northern Pacific Railroad, of which he became president in 1881. Under his direction the main line to the Pacific was completed, but at such an expense that the company became embarrassed, and Villard sacrificed his private fortune and retired from the presidency. A few years later he again obtained control of the Northern Pacific, and from 1889 to 1893 was chairman of its board of directors. In 1881 he bought a controlling interest in the New York *Evening Post* and the *Nation*. He was also interested in promoting Thomas A. Edison's inventions, and in 1890 organized the Edison General Electric Company, of which he became president. In 1866 he married a daughter of William Lloyd Garrison. Consult *Memoirs of Henry Villard*, 1835–1900 (3 vols., Boston, 1904)

VILLARD, Oswald Garrison (1872–). An American journalist, son of Henry Villard and grandson of William Lloyd Garrison (qq.v.). He was born at Wiesbaden, Germany, and in 1893 graduated from Harvard (A.M., 1896), where he was an assistant in United States history (1894–96) After working as a reporter on the Philadelphia *Press* (1896–97), he became an editorial writer for the New York *Evening Post* and its publisher. In 1916 he was elected president of the Symphony Society of New York. He wrote *John Brown—A Biography Fifty Years After* (1910); *Germany Embattled* (1915); and monographs on the early history of Wall Street and on the German Imperial court

VILLARD DE HONNECOURT. See Wilars de Honnecourt

VILLA REALE, vēl'la ra-a'lā See Villa Nazionale

VILLARI, vēl'là-rē, Pasquale (1827–1914). An Italian scholar, born in Naples Exiled in 1848, he long resided in Florence He was elected to the Chamber in 1867, was appointed Senator in 1884, and was Minister of Education in 1891–92. Villari wrote standard biographies of Savonarola (1888) and Machiavelli (1895); *The First Two Centuries of Florentine History* (1894), and *The Barbaric Invasions in Italy* (1902), all available in English. Among numerous minor works *Lettere meridionali* (1878) is to be noted.

VILLA RICA, vē'là rē'ka. A town of Brazil, known also as Ouro Preto (q.v.).

VILLA RICA, vēl'yà rē'kà. A town of the Department of Guaira, Paraguay, 70 miles southeast of Asunción, with which it has railway connection (Map Argentina) It has a thriving tobacco trade, and is the centre for the collection of maté. Pop. (est.), 8000.

VILLARREAL, vēl'yà-rā-āl'. A town in the Province of Castellón, Spain, 33 miles north of Valencia, near the coast, at a short distance from the mouth of the Mijares River (Map Spain, E 3). Near the town is the famous Canal de Castellón, a magnificent piece of Moorish irrigation engineering, still in good condition after seven centuries of continuous use. The town has distilleries and woolen and paper manufactories. Its decadence dates from the expulsion of the Moriscoes (1609) Pop., 1900, 16,493; 1910, 17,554.

VILLARS, vē'lär', Claude Louis Hector, Duke de (1653–1734). A French marshal. He was born in Moulins, Department of Allier, May 8, 1653; became a court page, and entered the army in Holland as a volunteer in 1672. He served in many important campaigns under Turenne, Condé, and Luxembourg, and in 1686, and again from 1698 to 1701, represented France at the court of Vienna. In 1702 he was given an independent command and sent to aid the Elector of Bavaria, who had taken up arms on the side of France. He defeated the Imperialists at Friedlingen and in the following year gained the victory of Höchstädt (Sept. 20, 1703). In 1704 he suppressed the insurrection of the Camisards (q.v.). He opposed Marlborough, and, entering Germany, outgeneraled the Imperialists under the Margrave of Baden. In 1708 with a comparatively small force he foiled the attempts of Prince Eugène to penetrate France from Italy. In 1709 he commanded in Flanders and was defeated by Marlborough and Prince Eugène at Malplaquet (q.v.). He was severely wounded at the beginning of the battle, and the reopening of his wound in the autumn of 1711 forced him again to resign the command. But in 1711 he returned to his post, defeated the English and Dutch at Denain, July 24, 1712, and gained a success over Prince Eugène near Landrecy. These victories hastened the conclusion of the Peace of Rastadt, which Villars signed as Plenipotentiary, in 1714. He then became chief adviser of the court on military and foreign affairs. In 1733 as marshal general he took command of the French forces in Italy, but later resigned. He died at Turin, June 17, 1734. Vi

lars was the last of the great military leaders of the French monarchy His *Mémoires* were edited by Vogué and published by the Société de l'Histoire de France (Paris, 1884–91). Consult Anquetil, *Vie du Maréchal de Villars* (Paris, 1784); Vogué, *Villars d'après sa correspondance* (ib, 1888).

VILLAR'SIA (Neo-Lat., named in honor of Domenique Villars, a French botanist), or FLOATING HEART. A genus of plants of the family Gentianaceæ. *Villarsia*, or *Limnanthemum, peltatum*, or *Nymphoides peltatum* as it is now called, is a native of Europe, from Denmark to the Mediterranean, and is very abundant in Holland, often covering large tracts of the canals with its beautiful yellow flowers and leaves. It abounds in the south of Siberia. It is easily cultivated. This species has become established in ponds in the District of Columbia. There are two indigenous species in the United States, *Nymphoides lacunosum* and *Nymphoides aquaticum*. The name *Villaresia congonha* is given to a plant belonging to the family Staphyleaceæ which produces a kind of maté (q.v.).

VILLASIS, vēl-yä'sēs. A town of Luzon, Philippines, in the Province of Pangasinān, situated on the right bank of the Agno River, 24 miles southeast of Lingayén. It is an important junction of highways Pop., 1903, 12,660.

VILLA-URRUTIA, vēl'yä-o͝or-ro͞o'tyä, WENCESLAO RAMÍREZ, MARQUÉS DE (1850–). A Spanish diplomat, statesman, and scholar. Born in Havana, Cuba, he studied law at the University of Madrid and entered the diplomatic service at 18. After serving as attaché and secretary of various legations and embassies, he was minister resident at Carácas and then at The Hague, and Minister Plenipotentiary at Constantinople and at Brussels. At the time of negotiating the Peace Treaty at Paris between Spain and the United States (1898) he was Spain's Plenipotentiary. He was also a delegate for Spain at The Hague Peace Conferences of 1899 and 1907. Afterward he served as Ambassador in Vienna, as Minister of Foreign Affairs, and as Ambassador in London (1906–13) and in Paris (1913–14). He received many honors, including the British G. C. V. O. His publications are concerned mostly with problems of diplomacy and international relations.

VILLAVICENCIO, PEDRO NÚÑEZ DE. See NÚÑEZ DE VILLAVICENCIO.

VILLEFRANCHE-DE-ROUERGUE, vēl'frănsh'-de-ro͞o'ârg'. The capital of an arrondissement in the Department of Aveyron, France, 27 miles west of Rodez, on the Aveyron (Map: France, S., F 4). Among its interesting features are the thirteenth-century bridge across the Aveyron, the mediæval Church of Notre Dame, and the old Carthusian convent, at present used as a hospital. The industrial establishments include foundries, oil mills, and tanneries, and a trade is carried on in flour, linen, truffles, wine, and liquors. Lead and phosphates are found in the vicinity. Pop. (commune), 1901, 9730; 1911, 8434. Villefranche was founded about the middle of the thirteenth century and soon attained considerable commercial prominence. It played an important part in the struggle between the English and French over the disposition of Aquitaine.

VILLEFRANCHE-SUR-SAÔNE, sụr sōn. The capital of an arrondissement in the Department of Rhône, France, on the left bank of the Saône, 21 miles by rail north-northwest of Lyons (Map: France, S., J 3). The Church of Notre Dame des Marais (fourteenth to sixteenth century) and the Renaissance Hôtel de Ville are worthy of notice. The value of the cotton fabric manufactures exceeds $5,000,000 annually. There is a large trade in the famous Beaujolais wine. Pop., 1901, 14,793; 1911, 16,388.

VILLEGAIGNON, vel'ga'nyôN', or **VILLEGAGNON,** NICOLAS DURAND DE (1510–71). A French naval officer, born in Provence He became a member of the Order of St. John, fought in the disastrous expedition of Charles V to Algiers in 1541, transported to Scotland the French force destined to assist the Regency, and carried Mary Stuart from Dumbarton to France. He then fought against the Turks, and was afterward vice admiral of Brittany. With the approbation of Coligny he attempted to found in South America a colony for French Protestants. In 1555 he sailed with two ships, and established a colony at Rio de Janeiro Other colonists arrived, but religious disputes broke out, and after the return of Villegaignon to France in 1559 the weakened colony was conquered by the Portuguese. For having sided with the Catholics in the disputes, Villegaignon was given the name of the "Cain of America." Among his published works are *Caroli V. Imperatoris Expedatio in Africam ad Arginam* (1542; republished in 1874) and the controversial work, *Ad Articulos Calvinianæ de Sacramento Eucharistæ Traditionis Responsiones* (1560)

VILLEGAS, vēl-yā'gäs, ESTEBÁN MANUEL DE (1589–1669). A Spanish poet, born at Matute or Nájera in the Province of Logroño, and educated at Madrid and at Salamanca. In 1617 he published his clever *Eróticas ó amatorias*. He published in 1665 an excellent translation of Boëthius' *De Consolatione Philosophiæ*. Villegas is known not only for the amazing imitations of Anacreon and Catullus contained in his early volume of poems, but also for the good prose and excellent verse of his Boethius. Consult George Ticknor, *History of Spanish Literature* (6th ed., 3 vols., Boston, 1888). His poems are accessible in Rivadeneyra's *Biblioteca de autores españoles*, vol. xlii.

VILLEGAS, José (1848–). A Spanish genre painter. He was born in Seville and studied there at the Academy, and at Madrid, and in 1869 at Rome. His paintings, which display great versatility and dexterity, include: "Columbus at La Rabida"; "Palm Sunday in Venice"; "A Spanish Christening," "Examining Arms," and "A Dream of the Arabian Nights" (all three in the Metropolitan Museum, New York); and "A Cairo Slipper Market" (1872; W. T. Walters collection, Baltimore, Md.). Villegas took the grand gold medal at the Berlin Exhibition of 1875, and in 1895 was elected to the Academy of that city. He also became a member of the Academy of St. Luke, Rome, and director of the Prado Museum, Madrid.

VILLEHARDOUIN, vēl ȧr'dwăN', GEOFFROY DE (c.1150–c.1213). A French chronicler of noble birth, born near Troyes. In 1199, while marshal at the court of Thibaut of Champagne, he enlisted in the Fourth Crusade. He was sent as leader of an embassy to Dandolo, Doge of Venice, asking for transports for the Crusaders. Upon going to Constantinople, he was sent to Emperor Alexis to aid in settling difficulties. He played a brilliant part in the conquest of Constantinople, and received from Baldwin I (q.v.) lands in Macedonia and the title of Mar-

shal of Rumania After Baldwin's defeat by the Bulgarians, he served Baldwin's brother Henry faithfully His history of the conquest of Constantinople is one of the earliest known historical works in the vernacular French It is a somewhat prejudiced account of the Fourth Crusade, and apologizes for the misdeeds of the Christian leaders The Venetian Senate began to print an edition in 1573, but the first complete edition was printed at Paris in 1585. The best modern editions are by De Wailly (Paris, 1872), which gives the original text of the thirteenth century and a translation into modern French, and by Bonchet (2 vols, Paris, 1891). For other editions of his writings and for secondary works, consult Potthast, *Bibliotheca Historica Medii Ævi*, vol. ii (Berlin, 1896), Molinier, *Les sources de l'histoire de France*, vol. iii (Paris, 1903).

VILLEIN, vĭl'ĭn (OF. *villein, vilain*, Fr. *vilain*, from ML. *villanus*, farm servant, serf). Another name for a serf (q.v.). Sometimes historians call all the peasants of the Middle Ages, whether free or unfree, villeins At times villeins means the free peasants as distinguished from the unfree.

VILLEINAGE. The status of villeins, which was between slavery and freedom. Each villein was allowed to hold and cultivate some land for himself on condition of assisting his lord—the lord of the manor—in his farming operations The villein was bound to the soil: he could not be sold, he could not be turned out so long as he discharged his obligations to his lord, and he was obliged to remain on the manor unless his lord consented to his removal His lord was bound to afford him protection to life and limb, but as there was otherwise no law of the realm governing the relations of lord and villein they varied greatly, according to the "custom of the manor," which was determined and interpreted by the manorial courts. By the middle of the fifteenth century villeins were for the most part no longer doing work on their lords' lands but were paying their rent in money, and with this change they became copyholders. (See COPYHOLD.) Consult Paul Vinogradov, *Villainage in England* (Oxford, 1892), and T. W. Page, *The End of Villainage in England* (New York, 1900).

VILLÈLE, vē'lāl', JOSEPH, COUNT DE (1773–1854). A French statesman, born at Toulouse. In 1791 he entered the navy, went to the West Indies, remained there until 1803, and accumulated a fortune. Returning to Toulouse, he lived quietly until the Restoration. In 1814 he wrote a pamphlet, *Observations sur le projet de Constitution*, in which he opposed the *Charte* issued by Louis XVIII. He became mayor of Toulouse, was elected to the Chamber of Deputies in 1815, and soon became the most influential among the leaders of the Royalist party. He entered the Richelieu ministry in 1820, and a year later became Minister of Finance. In 1822 he was given the title of Count and made President of the Council and Minister of Foreign Affairs. During his administration an expedition was sent into Spain to restore Ferdinand VII (1823) in accordance with the policy of the Holy Alliance. Villèle's extreme Royalist policy was satisfactory to Charles X, but it tended to bring on the revolution which finally overthrew the Bourbons. His reactionary measures (restrictions on the press, and partiality for the Jesuits) led to his retirement in January, 1828. Consult Neuville, *Notice historique sur M le Comte de Villèle* (Paris, 1855), and *Mémoires et correspondance du Comte de Villèle* (ib., 1888–90).

VILLEMAIN, vēl'măN', ABEL FRANÇOIS (1790–1870), born in Paris A French historian and critic He was professor of rhetoric at the Lycée Charlemagne (1810), the Ecole Normale, and the Sorbonne (1816–26) He won three academic prizes (1812–16), published a *Histoire de Cromwell* (1819), was elected to the Academy (1821), and in 1829 became a deputy. Under Louis Philippe he was made a peer (1832). From 1840 to 1844 he was Minister of Public Instruction After the revolution of 1848 he gave himself entirely to literature. His chief works, revised in later editions, are: *Discours et mélanges* (1823); *Cours de littérature française* (1828–30; 2d ed., 1864); *Etudes de littérature ancienne et étrangère* (1846); *Souvenirs contemporains de l'histoire et de la littérature* (1856); and a *Histoire de Grégoire VII*, published posthumously. Villemain, though a writer of wide culture, is often shallow, but he is always interesting and sometimes eloquent.

VILLEMAIN, SIEUR DE. See NICOT, JEAN.

VILLEMARQUÉ, THÉODORE CLAUDE HENRI HERSART, VICOMTE DE LA. See LA VILLEMARQUÉ, VICOMTE DE.

VILLEMESSANT, vēl'me-säN', JEAN HIPPOLYTE CARTIER (1812–79). A French journalist, born at Rouen. He went to Paris in 1840, and revived, in 1854, *Le Figaro* (q.v.) as a weekly, semiweekly, and, after 1866, a daily newspaper. His methods were original and successful. Consult his *Mémoires d'un journaliste* (Paris, 1867).

VILLENA, vēl-yā'nä. A town of the Province of Alicante, Spain, on the right bank of the Vinalapó, 63 miles south of Valencia (Map: Spain, E 3). The town, above which towers an imposing fortress, is irregularly built, with winding streets and buildings of mediæval Moorish architecture. East of the town is a great salt lagoon. Silks, brandies, linen, flour, and soap are the chief industrial products. Pop., 1900, 14,028; 1910, 15,692.

VILLENA, DON ENRIQUE DE (also called DON ENRIQUE DE ARAGÓN) (1384–1434). A Spanish author and scholar. He was connected by blood with the royal houses of Castile and Aragon. By Henry III of Castile he was made Grand Master of the Order of Calatrava in 1404, but the appointment was annulled by the General Session of the order 10 years afterward. Villena was an enthusiastic student of the sciences, and because of his knowledge was suspected of sorcery. Among his works were *Arte de Trovar, Tractado del arte del cortar del cuchillo* (usually called *Arte cisoria*, a treatise on carving); *Libro del aojamiento ó fascinología* (a treatise on the "evil eye"); and *Doce trabajos de Hércules* (original in Catalan). He made the first translation of Vergil's *Æneid* (finished, 1428). Consult Emilio Cotarelo y Mori, *Don Enrique de Villena* (Madrid, 1896).

VILLENEUVE, JÉRÔME PÉTION DE. See PÉTION DE VILLENEUVE, JÉRÔME

VILLENEUVE, vēl'nĕv', PIERRE CHARLES JEAN BAPTISTE SYLVESTRE DE (1763–1806). A vice admiral of France, born at Valensoles, in Provence. He entered the navy in his 15th year. He became a rear admiral (1796) and commanded the rear division at the battle of the Nile (1798). In 1804 he was made vice admiral, and in the following year received com-

mand of the Toulon squadron At the Azores he encountered a British squadron, under Sir Robert Calder, and an indecisive battle ensued (July 22, 1805). The failure of Villeneuve's movement broke up Napoleon's plan for invading England, and the Admiral, blamed unjustly and about to be superseded, sailed out and engaged Nelson in the great sea fight of Trafalgar (See TRAFALGAR; NELSON) Villeneuve's vessel, the *Bucentaure*, was dismasted; he struck his flag, was made prisoner, and conveyed to England. He returned to France in April, 1806, but, learning at Rennes of the Emperor's disfavor, he committed suicide.

VILLENEUVE-SUR-LOT, sür-lō′. The capital of an arrondissement, Department of Lot-et-Garonne, France, in a charming valley, 22 miles by rail north-northeast of Agen (Map: France, S., F 4). The river Lot is spanned by a remarkably bold thirteenth-century bridge with a single arch. There are manufactures of paper, cloth, table linen, and copper wares. Pop., 1901, 13,594; 1911, 13,181.

VILLEROI, vēl′rwä′, FRANÇOIS DE NEUFVILLE, DUKE DE (1644–1730). A French soldier. He was born at Lyons, was educated with young Louis XIV, and always had the favor of that monarch. Created a marshal in 1693, he commanded the French army in the Low Countries, where he vainly attempted to relieve Namur In the War of the Spanish Succession he was put in command of the Army of Italy in 1701, but was repulsed by Prince Eugène at Chiari, and in the following year was surprised at Cremona and was taken prisoner. In 1706 he had command of the army opposing Marlborough; but he was defeated at Ramillies.

VILLERS, vē′lâr′, CHARLES DE (1765–1815). A French soldier and author, born in Boulay (Lorraine). In 1782 he entered the army as an artillery officer, but was compelled to emigrate in 1793. After a few months in the army of Condé he lived in various cities of Germany until 1797, when he settled in Lübeck. There he took up German literature and philosophy, with which he subsequently endeavored to familiarize his countrymen, and published *La philosophie de Kant ou principes fondamentaux de la philosophie transcendentale* (1802)—the first introduction of Frenchmen to the works of the German philosopher. It was followed by *Essai sur l'esprit et l'influence de la Réformation de Luther* (1804; 5th ed., 1851; Ger. trans., 1805; abridged ed., 1836) and *Coup d'œil sur les universités de l'Allemagne protestante* (1808). His sympathy for Germany was not, however, confined to her literature. In 1806 he wrote *Lettre à Madame la comtesse Fanny de Beauharnais sur Lubeck*, in which he related the outrages committed by the French when they took that city. As a result, when the Hanseatic towns were incorporated in the French Empire, De Villers was exiled from Lübeck. He then secured a professorship at Göttingen, but was deprived of his post after the restoration of the Hanoverian dynasty by the French.

VILLETTE, vē-lĕt′. The last completed novel of Charlotte Brontë (1853).

VILLEURBANNE, vēl′ür′băn′. A French town in the Department of Rhône, 3 miles east of Lyons, on the Lyons-Saint-Genix Railway. Its manufactures include silks, hats, wax candles, chemical products, church bronzes, and liqueurs. Pop., 1901, 27,746; 1911, 32,526.

VILLI, vēl′lē, LE. An opera by Puccini (q.v.), first produced in Milan, May 31, 1884; in the United States, Dec. 17, 1908 (New York).

VILLIERS, vil′ērz, CHARLES PELHAM (1802–98). An English statesman, born in London. He graduated at St. John's College, Cambridge, in 1824, and in 1827 was called to the bar In 1834 he was returned to the House of Commons for Wolverhampton, and he continued to represent that constituency down to its division in 1885, after which he sat for South Wolverhampton Throughout his parliamentary career he was an ardent free trader. In 1838 he introduced in Parliament the first of his famous annual motions for the repeal of the Corn Laws. This was before the formation of the Anti-Corn Law Association (afterward transformed into the Anti-Corn Law League) and before either Cobden or Bright had become interested in the subject, hence to Villiers belongs the honor of being the pioneer in the movement. He continued to be one of the leaders in the agitation until the repeal was effected in 1846. With the accomplishment of that end his chief work was done. Some of his speeches, edited by a member of the Cobden Club, were published as *Free-Trade Speeches of the Right Hon. Charles Pelham Villiers, M P* (1883).

VILLIERS, FREDERIC (1852–1922). An English war artist and correspondent, born in London. He was educated at Guines, Pas-de-Calais, France, and studied in the South Kensington School of Art and at the Royal Academy. In 1876 he was war artist for the *Graphic* in Servia, and two years later was with the Russians in the war with Turkey. Subsequent assignments took him to all parts of the world, and he lectured widely. He was correspondent for the *Illustrated London News* during the Boer War (1899), and with the Japanese forces in 1905, and was present at the siege of Port Arthur. In 1912–13 he accompanied the Bulgarian army during the Balkan wars. He published: *Pictures of Many Wars* (1902); *Port Arthur* (1905); *Peaceful Personalities and Warriors Bold* (1907)—all illustrated by himself.

VILLIERS, GEORGE, first DUKE OF BUCKINGHAM (1592–1628). The favorite of James I and Charles I of England. He was born in August, 1592, and in 1614 entered the service of the court, where at first his advance was retarded by the enmity of the powerful Earl of Somerset. After Somerset's fall Villiers rapidly rose in favor. In 1616 he received the Garter, and was created Viscount Villiers and Baron Waddon. In the January following he was created Earl of Buckingham, and was sworn Privy Councilor. Thereafter he became in succession Marquis, Lord Admiral of England, Master of the King's Bench, High Steward of Westminster, and Constable of Windsor Castle. In 1620 Buckingham married Lady Katherine Manners, daughter of the Catholic Earl of Rutland. In 1623, while negotiations were in progress for a marriage of the Spanish Infanta with the Prince of Wales, later Charles I, Buckingham persuaded the latter to go to Madrid and press his suit in person. While on this mission he was created Duke of Buckingham, and on his return was nominated Lord Warden of the Cinque Ports. The negotiations proved an absolute failure, partly no doubt on account of Buckingham's arrogance, and as a result James declared war against Spain and allied himself with France. Buckingham maintained his ascendency after Charles I came to the throne, and the treaty for

e marriage of Charles with the Princess Hen-ietta of France was concluded by him, but he as never after permitted to return to Paris, consequence of his audacity in making love the French Queen, Anne of Austria. For a ort time Buckingham enjoyed a passing popu-arity, but the ill-fated expedition to Cadiz made m odious to the nation, and he was barely ved from impeachment by the King, who dis-lved Parliament The alliance with France oving unsatisfactory, Buckingham prepared to d the Huguenots In 1627, with an armament 100 sail and 7000 soldiers, Buckingham ap-eared before La Rochelle, then in possession f the Huguenots, but they refused him admis-on to the harbor His troops then made a escent on the Isle of Rhé, only to return to ngland, defeated and disgraced. Buckingham as not discouraged and soon after prepared a econd expedition to La Rochelle. He proceeded o Portsmouth for embarkation, and there was ssassinated on Aug. 23, 1628, by a discontented ubaltern named Felton. Buckingham was an greeable personality, but he lacked all the quali-ies that go to make a statesman, and he regu-ated his policy in accordance with personal ique Consult: A T. Thompson, *Life and imes of George Villiers, Duke of Buckingham* 3 vols., London, 1860); S R. Gardiner, *His-ory of England*, vols. ii–iv (London and New ork, 1889); Philip Gibbs, *The Romance of eorge Villiers* (ib., 1908).

VILLIERS, GEORGE, second DUKE OF BUCK-NGHAM (1628–87) An English politician. He as the second son of the first Duke of Buck-ngham, and, his elder brother dying while his ather was still living, he succeeded to the title n the death of his father. He was brought up vith the royal princes and educated at Trinity ollege, Cambridge. In the Civil War he served n the royal army, and as a result his immense states were confiscated. In 1650 Buckingham vas given an important command in the pro-ected invasion of Scotland, and fought with harles II at Worcester. Later, however, he ought to make his peace with the Protector by eturning secretly to England and marrying he daughter of Fairfax, the Parliamentary eneral. But he was arrested, and only released n the abdication of Richard Cromwell. When harles II was placed on the throne Bucking-am received various minor offices about the ourt, but did not possess much influence until he downfall in 1667 of Clarendon, who had been his enemy. Buckingham now became one of the chief advisers of Charles, and belonged to the so-called Cabal, though he held no official position. He favored the Declaration of Indul-gence of 1672, and was an opponent of the Duke of York. Buckingham favored an alliance with France, but was not in the secret of the Treaty of Dover of 1670. His influence rapidly declined, and in 1673 he came to an open rupture with Arlington, who had the support of the King. The result was that he lost the remainder of his influence, and that he soon retired to private life. Buckingham was a patron of authors, and also wrote himself. His drama, *The Rehearsal* (1671), enjoyed some popularity. Consult: Leopold Ranke, *History of England* (Oxford, 1875); Winifred Burghclere, *George Villiers, Second Duke of Buckingham, 1628–1687* (London, 1903).

VILLIERS, GEORGE WILLIAM FREDERICK, EARL OF CLARENDON. See CLARENDON.

VILLIERS DE L'ISLE ADAM, vē'lyâr' de lel a'dăN', PHILIPPE AUGUSTE MATHIAS, COMTE DE (1838–89) A French author, born at Saint-Brieuc, in Brittany He is perhaps to be considered the originator of the symbolistic move ment in French literature He was a writer of vivid imagination and remarkable power, and he exercised considerable influence upon the younger school of authors; but his work was never popular with the general public, and he died in poverty in the care of the Frères Saint-Jean-de-Dieu His first publication was a volume entitled *Premières poésies* (1856–58), and it was followed in 1862 by a romance of the supernatural called *Isis* Among his other works are: the plays *Elen* (1864), *Morgane* (1865), *La révolte* (1870), *Nouveau monde* (1880), and the remarkable *Axel* (posthumous, 1890); the fine volume of short stories, *Contes cruels* (1883); the satirical romance of modern science, *L'Eve future* (1886); and the romances *L'amour suprême* (1886), *Tribulat bonhomet* (1887), and *Secret de l'Echafaud* (1888). A biography was written by Lady Mary Lloyd (London, 1904).

VILLOISON, vē'lwä'zôN', JEAN BAPTISTE GASPARD D'ANSSE DE (1750–1805). A French classical scholar, born at Corbeil-sur-Seine. He early displayed great ability, and at the age of 23 became a member of the Académie des Inscriptions. In 1778 he was commissioned by the French government to examine the manuscripts of the library of St. Mark at Venice. The results of his study there were published in his *Anecdota Græca* (1781). The most important of these results was the discovery of the famous *Codex Venetus* of Homer with the scholia. From 1785 to 1788 Villoison traveled in Greece Shortly after his return to Paris the French Revolution broke out, and he retired to Orléans; but in 1800 he was appointed professor at the Collège de France His other most important publications are: the *Homeric Lexicon* of Apollonius (1773); *Longi Pastoralium Libri IV* (1788); and his most famous work, the *Iliad*, edited on the basis of the *Codex Venetus* (1788) Consult: J Dacier, *Notice historique sur la vie et les ouvrages de Villoison* (1806); E Quatremère, in *Nouvelle biographie générale*, vol. xiii; J. E. Sandys, *A History of Classical Scholarship*, vol. ii (Cambridge, 1908).

VILLON, vē'yôN' *or* vē'lôN', FRANÇOIS (1431–?). The first and one of the greatest of the French lyric poets of the modern school. His real name was François de Montcorbier, and the name Villon, by which he is generally known, he adopted out of gratitude to Maître Guillaume de Villon, who was to him a sort of second father. The details of his life are little edifying. His immediate family was poor and ignorant. Young François showed vivacity of mind and facility of study, which caused Guillaume de Villon to take an interest in him and to give him an education and make him an ecclesiastic. Maître-Guillaume took him to live with him in the Convent of Saint-Benoît-le-Bétourné, near the Sorbonne. Villon became bachelor of arts in 1449, and master of arts in 1452. But master's degree was inferior, and many long years of study were needed to reach in the other faculties the higher positions. Villon was well liked by his fellow students, and led the roistering life characteristic of the time.

On June 5, 1455, Villon, apparently in self-defense, fatally stabbed a priest, named Philippe Sermaise, and took refuge in the convent. He

then absented himself from Paris, while awaiting a pardon, which was granted in January, 1456, and probably at this time had a disgraceful intrigue with the Abbess of Pourras. In December, 1456, he took part in the robbery of a large sum of money in the Collège de Navarre at Paris. He fled to Angers, and in 1457 we find him at Blois at the poetic and gallant court of Charles of Orléans. Then he began a nomadic life, that led him into nearly every corner of France. In 1461 he was arrested by order of the Bishop of Orléans and imprisoned at Meung-sur-Loire, but after several months of durance was set free on the strength of an amnesty proclaimed by King Louis XI in honor of his recent accession. Before the end of 1462 Villon returned to Paris, determined to settle down and become a man. But his good intentions were not fulfilled. In November, 1462, we find him imprisoned in the Châtelet on a charge of theft, which was not proved In this same month he was in a serious brawl, and, although he seems to have taken no active part in it, he was arrested and condemned to death. After more than a year's imprisonment the sentence was commuted to banishment from Paris. From this time on Villon disappears from view. He must be judged, not by our standards, but by those of his times, in which, from a moral and social point of view, those who represented the law, and those who held their heads highest, were hardly better in many respects than he. His good points were his piety, intermittent but real, his sincerity, the humility with which he acknowledged his faults and planned to do better, only to fall again at the first temptation, his affection for his mother, his gratitude toward Maître Guillaume, his sympathy for those who were suffering the misery about which he knew so much, and his patriotism. He had seen life in all its phases, and knew everything, as he naively puts it, except himself.

Villon's great merit lies in the intense subjectivity of his verse There is no sham, no hiding of anything he feels, whether it be good or bad. His frankness about himself made him feel that he had a right to be just as frank about others, and every one with whom he comes in contact is put upon the grill. The result is that his writings form a highly colored and generally trustworthy picture of the times in which he lived. They comprise *Le petit testament* (1456), a poem in 40 stanzas; *Le grand testament* (1461), a poem in 173 stanzas, in which about a score of ballads or rondeaux are inserted; a *Codicile*, composed mainly of ballads; *Le jargon*, a collection of ballads in argot; an admirable *Dialogue* between the Seigneurs de Mallepaye and Baillavent; and a *Monologue*, even more excellent, entitled *Le franc archier de Bagnolet*. *Les repues franches*, a curious production, describing the swindling tricks of Villon and his companions, has been wrongly attributed to him.

Bibliography. The first edition of his works was published in 1489. In 1533 they enjoyed the honor of having Marot for their editor. The best of recent editions is that by Longnon (Paris, 1892). For his biography, consult Longnon (ib., 1877), Schwob, in the *Revue des Deux Mondes* (Paris, July, 1892), and Gaston Paris (ib., 1901). Consult also: Byvanck, *Spécimen d'un essai critique sur les œuvres de François Villon* (Leyden, 1882); Schwob, *Le jargon des coquillards en 1455* (Paris, 1890); Payne, *François Villon, Poems; rendered into English verse, in the original forms, with a biographical and critical introduction* (London, 1892), Paris and Schwob, "Villoniana," in *Romania* (Paris, 1901); the *Poems*, translated by H DeVere Stacpoole (ib., 1913); P. Champion, *Villon, sa vie et son temps* (1913); R. L. Stevenson, *Familiar Studies* (biographical ed., New York, 1910).

VILMAR, fil'mär, Augustus Friedrich Christian (1800–68). A German theologian and literary historian, born at Solz, Hesse-Cassel. He studied theology and philosophy at the University of Marburg. In 1831 he was elected by the synod superintendent in chief of the Church of the Electorate, but as this election was not approved he shortly afterward accepted the post of professor of theology at the University of Marburg. His theological writings include *Theologische Moral* (1871; ed. by Israel) and *Die Theologie der Thatsachen wider die Theologie der Rhetorik* (1856–76), but he is better known as a literary historian, in which field his chief works are *Geschichte der deutschen Nationallitteratur* (1845, 26th ed., 1905), which was continued by Adolf Stern, and *Deutsche Verskunst* (1870, new ed., rev. by Kauffmann under the title *Deutsche Metrik*, 2d ed., 1907). Consult biography by Leimbach (Hanover, 1875).

VILNA, vēl'na. A government of west Russia, lying between the Dvina and the Niemen. Area, 16,420 square miles (Map: Russia, C 4). The larger part of the surface is low, and its highest point is only a little above 1000 feet. Marshes and lakes occupy a considerable proportion of the area. The chief rivers are the Niemen, the Vilia, and the Dvina—all of them navigable and important for the commerce of the government. The climate is moderate and steady, the precipitation ample. Agriculture is the principal occupation. The population was 1,989,900 in 1912, of whom the Lithuanians formed about one-half and the rest was composed of Russians, Poles, and Jews. The Roman Catholics numbered about 1,000,000.

VILNA (Polish, *Wilno*). The capital of the Government and Governor-Generalship of Vilna, in west Russia, situated at the confluence of the Vileika with the Vilia, 436 miles south-southwest of St. Petersburg (Map: Russia, C 4). It is an old city irregularly built and unsatisfactory in its sanitary arrangements. Its most interesting ecclesiastical edifices are the Roman Catholic cathedral of St. Stanislaus with the silver coffin of St. Casimir, the Greek Catholic cathedral of St. Nicholas and the Greek Orthodox cathedral of the Holy Virgin. Vilna is well provided with educational institutions which include a Greek Orthodox and a Roman Catholic seminary, three classical Gymnasia, an archæological museum with a public library (containing some 220,000 volumes and over 10,000 manuscripts), and a municipal theatre. In the suburbs are a number of ancient monasteries and churches and the ruins of the castle of the Jagellons. Vilna manufactures tobacco, knit goods, articles of apparel, artificial flowers, gloves, etc. The extensive commerce in grain and timber is favored by the position of Vilna at the intersection of three important railway lines and on a navigable river. Pop., 1900, 162,633; 1911, 192,746, composed of Jews, Lithuanians, and Poles.

Vilna was probably founded in the tenth cen-

tury, but it became prominent only as the capital of Lithuania under Gedimin (about 1323) It obtained Magdeburg rights from Jagellon, and had a printing press as early as 1519 During the seventeenth century it was nearly ruined in the struggle between Russia and Poland. It was annexed to Russia in 1795. The inhabitants of the city welcomed Napoleon in 1812 and took a prominent part in the Polish uprisings of 1830–31 and 1863. Since the sixteenth century Vilna has been an important cultural, religious, and commercial centre of the Jews inhabiting eastern Europe. The city was occupied by the Germans in 1915. See WAR IN EUROPE.

VILNA, ELIJAH OF. See WILNA, RABBI ELIAS

VILVORDE, vĕl'vôrd'. A town of the Province of Brabant, Belgium, on the river Senne, 9 miles north of Brussels (Map: Belgium, C 4). It has manufactures of horsehair goods and passementerie. Pop., 1900, 12,992; 1909, 15,403.

VIMEUR, JEAN BAPTISTE DONATIEN DE See ROCHAMBEAU, COUNT DE.

VINA, vē'na (Skt. *vīnā*, lute). The principal musical instrument of the ancient Hindus. It consists of a cylindrical pipe of bamboo 3½ feet long with a finger board about 2 feet long. At the ends of the pipe are two hollow gourds for resonators, each 15 inches in diameter. Behind one of these resonators are four pegs on which metal strings are fastened, tuned as follows: dominant, leading tone, tonic, subdominant. On the bamboo pipe are 18 movable bridges, somewhat lower than the principal bridge. These bridges can be adjusted so that the instrument can be tuned in any of the Hindu scales. Along the finger board run three sympathetic strings acting as bourdons (q.v.). The vina has a range of two octaves with all chromatic intervals. The player knelt, so that one resonator rested upon the left shoulder, the other upon the right knee. The strings were struck by means of the first and second fingers of the right hand, each having a kind of thimble with a flexible point

VINCENNES, văn'sĕn'. A town of the Department of Seine, France, 5 miles by tramway east-southeast from the Louvre, Paris, on the north edge of the Bois de Vincennes (Map: Paris and Vicinity). The town is almost entirely given over to military purposes. There are immense barracks, a great fortress famous for its arsenal and its school of marksmanship, and depots of military supplies The château to which the town owes its historical importance is built in the form of a parallelogram. It originally possessed nine towers, of which only one, known as the Donjon de Vincennes, with walls 17 feet thick and 170 feet high, remains The building was begun by Louis VII in 1164, and was used as a royal residence until 1740. In 1832 Louis Philippe fortified it and turned it into a military depot. Among its famous prisoners were Henry IV, the great Condé, Cardinal de Retz, Mirabeau, and the unfortunate Duc d'Enghien, who was executed here in 1804. Chemicals, rubber goods, and hardware are manufactured. Pop., 1901, 31,405; 1911, 38,568.

VINCENNES, vĭn-sĕnz'. A city and the county seat of Knox Co., Ind., 117 miles by rail southwest of Indianapolis; on the Wabash River, and on the Cleveland, Cincinnati, Chicago, and St. Louis, the Baltimore and Ohio Southwestern, the Chicago and Eastern Illinois, and the Vandalia railroads (Map: Indiana, C 7). It has Vincennes University (nonsectarian), St. Rose Female Academy, a public library, and the Cathedral Library. Other points of interest are the house occupied by William Henry Harrison, while Territorial Governor, the old legislative hall, the Roman Catholic Cathedral, the courthouse, city hall, government building, Vincennes Sanatorium, and Harrison Park In the vicinity are several Indian mounds Vincennes manufactures novelties, jewelry, sewer pipe, stoves, glass, paper products, flour, furniture, tools, bridge work, spokes, handles, etc. Pop., 1900, 10,249; 1910, 14,895; 1915 (U. S. est.), 17,202; 1920, 17,160.

Vincennes is built on the site of the principal village, Chip-kaw-kay, of the Piankashaw Indians. A fort was erected here by the French about 1702, and a regular settlement was established soon afterward, which was called Au-Post or The Post until about 1736. Subsequently the name Vinsenne, given in honor of François Morgan de Vinsenne, an early commandant, gradually came into use. This name was finally changed to Vincennes. The British occupied the place in 1763; Col. George Rogers Clark captured it for Virginia early in 1779, and Virginia ceded it to the United States in 1783. It was the capital of Indiana Territory from 1801 to 1816, and was chartered as a city in 1856. It is the oldest permanent settlement in the State. Consult: Law, *The Colonial History of Vincennes* (Vincennes, 1858), "The Founding of Post Vincennes," in *Magazine of American History*, vol. xxii; and Powell, *Historic Towns of the Western States* (New York, 1901).

VINCENNES, văn'sĕn', JEAN BAPTISTE BISSOT, SIEUR DE (1688–1736). A Canadian explorer He became an ensign in 1701 and in 1704 he saw service in the Miami country. There he rescued a number of Iroquois who had been taken prisoners by the Ottawas contrary to treaty stipulations, and thus prevented a general war. In 1712 he defended Detroit against the Fox Indians and subsequently, as the lieutenant of La Mothe Cadillac, was active in the exploration of the country between the Ohio and the Great Lakes. About 1725 he built a fort and trading post on the site of the city in Indiana that now bears his name. In 1736 he participated in an expedition against the Chickasaws, but was taken prisoner and burned at the stake.

VIN'CENT, BOYD (1845–). An American Protestant Episcopal bishop. He was born at Erie, Pa., and was educated at Yale (A.B., 1867). Ordained a priest, he held rectorships in Pennsylvania, at Erie (1872–74), and at Pittsburgh (1874–89), was consecrated Coadjutor Bishop of Southern Ohio in 1889, and became Bishop of that district in 1904 Bishop Vincent served as President of the Court of Review (1904) and of the Missionary Council (1907) of the Fifth Department of the Protestant Episcopal church, and as chairman of the House of Bishops (1910). He published *Can God Hear Prayer?* (1897).

VINCENT, SIR CHARLES EDWARD HOWARD (1849–1908). An English author and soldier, born at Slinfold, Sussex. He was educated at Westminster School and at Sandhurst. After serving with other regiments he became colonel commandant of the Queen's Westminster Volunteers (1884–1904), and served with that body during the South African War. He entered

Parliament as a Conservative in 1885 from central Sheffield, which constituency he represented until his death, founded the United Empire Trade League in 1891, and was chairman of the National Union Conservative Associations in 1895. His publications include: a translation from the German of Hugo Sturman's *Russia's Advance Eastward* (1873); *Military Geography, Reconnoitring, and Sketching* (1873); *Law of Extradition* (1880); *Police Code and Manual of Criminal Law* (1882; 12th ed., 1904).

VINCENT, EDGAR, first BARON D'ABERNON (1857–). A British financier, born in Sussex In 1883 he was president of the council of the Ottoman public debt, held at Constantinople, and then until 1889 was financial adviser to the Egyptian government. While in that post he reformed the Egyptian currency, and later, as governor of the Imperial Ottoman Bank (1889–97), freed Turkey from financial embarrassment From 1899 to 1906 he was a Conservative member of Parliament for Exeter. He had received the K.C.M.G. when 30 years old, and in 1914 he was raised to the peerage. In 1915 he was appointed chairman of the Central Control Board, which had control of the liquor traffic in Great Britain during the European War. He published *A Grammar of Modern Greek* (1881).

VINCENT, FRANK (1848–1916) An American traveler and author, born in Brooklyn, N. Y., and educated at Yale. He spent many years in traveling in almost all parts of the world, and in 1884 he presented to the New York Metropolitan Museum of Art a valuable collection of Indo-Chinese antiquities and art and industrial objects. Among his works are: *The Land of the White Elephant* (1874; 4th ed., 1884); *Through and Through the Tropics* (1876); *Two Months in Burmah* (1877); *Norsk, Lapp, and Finn* (1881); *Around and About South America* (1890; 5th ed., 1895); *In and Out of Central America* (1891; 4th ed., 1896); *Actual Africa* (1895).

VINCENT, GEORGE EDGAR (1864–). An American university president, born at Rockford, Ill, the son of Bishop John H. Vincent (q.v.). After graduating at Yale in 1885 he engaged in journalistic and literary work. In 1888 he became associated with the Chautauqua system as vice principal, and after 1907 was president of the Chautauqua Institution. From 1892 to 1894 he was fellow at Chicago University, to the faculty of which he was appointed in 1894, becoming professor of sociology in 1904. From 1900 to 1907 he was dean of the junior colleges, and from 1907 to 1911 dean of the faculties of arts, literature, and science. In 1911 he became president of the University of Minnesota. In 1914 he was elected president of the Religious Education Association. His writings include *Social Mind and Education* (1896); *An Introduction to the Study of Society* (1895), with Prof. Albion W. Small.

VINCENT, JOHN HEYL (1832–1920). An American Methodist Episcopal bishop. He was born at Tuscaloosa, Ala., and was educated at Lewisburg (Pa) Academy and at Wesleyan Institute, Newark, N. J. He entered the New Jersey Conference (1853), and was transferred to the Rock River Conference (1857). He was pastor of churches in Chicago and established the *Northwest Sunday-School Quarterly* (1865) and the *Sunday-School Teacher* (1866). He was corresponding secretary of the Sunday-school Union of his denomination and editor of its publications (1868–84). In 1888 he was elected Bishop and was appointed Resident Bishop in Europe in 1900, stationed at Zurich, Switzerland; in 1904 he retired from the active episcopate He was the chief founder of the Chautauqua Assembly (1874), and chancellor of Chautauqua University from its organization (1878). He published *The Chautauqua Movement* (1886), *The Church School and Its Officers* (1886), *Studies in Young Life* (1890); *A Study in Pedagogy* (1890); *Family Worship for Every Day in the Year* (1905). For his son see VINCENT, GEORGE EDGAR.

VINCENT, JOHN MARTIN (1857–). An American historical scholar, born at Elyria, Ohio. He studied at Berlin and Leipzig in 1881–83, and in 1890 took his Ph.D at Johns Hopkins, where he taught history after 1889, from 1905 as professor of European history. In 1909 the University of Geneva gave him the degree Docteur en Droit. He became editor of the "Johns Hopkins University Studies in Historical and Political Science." Besides editing W. D. Ball's *Evolution in Science and Revolution in Religion* (1893) and Borgeaud's *Adoption and Amendment of Constitutions in Europe and America* (1895), he published: *State and Federal Government in Switzerland* (1891); *Government in Switzerland* (1900); *Historical Research* (1911).

VINCENT, MARVIN RICHARDSON (1834–). An American Presbyterian scholar, born at Poughkeepsie, N Y He was educated at Columbia, graduating in 1854, and becoming the first classical instructor in the grammar school connected with the college. He was professor of Latin in Troy University in 1858–60; held two Presbyterian pastorates, in Troy and New York, from 1863 to 1888, in which year he became professor of New Testament exegesis and criticism in Union Theological Seminary. Among his published works are: *Faith and Character* (1880); *Word-Studies in the New Testament* (4 vols., 1887, 1900); *The Age of Hildebrand* (1896); *History of the Textual Criticism of the New Testament* (1899); and translations of Bengel's *Gnomon of the New Testament* (1862) and Dante's *Inferno* (1904).

VINCENT, MARY ANNE, *née* FARLIN (1818–87). An American actress, born at Portsmouth, England. She first appeared on the stage at Cowes in 1835, and in the same year was married to James R. Vincent (died 1850), a comedian, with whom she toured in England, Ireland, and Scotland until 1846, when they went to the United States. Mrs. Vincent played at the National Theatre, Boston, until it was burned in 1852, and thenceforth, until her death, was connected with the company at the Boston Museum, where she was a great favorite.

VINCENT DE PAUL, VĂN'SĂN' de pōl, SAINT (1580 or 1576–1660). A distinguished French priest, founder of the missionary Order of the Lazarists. He was born at Ranquines, near Pouy, in Gascony, and was sent to school at Toulouse. He became an ecclesiastical student, and was admitted to priest's orders in 1600. On a voyage which he was making from Marseilles to Narbonne his ship was captured by corsairs, and he with his companions sold into slavery at Tunis, where he passed through the hands of three different masters. The last of these, who was a renegade Savoyard, yielded to the exhortations of Vincent, resolved to return to the

Christian faith, and, with Vincent, made his escape from Barbary. They landed in France in 1607. Having gone thence to Rome, he was intrusted with an important mission to the French court in 1608, and continued for some time to reside in Paris as the almoner of Marguerite de Valois The accident of his becoming preceptor of the children of M. de Gondy, the commandant of the galleys at Marseilles, led to his being appointed almoner general of the galleys in 1619. For the foundation of the Congregation of Priests of the Mission, which occupied a large part of his time from 1624, see LAZARISTS. His life was devoted to the organization of works of charity and benevolence To him Paris owes the establishment of the foundling hospital. The Sisters of Charity (see BROTHERS AND SISTERS OF CHARITY) were founded under his direction, and he was intrusted by St. Francis of Sales with the direction of the newly founded Order of Sisters of the Visitation. He left nothing behind him but the *Constitutions of the Congregation of the Mission*, *Conferences* on these constitutions, and a considerable number of letters, chiefly on spiritual subjects. He died at St. Lazare, Sept. 27, 1660, and was canonized by Clement XII in 1737. His festival is July 19, the day of his canonization. Consult his *Life* by Addeiley (London, 1901), Jones (ib., 1873), P. Boyle (New York, 1909), and in French by Lorti (Paris, 1880), Morel (1884), De Broglie (Eng. trans., New York, 1899), and L. Bougaud (Eng. trans., ib , 1908).

VINCENT OF BEAUVAIS, bō'vâ' (c.1190–c.1264). A French encyclopædist. He belonged to the Dominican monastery of Beauvais, and was in high favor with Louis IX of France, who invited him to his court. Here he composed his famous encyclopædia called the *Speculum Majus*. This vast summary of the knowledge of the times is in all printed editions divided into four parts· *Speculum Naturale*, *Doctrinale*, *Historiale*, and *Morale*. This last, however, is considered by most scholars to be an addition by a different hand. The *Speculum Naturale* contains all that was known at that time of natural history. The *Speculum Doctrinale* is a compendium of the scholastic learning of the day. The *Speculum Historiale* begins with the creation and gives the history of the world down to 1244; this book has little intrinsic value. In addition he wrote several other works, all marked by great industry but little originality. Consult August Potthast, *Bibliotheca Historica Medii Ævi*, vol. ii (Berlin, 1896), for editions and secondary works relating to Vincent.

VINCENT'S ANGINA. A variety of pharyngitis characterized by the formation of a false membrane, covering a sloughing, ulcerated base, being first described by a French physician, H. Vincent. The disease is caused by two organisms dwelling in symbiosis, viz., a fusiform bacillus and a spirillum. Numerous transitional forms have been noted by late investigators, pointing to the possibility that the bacillus and spirillum are merely developmental stages of the same organism. These organisms do not confine their activities to the throat, but are found in the larynx, trachea, ear, in brain abscess, and in necrotic lesions about the anal orifice and vulva. Devitalized tissues are especially susceptible to attack, and children exhausted by long illnesses and possessing diseased teeth and tonsils are not infrequent victims. Mulholland, of New York, who studied the incidence of the malady among foundlings, concludes that it is an institutional disease, and that it is mildly contagious Several epidemics have been reported among institutional children. Localized lesions, if treated promptly, can be cured by the application of iodine, trichloracetic acid, or other active antiseptics. The most efficacious remedy seems to be salvarsan (q.v.), applied locally or given by intravenous injection. See CANCRUM ORIS

VINCI, vĭn'chĕ, LEONARDO DA (1452–1519). A Florentine painter, one of the greatest masters of the High Renaissance, also celebrated as a sculptor, architect, engineer, and scientist. He was born at Vinci, a Tuscan mountain town near Empoli, the illegitimate son of Ser Piero d' Antonio, a Florentine notary, and Catarina, a peasant woman. His boyhood was spent in the paternal home at Vinci. By 1469 the family was settled at Florence, where his father's wealth enabled him to enjoy the very best education which Florence, at that time the intellectual and artistic centre of Italy, could afford, and he speedily became the embodiment of every social and intellectual charm He was singularly handsome in person, powerful in physique, persuasive in conversation, a fine musician and improvisatore; and his mind was possessed of a profound and insatiable love of knowledge and research, which proved the controlling factor of his life. Before taking up painting he began the studies in mechanics and in the natural sciences which went hand in hand with his artistic activity throughout life

About 1466–69 he became the pupil of his father's friend Andrea del Verrocchio (q.v.). In 1472 he was entered into the painters' guild of Florence, and in 1476 he is still mentioned as Verrocchio's assistant, but in 1478 he was working as an independent master. From Verrocchio Leonardo learned modeling as well as painting; but nothing of his work during apprenticeship has survived. According to Vasari he painted an angel in Verrocchio's "Baptism of Christ" (c.1470, Academy, Florence) with such skill that his master resolved to cease painting. The statement concerning Verrocchio is wrong, but it is quite possible that the angel in question is by Leonardo. The account of the terrifying shield upon which the artist painted all manner of monstrosities acquired from his studies of lizards, serpents, worms, etc., may have some basis of fact; but the "Head of Medusa" in the Uffizi is certainly a forgery based on Vasari's description. The "Annunciation," too, in the same gallery is by a member of the school of Verrocchio; but a genuine painting of this subject by Leonardo is in the Louvre.

In 1478 he was commissioned by the Signoria of Florence to paint a picture for the Chapel of St. Bernard in the Palazzo Pubblico. His first masterpiece, the "Adoration of the Kings," which in an unfinished state survives in the Uffizi, was ordered in 1481 for San Donato a Scopello, Florence. The figures have not, for the most part, advanced further than the grounding; but they reveal a fine scheme of composition and dramatic action. The Madonna sits in the midst of a great classic ruin; and in the intense, dramatic action of the worshipers and the crowds endeavoring to approach, the artist has surpassed the highest achievements of the Early Renaissance. Of the other works ascribed to this youthful period none seem genuine, except his unfinished "St. Jerome" (Vatican), a fine

anatomical study. The small "Madonna del Fiore" in the Hermitage, St. Petersburg, is after Leonardo's design, but Berenson attributes to him an unfinished profile of a girl, in possession of Donna Laura Minghetti at Rome

Leonardo first visited Milan about 1482–83 as the bearer of a present from Lorenzo de' Medici to Lodovico il Moro, the reigning duke. This present was a strange musical instrument sounding like a lute, and invented by Leonardo himself, who thus sang his way into the Duke's favor. Among the artist's papers is the brief of a curious letter which he wrote to the Duke after his return to Florence, stating his various accomplishments. Nine of the 10 divisions of the letter are devoted to his abilities as a military and naval engineer; in the last he states his prowess in architecture and in sculpture: "In painting, also, I can do what may be done, as well as any other, be he who he may." The earliest documentary evidences of Leonardo's presence in Milan dates from April 25, 1483, and he remained there until his patron was driven from the city by the French in 1499. This was the most fruitful period of Leonardo's activity.

His work at Milan was important and varied. As a sort of general factotum for the ruler, he was principal engineer in his numerous military enterprises, constructed the Martesana Canal, and directed great festivities, as when Lodovico married his niece to the Emperor Maximilian. He was also active as an architect, being one of those employed upon the cathedral of Milan, and he probably designed other public buildings. He found time to prosecute his studies in anatomy, especially of animals, with Marco della Torre, and to assist Luca Pacioli in one of his mathematical works. At the same time he was at the head of a large and important band of pupils, whether or not they then constituted the supposed Milanese Academy: for them he probably wrote his *Treatise on Painting;* and it is certain he designed paintings which they carried out. The artistic task in which Leonardo took chief interest, and indeed the dearest plan of his life, was a colossal bronze monument to Francesco Sforza, the father of Lodovico. On it he labored constantly till his departure from Milan in 1499, without having brought it to completion. His interest is attested by the numerous studies of horses, in all manner of positions (Ambrosiana, Milan, and Windsor), in sketches for the monument and reliefs in wax and clay. The model for the horse, 26½ feet high, was complete when the French occupied Milan in 1500 and formed a target for the Gascon archers. Had Leonardo completed this monument it probably would have ranked as the greatest equestrian statue of the Renaissance, surpassing Verrocchio's Colleone as far as the latter did Donatello's Gattemelata.

Of his paintings during the early Milan period, the most important panel is the well-known "Virgin of the Grotto," in the Louvre, executed for the Confraternità della Concezione (1482–90). In this Leonardo has finally solved the problem of chiaroscuro, in the striking contrast of the faces of the Virgin and the two children in the darkness of the grotto. The supposed original in the National Gallery, London, is a copy by Ambrogio da Predis. From 1494 or 95 to 1497 Leonardo labored on his masterpiece of painting, the "Last Supper," a wall decoration in the refectory in the monastery of Santa Maria delle Grazie, Milan. Because of his use of tempera colors directly upon the wall, a surface unfit for the purpose, and because of neglect, and the vandalism of monks and soldiers, the grand original was reduced to a ruin. But while for purposes of study it is necessary to refer to the many pen and red-chalk sketches by Leonardo himself, the copies by his pupils, the best of which are those by Marco d'Oggiono in St. Petersburg and in the Royal Academy, London (see Illustration), and to Raffaello Morghen's excellent print, the original alone gives the true, though faint, idea of the wonderful lighting and melting color, especially since the recent effective restoration. (See LORD'S SUPPER, THE, also called THE LAST SUPPER.) The painting was epoch-making, no less in pictorial qualities than in the remarkable composition. The disciples are represented upon one side of a table, their faces to the spectator. They are divided into four groups of three, each complete in itself, but subordinated to the principal action emanating from the central figure of Christ He is just pronouncing the words, "One of you shall betray me," and the painting represents the psychological effect of this announcement upon the Apostles. This effect is shown not only in the faces, the ineffable sadness of Christ, the wrath of Peter, the villainy of Judas, but also in the hands, which are treated with a subtle mastery of pantomime, never before attempted or since equaled. Were the heads gone, the hands alone might tell the story The figures are twice life size and everything is subordinated to architectural effect and sculpturesque composition—the effect of perspective being gained by open windows with Lombard scenery in the distance.

All of the other pictures painted by Leonardo during this period have been lost. On the wall opposite "The Last Supper" portraits of the Duke, his wife, and two children may still be seen in the fresco by Giovanni Montorfano, in which they were painted by Leonardo. But his supposed portraits of the Duke and the Duke's wife, Beatrice d'Este, in the Ambrosiana are now more properly termed "A Musician" and "Bianca Sfzora" and are attributed to Ambrogio da Predis. The so-called "La belle Féronnière," of the Louvre, formerly supposed to represent Lucrezia Crivelli, the Duke's mistress, is now attributed to Beltraffio, while the beautiful "Madonna Litta" in the Hermitage, St. Petersburg, is most likely by Bernardino de Conti. The large "Resurrection" in the Berlin Museum is probably the work of Beltraffio.

In December, 1499, after the expulsion of Duke Lodovico, Leonardo left Milan for Venice. To a brief sojourn at Mantua we owe two beautiful drawings of Isabella d'Este (Louvre and Uffizi), though he never painted for her the desired portrait. He remained at Venice till about 1500, when he returned to Florence and assiduously devoted himself to the study of mathematics. Having received a commission for an altarpiece from the Servite monks, he designed the famous cartoon "Madonna with the Christ Child in the Lap of St. Anne" (1501), which set all Florence in commotion. Not only was it frequently copied, but motives and entire figures were adopted by other artists, as by Raphael in his "Madonna with the Lamb" (Madrid). Leonardo did not himself carry out the oil painting, now in the Louvre, of which it was the model, until a later period, and then with the aid of pupils. In this the Madonna, seated in the lap of St. Anne, is represented in the act of lifting

up the Christ child, who plays with a lamb Contemporaries were particularly impressed by the position of the Christ child, the beautiful studies for which survive in the Academy of Venice. Other sketches for the cartoon are in the British Museum, in the Louvre, and at Windsor. The cartoon of the same subject, in possession of the Royal Academy, is not the original, but an earlier variation of the same theme

In 1502 Leonardo entered the service of Cesare Borgia as a military engineer, rendering important services in different parts of Central Italy. In January, 1503, he was again in Florence, where he served on the commission of artists to decide upon the proper location for Michelangelo's "David," and served as an engineer in the war against Pisa Towards the end of the year he entered upon his famous contest with Michelangelo (q.v.) in a design for the decoration of the great hall of the Palazzo Vecchio .The contest was of political importance, designed, by a glorification of past valor, to encourage the Florentines in their struggle with Pisa Each prepared a cartoon for one of the long walls, Leonardo's subject being the "Battle of Anghiari." The centre of the cartoon was a cavalry struggle upon a bridge over a standard in which the fierce passion of battle was portrayed, as never before or since. To judge from Leonardo's report to the Signoria, based upon profound historical studies, it seems that on the left the Patriarch of Aquileja, leader of the Florentines, watched the battle, praying for success, and on the right the Milanese troops were in full flight. The execution of the painting upon the wall does not seem to have progressed beyond the central group about the standard, which survives in the "Battle of the Standard," a drawing in the Louvre ascribed to Rubens, and in the well-known engraving by Edelinck.

During this second Florentine period (1503–06) Leonardo painted several portraits, but the only one which survives is the world-famous "Mona Lisa," the pride of the Louvre, perhaps the most celebrated portrait in the world. The subject was the third wife of the Florentine Francesco del Giocondo, whence the name "La Gioconda," by which the portrait is known in France. The face has sadly suffered at the restorer's hand, Walter Pater to the contrary notwithstanding. The redness of the lips and the carnation of the face have disappeared, as have the subtle gradations of blue and red about the eyes, which Vasari praises so highly. But the eyes still have their dewy shimmer, as in life, a subtle smile plays about the mouth, and the wonderful hands are almost unspoiled. Leonardo is said to have employed musicians and jesters to produce the mysterious expression of her countenance, an effect heightened by the strange, rocky landscape in which she appears. After four years' labor on the work, he pronounced it unfinished; but to other eyes it seems one of the most highly finished works in modern art. A great sensation was caused by the disappearance of this masterpiece in August, 1911. Not until two years later was it discovered in Florence in the possession of the thief, Vincenzo Perugia, who alleged patriotic motives in bringing back the picture to Italy. It was exhibited to vast crowds in Florence, Rome, and Milan before its return to the Louvre, Dec. 12, 1913.

In 1506 Leonardo went to Milan on a three months' leave of absence from Florence. The powerful intercession of Chaumont, the French Governor of Milan, at length induced the gonfalonier of Florence to release him from his contract in the Palazzo Vecchio. Leonardo was named court painter to the King, Louis XII, and for the next few years he divided his time between the two cities He was kept at Florence (1507–08) by a long lawsuit against one of his brothers, who tried to prevent him from claiming an inheritance left him by an uncle At Milan he continued his engineering projects, and he had studios both there and at Florence. At this period, especially, he executed many designs for paintings carried out by his Milanese pupils. It has been the service of Morelli to distinguish these from his genuine works, and to rewrite the history of the Milanese school Among such paintings now attributed to followers of Leonardo the "Holy Family with St. Catharine" and a half-nude female figure recalling "Mona Lisa" in the Hermitage, St. Petersburg; "Madonna with the Scales," the small "St. John," "Madonna with the Child and St. John Baptist," and a "Youthful St. John Baptist" in the disguise of a Bacchus, ascribed to Cesare da Sesto, all in the Louvre; and the fresco of a "Virgin with Donor" in Sant' Onofrio, Rome. Several copies of Leonardo's "Leda and the Swan," which we know he painted during the second Milanese period, survive, the best being the free copy formerly ascribed to Sodoma, in the Borghese collection, Rome.

When the French temporarily abandoned Milan in 1513 Leonardo paid a visit to Rome; but neither this nor his previous brief sojourn seems to have exercised any influence upon his art. In 1516 he returned to Milan. He was made court painter at a salary of 700 gold scudi annually, besides being confirmed in his previous possessions By order of Francis I he bought up all of his own pictures that could be had, whence the collection in the Louvre, and the same year he accompanied the King to France. He passed the remainder of his days in the residence assigned him in Castle Cloux, devoted to scientific research, and died there soon after the date of his testament, May 2, 1519. He did not die in the arms of Francis I, as is often supposed on the evidence of Vasari, but in the presence of his friend Melzi, a young Milanese nobleman who had been his constant companion during the latter part of his life, and to whom he left his invaluable manuscripts and his various instruments.

Leonardo was the most extraordinarily versatile genius of that age of geniuses, the Renaissance. As a man of science he towered above all contemporaries, and had his views been known and generally published, they must have revolutionized the science of his day. That they were not known is perhaps due to the fact that his manuscripts were almost undecipherable, being written with the left hand, back-handed, and from right to left. With an almost inspired glance he divined the secrets of nature, making discoveries which it has been reserved for our own time to perfect. A consummate master of anatomy, he even divined the circulation of the blood and the action of the eye in vision. He made astounding observations in meteorology, knew the earth's annual motion and the effect of the moon upon the tides, foreshadowed the hypothesis of the elevation of continents, and discovered the nature of fossil shells. He originated the science of hydraulics, and probably



LEONARDO DA VINCI

"THE LAST SUPPER," AFTER THE PAINTING IN THE MONASTERY S. MARIA DELLE GRAZIE, MILAN. FROM THE COPY IN THE LOUVRE

invented the hydrometer, his scheme for the canalization of rivers is still of practical value. He invented a large number of labor-saving machines, very remarkable for his day, and as a mathematician he takes high rank, especially for his study of spirals

In the art of painting he wielded the greatest influence. He was the pioneer of the High Renaissance, the first to achieve that complete mastery of form and technique which admitted of a new freedom of handling, a new truth to nature and life. He was the first to attain a sound and complete mastery of anatomy and to introduce color, in the higher sense, into Florentine painting. By the use of sfumato—a smoky, hazy quality—he achieved a remarkable melting tone and blending of color; he was the first great master of light and shade, which he made witching and lovely. His drawings reveal the consummate draftsman seeking rather after finesse than general effect, they may be found in the principal European collections, especially at Windsor. Among the principal are the studies for his principal paintings, such as the "Kneeling Leda" (Chatsworth and Ducal Palace, Weimar), "Neptune Driving his Team," "The Battle of the Standard," the "Last Supper," the magnificent head of Leonardo in old age (Royal Library, Turin), and the large series of caricatures in which he displays a remarkable sense of humor. The beautiful beardless head of Christ in the Ambrosiana is now generally ascribed to Luini. Especially characteristic of Leonardo's art are his landscape backgrounds, into which he was among the first to introduce atmospheric perspective, that mysterious quality which heightens most admirably the effect of the picture, and the subtle mysterious smile, which Vasari has characterized as more than human. The influence which he wielded over Italian art was profound and wholesome. The chief masters of the High Renaissance in Florence—like Raphael, Andrea del Sarto, and Fra Bartolommeo—all learned from him; he completely transformed the school of Milan (see PAINTING, *High Renaissance, Italy*), and at Parma Correggio carried his art to its logical development.

Bibliography. Leonardo's copious manuscripts, rich in drawings by his own hand, have been published, for the most part, in facsimile; those in the Paris libraries under the editorship of Ravaisson-Mollien (6 vols, Paris, 1881–91); the Codex Atlanticus in the Ambrosiana (Milan, 1895); and those in the Trivulzio collection (ib., 1891). His celebrated *Trattato della pittura*, compiled from the manuscripts by some pupils, has been published many times (London, 1802; Rome, 1890; Vienna, 1882). The best edition of his literary works is by J. P. Richter (London, 1883), with English translation. The first critical biography was by Amoretti (Milan, 1803). Uzzielli, *Ricerche intorno a Leonardo da Vinci* (2d ed., Turin, 1896 et seq.), has best used the documentary evidence. The most extensively planned biography, that of Paul Müller-Walde (Munich, 1889–90), remained unfinished. Others are by A. Rosenberg (Bielefeld, 1898; Eng. trans., 1903); E. Müntz (Paris, 1899; trans., London, 1898); Volynsky (St. Petersburg, 1900; trans. by Heaton and Black, London, 1904); R. McCurdy (London, 1904); H. P. Horne (ib., 1908); G. Gronau (New York, 1903); G. Séailles (Paris, 1912). Later works on Da Vinci are by Dr. Jens Thiis for the early period (London, n d.), and Osvald Sirén (New Haven, rev. ed., 1916), both profound and scholarly. Of special importance for the criticism of his works are the researches of Morelli (q v).

VIN'CUM. See BINGEN

VINDHYA (vĭnd'ya) **MOUNTAINS.** A range of mountains in British India In its widest sense the name is applied to the whole northern escarpment of the great triangular plateau of the Deccan, stretching in an east and west direction from the mouth of the Ganges to the head of the Gulf of Cambay (Map: India, C 4). It is, however, chiefly along the middle course of the Nerbudda River that there is a well-defined ridge. This river has a deeply cut valley, which separates the ridge from the main plateau and gives it a steep southern slope. On the north there is a lower plateau, which falls towards the great Ganges-Indus lowland. The range consists chiefly of Mesozoic sandstone, and has an average altitude of 2000 feet, with a maximum of 5500 feet

VIN'DINUM. See MANS, LE.

VINDOB'ONA. The Roman name of Vienna (q v.).

VINE. See GRAPE; LIANAS.

VINEA, PETER DE See PETER DE VINEA.

VINE FAMILY. See VITACEÆ.

VINEGAR (OF., Fr. *vinaigre*, from *vin*, from Lat *vinum*, wine + *aigre*, sour, sharp, keen, from Lat. *acer*, sharp, keen). A sour liquid obtained by acetic fermentation of alcoholic products, usually wine, cider, or malt, used chiefly for culinary purposes and for preserving. The active principle of vinegar is acetic acid, which varies in amount from 2 per cent to 10 per cent and even more; the distinctive flavor and aroma are derived from the materials from which it is made or, in artificial products, from added substances. Small amounts of alcohol, and incidental products of fermentation, are usually present, together with extractive matters depending upon the nature of the materials from which it is made. Cider vinegar contains traces of malic acid, the acid of the apple. Formerly some mineral acid, usually sulphuric, was added to vinegar as a preservative and to reënforce it, but this practice is now regarded as an adulteration. In Europe wine and spirit vinegars are most commonly used, that from white wine being most highly esteemed; in Great Britain malt vinegar is extensively used; in the United States cider vinegar is preferred.

There are two methods of making vinegar—the slow or natural fermentation and the quick process. In both of these the production of acetic acid from the alcohol is effected through oxidation by the agency of microörganisms, which are supplied in the lees or the mother of vinegar. The latter is a soft, felted mass, commonly forming a scum on the surface of the fermenting liquid. It contains an aggregation of microörganisms, mainly acetic bacteria. The process as ordinarily carried on in casks or barrels is quite slow, requiring several weeks at a favorable temperature.

The quick process consists in bringing the alcoholic liquid into intimate contact with the air by means of beechwood shavings, which are placed in a tall vessel called a generator, and inoculated with warm vinegar to furnish the microörganisms and to start the process. The generator is usually a tall wooden cask, smaller at the top than at the bottom, and divided into

three horizontal sections, one of the dividing disks being near the top, and the other a false bottom. Several glass tubes that serve as air ducts extend through the upper disk, which is also perforated with numerous small holes, through which pack threads extend. The central or main part of the generator is filled with beech shavings The alcoholic liquid is introduced intermittently at the upper part of the apparatus, trickles slowly down the pack threads, diffuses over the chips, coming in contact with the rising current of air, and collects in the bottom of the cask, where it is drawn off by a siphon pipe. It is necessary for the liquid to pass through the cask several times, or through several casks, before acetification is completed, the entire operation requiring from 24 to 36 hours. A temperature of about 30° C. or 86° F. is maintained.

The employment of the quick process in vinegar making enables a more uniform article to be produced with certainty than by the slow fermentation. The latter is more or less haphazard, depending upon the exact kinds of organisms present, and results in considerable loss of alcohol as well as a smaller yield of acetic acid. This has suggested the use of pure cultures of vinegar bacteria, but in practice they have been little introduced

In addition to being a condiment, vinegar is used extensively in pickling and preserving various kinds of foods, and has an important action in softening the fibres of hard meats and the cellulose of green vegetables.

In pharmacy a solution of a drug in dilute acetic acid is known as a vinegar. Two such preparations are official in the pharmacopœia, *acetum scillæ*, or vinegar of squill, and *acetum opii* or vinegar of opium, popularly known as black drop, and used as a sedative. Vinegar of squill is employed for its expectorant properties. *Acetum aromaticum*, aromatic vinegar, is a solution of the volatile oils of cinnamon, cloves, juniper, lavender, lemon, peppermint, and rosemary in alcohol, vinegar, and water, and is used as a cooling lotion in headaches and fever. Vinegar is a popular domestic remedy, being frequently employed as a gargle. Consult: Brannt, *A Practical Treatise on the Manufacture of Vinegar and Acetates, etc.* (Philadelphia, 1890), Marshall, *Microbiology* (ib., 1911) See ACETIC ACID.

VINEGAR BIBLE. See BIBLE, CURIOUS EDITIONS OF THE.

VINEGAR EEL, or PASTE EEL. See EEL WORM

VINEGAR FLY. A pomace or wine fly of the genus *Drosophila*, also called fruit fly, although it does not attack sound fruit. The majority of the 30 species breed in the juices of decayed and fermenting fruit. Their larvæ are small, white, slender maggots, and are frequently found in canned fruits and pickles which have been imperfectly sealed, occurring mostly near the top of the jars, but living without inconvenience in the briny or vinegary liquid, and transforming within brown puparia around the edges of the jar. Consult Howard and Marlatt, *Household Insects of the United States* (Department of Agriculture, Washington, 1896).

VINEGARONE, vĭn'ē-ga-rōn' (from *vinegar*, so called from its odor when alarmed) The local name in Texas for the whip-tailed scorpion (*Thelyphonus giganteus*). See SCORPION.

VINE INSECTS (OF. *vine, vigne*, Fr. *vigne*, from Lat. *vinea*, vine, fem sing of *vineus*, relating to wine, from *vinum*, wine) About 40 species of insects affecting grapes have been recorded in Europe, and a much greater number occur in the United States. The grapevine phylloxera (see PHYLLOXERA) is the most important and is cosmopolitan. The grapevine fidia (*Fidia viticida*) is a brownish beetle about a quarter of an inch in length, that feeds upon the leaves, the larvæ live at the roots of the vine and check growth It has done serious damage in the Central States and in New York State. The yellowish eggs are laid in large batches in crevices in the bark of old wood, usually well aboveground, and the larvæ on hatching penetrate the cracks in the soil near the base of the plant They feed at first upon the fibrous roots near the point of entrance, but soon reach the larger roots, sometimes penetrating three feet below the surface of the ground. They reach full growth in August and construct earthen cells, in which they remain until June of the following year, when they change to pupæ. The adult beetles emerge two weeks after pupation; these may be killed by applying arsenical spray to the vines, while the larvæ are destroyed by the underground injection of bisulphide of carbon or by a strong kerosene emulsion wash.

The grape cane borer (*Amphicerus bicaudatus*) is a botrichid beetle, common in the Central United States, which damages grape canes by boring small holes into them. The eggs are laid in May, and the larvæ, which also bore in the canes, develop during summer, transforming to pupæ and beetles in the fall, the beetles remaining in the burrows until the following year. This insect also breeds in other perennial plants. Prompt destruction of all infested wood is recommended.

The grapevine flea beetle (*Haltica chalybea*) is a stout metallic blue beetle about one-fifth of an inch long, which has enlarged hind thighs. It appears in the early spring, feeds upon the buds, and later deposits its orange eggs in clusters on the lower surface of the young leaves, upon which the larvæ, which are shining-brown, feed, entirely defoliating the plants when numerous They reach full growth in a month, enter the ground for transformation, and appear in July as beetles, which hibernate and lay eggs in the spring. Spraying with arsenites and jarring the adults upon cloth soaked in kerosene are recommended remedies.

The grape leaf folder (*Desmia maculatis*) is a widely distributed small, shining-black moth, with wings bordered with white and marked with white spots. It lays its eggs upon grape leaves, which the active greenish larva folds together with silk, and skeletonizes them. There are two or three generations each summer, the last generation hibernating in the leaves. The destruction of the folded leaves with the early generation is recommended. Probably the larvæ of more than 50 species, including 10 hawk moths (Sphingidæ), feed upon the foliage Climbing cutworms are frequently destructive in northern New York and California. See CUTWORM.

The grape berry moth (*Eudemis polychrosis*) is a European species which has been introduced into the United States. It is a small, slate-colored moth, which lays its eggs on the young berries, into which the whitish larva burrows. Infested berries shrivel, become discolored, and seem to be attacked by the black rot.

When full grown, the larva, then one-third of an inch long, changes to a chrysalis within a folded leaf, where it passes the winter. Bagging of grapes and burning of fallen leaves in the autumn are suggested remedies.

The grapevine leaf hopper (*Typhlocyba vitifex*), which is also sometimes known as grapevine thrips (see THRIPS), occurs upon the vines in June, frequently in great numbers, increasing through the summer and passing the winter as adults, laying its eggs upon the lower sides of the leaves the following summer. Burning the fallen leaves and other rubbish and spraying with kerosene emulsion are popular remedies. Tarred paper shields held close to jarred vines are also used; the insects fly against the tarred surface Consult Marlatt, *The Principal Insect Enemies of the Grape* (Department of Agriculture, Washington, 1898).

VINE'LAND. A borough in Cumberland Co., N. J., 34 miles south by east of Philadelphia, Pa., on the Central Railroad of New Jersey, and the West Jersey and Seashore Railroad (Map: New Jersey, B 5). It has a Training School for Feeble-Minded Children, the State Institution for Feeble-Minded Women, and the State Home for Disabled Soldiers and Sailors Other noteworthy features are the Carnegie Library; the Historical and Antiquarian Society, and the White King Squab Plant, with a building one-half mile in length. Its products include shoes, flint glass, chenille curtains, thermometers, clothing, pearl buttons, paper boxes, sashes, doors, and blinds. Vineland has adopted the commission form of government. Pop., 1900, 4370; 1910, 5282. Consult Nordhoff, *Communistic Societies of the United States* (New York, 1875).

VINE PEACH. See MUSKMELON.

VI'NER, CHARLES (1678–1756). An English jurist, born at Salisbury, Wiltshire. He attended Oxford for a time, and then resided at Aldershot, Hampshire. His great work was *A General Abridgment of Law and Equity* (23 vols., 1742–53). To the compilation of this work he devoted half a century of toil. The work was very irregular in its execution, hence it was not of much value until a better alphabetical index to it was published in 1758 by Robert Kelham. A second edition of the work and index appeared in London in 24 volumes in 1791–94, and a six-volume supplement was published in 1799–1806. At his death Viner left about £12,000 to the University of Oxford for the establishment of the Vinerian chair of common law and for fellowships and scholarships. The first incumbent of the chair was Sir William Blackstone.

VINES, RICHARD. An English merchant adventurer in the employ of Sir Ferdinando Gorges (q.v.). The date and place of his birth are unknown, though he was probably born near Bideford, England. He died at Bridgetown, Barbados, W. I., in 1651. He arrived at the mouth of the Saco River, Me., in the autumn of 1616 and passed the following winter there, whence the local name of Winter Harbor for the spot. He explored the surrounding country and continued to transport settlers there and trade in fish and furs with the Indians for his patron until 1630, when, in association with John Oldham, he received a patent of lands on the west side of the river. He acted as agent of Gorges until 1636. With Isaac Allerton of Plymouth, Mass., Vines attempted to establish a trading post at Machias, Me., in 1633, but they were driven out by the French under La Tour of St John. He probably established the first permanent settlements within the limits of Saco and Biddeford, but was not the first to enter the Saco River, Martin Pring having done so in 1603 and Capt John Smith in 1614

VINES, SYDNEY HOWARD (1849–). An English botanist, born in London and educated at Christ's College, Cambridge In 1888 he was made Sheraidian professor of botany in Oxford. He served as president of the Linnean Society of London in 1900–04. His published works include *Lectures on the Physiology of Plants* (1886); *Student's Text-Book of Botany* (1895); *An Account of the Morisonian Herbarium* (1914). Vines assisted in founding the *Annals of Botany* and became its editor.

VINET, vē'nā', ALEXANDER RODOLPHE (1797–1847) A Swiss theologian and literary historian, born at Ouchy, Canton of Vaud At the age of 20 he became professor of the French language and literature in the Gymnasium at Basel. He was professor of theology at Lausanne from 1837 to 1845, when he became a leading advocate of the entire separation of Church and State and aided in organizing the Free Church of Vaud. Of his numerous writings the following may be mentioned: *Sur la séparation de l'église et de l'état* (1842; Eng. trans., 1843); *Etudes sur Blaise Pascal* (1848; Eng trans., 1859); *Théologie pastorale* (1850; Eng. trans., 1852); *Homilétique* (1853; Eng. trans., 1853; new edition, 1880); *Etudes sur la littérature française au XIXème siècle* (1849–51); *Histoire de la littérature française au XVIIIème siècle* (1853); *Moralistes des XVIème et XVIIème siècles* (1859); *Poètes du siècle de Louis XIV* (1862). Vinet's letters were edited by Secretan and Rambert (Paris, 1882), and by Pressensé (ib., 1890). There are biographies by Rambert (ib., 1875), L. Molines (ib., 1890), Lane (Edinburgh, 1890), and A. Schumann (Leipzig, 1907).

VINEYARD SOUND. A passage 20 miles long and 3½ to 7 miles wide between the Elizabeth Islands, off the southeast coast of Massachusetts, and the island of Martha's Vineyard (Map: Massachusetts, F 7). It is the customary course for coasting vessels.

VINGT ANS APRÈS, văN'tăN'sà'prā' (Fr, twenty years after). A romantic novel by Alexandre Dumas (1845). It is a sequel to *Les trois mousquetaires*, its incidents being supposed to take place 20 years later in the lives of D'Artagnan and his companions. It was, in turn, succeeded by *Dix ans plus tard, ou le vicomte de Bragelonne* (1848–50).

VINGT-ET-UN, văN'tā'ēN' (Fr., twenty-one). A card game of French origin, played with a complete pack of cards and by any number of players. The cards have no rank, but, instead, have a counting value, all the court cards having an equal value of ten points each, and the ace reckoned as 11 or one at the option of the holder. The pack is dealt to the players, the first to receive an ace becoming the dealer. The object of the game is to secure as near 21 as possible in the total pip value of cards held. Each player deposits an equal stake in the pool, after which two cards are dealt, one at a time, to each player. The cards all dealt, the dealer first examines his hand, and if he has exactly 21 (called a Natural) exposes it at once and claims the pool; or, if playing for stakes, the players pay him twice the amount of their stake. Should another player also have a Natural, it

is declared a stand-off. If, after examination, the dealer has not a Natural, each player in turn, beginning with the eldest hand, examines his hand to see how nearly its total value approaches 21. If he has a Natural he declares it, and the dealer pays him double the amount staked, or he takes the pool or any other winning determined upon beforehand When none of the players has a Natural, each player in turn may draw another card or trust his fortunes to the two already in hand, which are not shown under any circumstances. If a player desires to draw a card, the dealer gives it to him face upward, and if the pips on the card drawn, added to those already in his hand, brings his total greater than 21, he is *crevé*, and passes over to the dealer his stake. The only skill required is for the player to know what hand to stand on, and what to draw to MACAO is another variety of the game, in which but one card is dealt to each player; the ace value is fixed at one, and court cards and tens count nothing. Nine must be secured instead of 21.

VINITA, vī-nē'tà A city and the county seat of Craig Co., Okla., 50 miles southwest of Joplin, Mo., on the Missouri, Kansas and Texas and the St. Louis and San Francisco railroads (Map: Oklahoma, F 2) The State Hospital for Insane and the Sacred Heart Institute (Roman Catholic) are situated here; and there are four fine parks. It has a large oil refinery. Pop., 1900, 2339, 1910, 4082

VINJE, vĭn'yĕ, AASMUND OLAFSSON (1818–70). A Norwegian journalist and author, born in Vinje, Telemarken. He graduated in law at Christiania University, but did not practice. With Henrik Ibsen, an old schoolmate, and others he founded *Andhrimner*, a satirical weekly. Accepting Ivar Aasen's *Landsmaal* (q.v.), he founded (1858) the original and witty weekly *Dolen*, which he conducted to his death In 1861 appeared his notable *Ferdamnni fraa Sumaren 1860*, a genial and realistic description of Norwegian country life, followed by *Diktsamling* (1863); *A Norseman's Views of Britain and the British* (1863; Norw. trans., 1873), the result of travels in England and Scotland; the epic cycle *Storegut* (1866; 7th ed., 1905), *Blandkorn* (1866), poems and prose. Many of his poems became popular songs in Norway. *Skrifter i Utval*, selections of his works, appeared in six volumes in 1883–90.

VINLAND, or **WINELAND**. The name given to that part of the continent of America visited by the Vikings of Norway. This coast was sighted in 986 by Bjarni Herjulfson (q.v.), who, in attempting to reach Greenland from Iceland, was carried out of his course by storms and the Arctic current. The land was not explored and named until 1000, when it was visited by Leif Ericson, who sailed along the coast from Labrador southward and gave the name of Wineland to one portion of the country because of the number of grapes he found growing there. Leif spent the winter felling timber with which to load his ship, and when spring came returned to Iceland. In 1002 Leif's brother Thorvald visited the land and spent the greater part of two years in exploration He attempted a settlement, but was attacked and killed by the natives, whom the Norsemen called Skrællings. In 1007 a colony of 160 men sailed from Greenland to establish themselves in the new land. They put up houses, but were discouraged by the persistent hostility of the natives, and after one winter returned to their own country. The last recorded voyage was in 1347.

The Icelandic historian, Are the Wise, who wrote in the early part of the twelfth century, mentions the discovery of Vinland, and he is authority for the accounts dating for the three centuries next following. Rafn (q.v.), in his *Antiquitates Americanæ* (1837), sets forth such evidence as exists respecting colonization in America by the Norsemen. To this work may be traced the extended popular belief in the statements that the Old Mill at Newport, the Dighton Rock, and other supposed remains can actually be ascribed to the Viking settlements. Professor Eben N. Horsford (q.v.), in the last quarter of the nineteenth century, revived interest in these settlements by a series of publications in which he tried to prove that the Norsemen visited the Charles River above Boston. The actual sources of documentary information are best given in A. M. Reeves's *Finding of Wineland the Good* (London, 1895). Consult also John Fiske, *The Discovery of America*, vol. i (Boston, 1892); J. E. Olson, *The Northmen, Columbus and Cabot* (New York, 1906); W. Hovgaard, *The Voyages of the Norsemen to America* (ib., 1914). See NORUMBEGA.

VINNEN, KARL (1863–). A German landscape painter. He was born in Bremen, was a pupil of the Dusseldorf and Karlsruhe Academies, and continued his studies during travels in Belgium and Holland. He was associated for a time with the Worpsweder group of painters, but never resided there. His landscapes, usually of northern Germany, are excellently composed and strong and brilliant in color. They include "Repose" (Bremen Gallery); "Evening" (Berlin National Gallery); "In the Park" (Hanover Gallery), and "Bremen in the Seventeenth Century" (mural painting in the Bremen Rathaus). Vinnen belongs to the Munich Secession, and received great gold medals at Vienna and Dresden.

VINNITSA, vĕn'nyĕ-tsà (Polish, *Winnica*). A district town in the Government of Podolia, Russia, situated on both banks of the Bug, 100 miles northwest of Kamenets-Podolsk (Map: Russia, C 5). It has a Jesuit college founded in 1649. Pop., 1910, 47,841, about one-third Jewish.

VINOGRADOV, vē'nŏ-grä'dôf, PAUL (PAVEL GAVRILOVITCH) (1854–1925). A British social and legal historian, born at Kostroma, Russia. He became a professor at Moscow, but his educational activities brought him into conflict with the bureaucracy. Settling in England, he made a special study of the village community (q.v.) in England, and showed that the early Anglo-Saxon village was a free community and not a manor. His important works, dealing with this subject, include *Villainage in England* (1892); an essay on Folkland in the *English Historical Review* (1893); *The Growth of the Manor* (1905); *English Society in the Eleventh Century* (1908). After 1903 Vinogradov served as corpus professor of jurisprudence at Oxford. In 1907 he lectured at American universities, and in 1913–14 was reader to the University of Calcutta. He published also *Common Sense in Law* (1914); *The Russian Problem* (1915); *Self-Government in Russia* (1916).

VINOGRADSKY, vē'nŏ-grät'skĭ, ALEXANDER NIKOLAIEVITCH (1855–). A Russian musical conductor. He studied piano under Nikolai

Rubinstein at Moscow and the theory of composition under Soloviev at St. Petersburg. From 1884 to 1886 he was director of the music school at Saratov, and in 1889 he became director of the Kiev branch of the Imperial Russian Musical Society and conductor of its symphony concerts. He conducted orchestras also in various foreign capitals, where he did much to arouse appreciation of Russian music by Western audiences. Among his compositions the more important are: a violin sonata; two string quartets; a set of variations for orchestra; a symphonic poem, *La nonne;* and *Air finnois* for violin and orchestra.

VINSAUF, văn'sôf', GEOFFREY DE (called also ANGLICUS). A poet and rhetorician, who lived in England about 1200. His name, *de Vino Salvo,* seems to have been derived from a work on the vine preserved in a manuscript at Cambridge, once attributed to him. He was the author of a poem, variously known as *Poetria Novella, Nova Poetria,* and *Ars Poetica.* It is written in Latin hexameters.

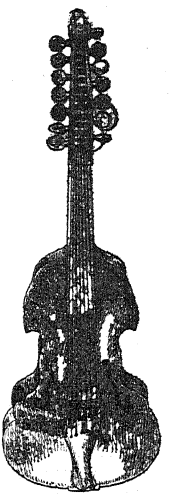
VINSON, văn'sôn', JULIEN (1843–). A French philologist, born in Paris, and educated in the Nancy School of Forestry. For some time he was assistant inspector of forests, but later devoted himself to linguistic study, became editor of the *Revue de Linguistique,* and in 1879 was made professor of Hindustani in the Ecole des Langues Orientales Vivantes. His especial studies were the Dravidian languages, Basque, and the dialects of Central and Southern America. He wrote: *Le Basque et les langues mexicaines* (1875); *Le verbe dans les langues dravidiennes* (1878); *Etudes de linguistique et d'ethnographie* (1878), with A. Hovelacque; *Eléments de la grammaire générale hindoustani* (1883); *Les religions actuelles* (1887); *Essai d'une bibliographie de la langue basque* (1891–98); *Manuel de la langue hindoustani* (1899); *Légendes bouddhistes et djainas* (1900); *Manuel de la langue tamoule* (1903).

VINTAR, vĕn-tär'. A town of Luzon, Philippines, in the Province of Ilocos Norte. It lies 5 miles northeast of Laoag, in a well-watered plain, surrounded by mountains. Pop., 1903, 9435.

VIN'TON. A city and the county seat of Benton Co., Iowa, 24 miles northwest of Cedar Rapids, on the Red Cedar River, and on the Chicago, Rock Island and Pacific Railroad (Map: Iowa, E 2). It is the seat of the Iowa College for the Blind; and has a Carnegie library and the Tilford Collegiate Academy. There are creameries, canning establishments, a large printing establishment, and manufactories of bricks, manure spreaders, etc. Pop., 1900, 3499; 1910, 3336.

VIOL (OF. *viole,* It. *viola,* viol, probably from OHG. *fidula,* Eng. *fiddle,* from ML. *vidula, vitula,* fiddle, from Lat. *vitulari,* to keep holiday, originally probably to sacrifice a calf, from *vitulus,* calf). A musical instrument, which was the immediate precursor of the violin. It is to be seen represented on monuments as far back as the close of the eleventh century. The belly and back were flat; there were larger bends in the sides than in the violin; and frets, like those of the guitar, were placed on the neck of the instrument. There was great variety in the number of strings: in Germany, 3, 4, and 5 were all common; in Italy there were usually 6. The strings were tuned by fourths and thirds. The bridge was but slightly arched, so that in the case of instruments with many strings it was very difficult to play upon the strings in the centre. But, on the other hand, this low-arched bridge greatly facilitated chord playing. There were treble, alto, tenor, and bass viols, and they were often played together. Consult E. van der Straeten, *The Violoncello and the Viols* (London, 1915).

VIOLA, vē-ō'là *or* vī-ō'là (It., viol). The tenor violin. An instrument in size and compass midway between the violin and the violoncello. It has four gut strings, the lower two covered with silvered copper wire. It is tuned in fifths, c, g, d^1, a^1, which is exactly an octave above the violoncello. The compass is from c to g^2, or even higher, and the music is written in the alto clef. In the orchestra and string quartet the viola is a fixture, but, in spite of its clear, mellow tone, very little use has been made of it as a solo instrument. The *viola d' amore* is an obsolete stringed instrument popular during the early eighteenth century. It had from five to seven strings of catgut, and below them, passing under the bridge, were an equal number of wire strings, which were tuned in unison and vibrated sympathetically with them. The compass was about three octaves and a half. See Plate of VIOLINS.

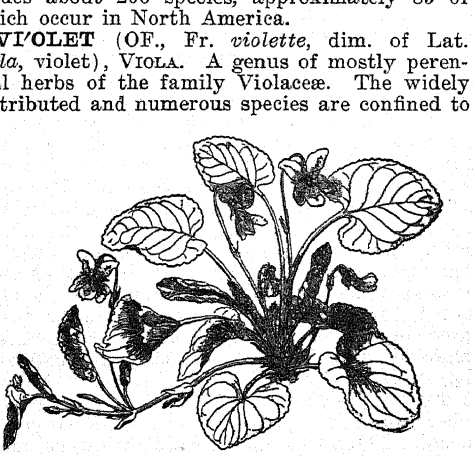


VIOLA D' AMORE.

VIOLA, vī'ō-là *or* vē-ō'là. The heroine of Shakespeare's *Twelfth Night.* She is wrecked, with a friendly captain, on the coast of Illyria, and is forced to reveal her identity by the appearance of her brother.

VI'OLA'CEÆ (Neo-Lat. nom. pl., from Lat. *violaceus,* relating to a violet, from *viola,* violet), or THE VIOLET FAMILY. A family of herbs and shrubs which includes about 15 genera and 300 species of wide distribution, distinguished by the peculiar type of irregular flowers. The best-known genus is *Viola* (violets), which includes about 200 species, approximately 85 of which occur in North America.

VI'OLET (OF., Fr. *violette,* dim. of Lat. *viola,* violet), VIOLA. A genus of mostly perennial herbs of the family Violaceæ. The widely distributed and numerous species are confined to temperate climates. Among the extensively cultivated species are *Viola tricolor* and *Viola odorata. Viola tricolor,* a native of the Old World is the wild species from which the common pansy



SWEET-SCENTED VIOLET (*Viola odorata*).

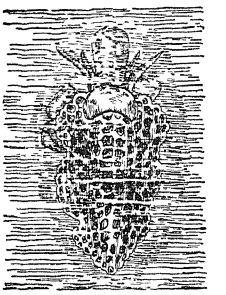
seems to have been developed. It has many varieties which surpass the natural species in beauty and diversity of color The pansy runs in strains rather than in varieties, and florists frequently group the varieties according to different arbitrary schemes. This species belongs to the leafy-stemmed violets The name pansy is derived from the French word *pensée*, thought. A strain of this species known as *Viola tricolor arvensis* has become naturalized in some places in the United States. The sweet violet (*Viola odorata*), one of the stemless species, is common in grassy places in Europe and northern Asia, with flowers of deep blue or rarely white. Cultivation has produced many varieties, including dwarf and double forms with great diversity of floral color. The wild plants are not as fragrant as improved garden varieties. *Viola canadensis* is an American species of which the cultivated varieties are frequently grown on sloping banks and rockeries. The bird's-foot violet (*Viola pedata*), also American, is the parent of several handsome cultivated varieties. *Viola altaica*, native to Siberia, has been introduced into cultivation, and by itself, or by hybridization with *Viola tricolor*, has become the parent of many garden violets. *Viola biflora* is widely distributed in the Northern Hemisphere. It produces small yellow flowers, usually in pairs, from April to June. Dogtooth violet is the common name of the genus *Erythronium* (q.v.), a genus unrelated to the violets proper.

Violets are of easy cultivation on various soils, best in cool, shady positions, with rich, moist, sandy loam, and good drainage. They are propagated chiefly by cuttings or divisions. Cuttings are made from vigorous shoots in the spring and set in fine sandy soil in a cool greenhouse or frame, and the resulting plants are transplanted to permanent quarters in the fall. Propagation by division consists in dividing the plants after the flowering period and replanting them immediately. Such plants flower the following spring.

There are a number of so-called diseases that are wont to attack violets. Rust, leaf blight, or spot (*Cercospora violæ*) causes the formation of circular grayish spots with dark centres upon the leaves. Badly infested plants and affected leaves should be destroyed to prevent the ripening of the spores. A spot disease attributed to *Alternaria violæ* attacks the parts above ground and is most troublesome upon rapidly growing plants. The spots have light-colored centres surrounded by darker zones, which become lighter in old spots. Care in the selection of plants, careful culture, removal of all diseased leaves and plants, and propagation of stocky, vigorous plants are suggested as preventive means. An anthracnose (*Gloeosporium violæ*), often quite destructive, begins at the edge of the leaf and continues to spread until the whole plant is affected. Many diseases can be prevented by proper management of the plants. Fungicides may be used, but they usually discolor the leaves by the deposit of copper. A root rot due to *Thielavia basicola*, often destructive in beds, may be controlled by sterilization of the soil. Nematoda (q.v.), which are sometimes troublesome, may be destroyed by steam sterilizing the soil before the plants are set. Consult A. and D. Allen-Brown, *The Violet Book* (New York, 1913), and B. T. Galloway, *Commercial Violet Culture* (ib., 1914).

VIOLET FAMILY. See VIOLACEÆ.

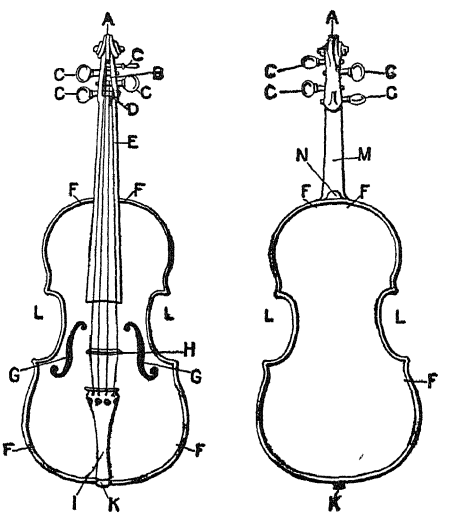
VIOLET SNAIL. A small pelagic pectinibranch gastropod mollusk of the genus *Janthina*, nearly related to the wentletraps (q.v.). Several species are known, all inhabitants of the open sea, where they cling to floating seaweeds and the like. Their shells are fragile, purple in color, and in shape like small turban shells (q.v.). They are especially interesting from the curious float which they construct to support their egg capsules. This is a gelatinous raft in which a cluster of eggs is entangled with air bubbles, buoying them up; and thus the collection is dragged about by the mollusk until the young hatch. They occur in shoals and feed upon jellyfishes.



VIOLET SNAIL.

A *Janthina* seen from above, showing its bubble raft of eggs.

VIOLIN (It. *violino*, dim. of *viola*, viol). The most popular of stringed instruments played with the bow. In its primitive form it is a development of the lyre and monochord (qq.v.), the strings from the former, and the elongated resonant box with its sound holes, finger board, and movable bridge, from the latter. The history of the violin begins with the invention of the bow, which was first applied to the crwth, or crowd (q.v.), some time before the thirteenth century, when the viole, or vielle, of the troubadours appeared. The rebec (q.v.), the geige, the fidel,



OUTLINE OF VIOLIN, SHOWING ITS COMPOSITE PARTS.

A, scroll, *B*, peg box; *C*, pegs, *D*, nut; *E*, finger board; *F*, purfling; *G*, sound holes; *H*, bridge; *I*, tailpiece; *K*, button; *L*, bouts; *M*, neck; *N*, neck plate.

and many kinds of viols and violas underwent changes until towards the middle of the sixteenth century the true violin model appeared, and superseded other instruments of its class, except the viola, violoncello, and double bass. The primitive violins had no contour, and it was not until the thirteenth century that the body of the vielle was scooped out at the ribs, forming a kind of waist. The corner blocks were added about the fifteenth century, and it is supposed

they originated in Germany. The foundation on which violin making was to rest was the viol with the double corners. These produced a new constructive feature, the bouts, the ribs which curve inward between the two corner blocks. These bouts rendered it possible for the first time for a player to get at the strings. At first they were of large size, but were tapered down later. For nearly a century the sound holes were shifted all over the violin, sometimes crowding with the bridge near the tailpiece. It was not until the violin model had been some time in use that they were cut in their proper place and the bridge fixed between them. The bridge was the last point perfected, and that by Stradivarius. Violins may be divided into two classes: those made on the high and those on the flat model. The former is characteristic of the Stainer pattern, the latter of the Stradivarius. The violin consists of 70 different parts, all of which, except the strings and loop, are made of wood.

The matter of varnish is important; for, aside from external appearances, varnish affects the tone. Two kinds are used, oil and spirit varnishes. The oil completely fills the pores of the wood and thus renders the tone of the instrument somewhat muffled at first; but when the oil in time evaporates the wood remains mellow and sensitive to the slightest vibration Spirit varnish dries rapidly. It does not fill the pores completely and leaves the surface incased in a glassy substance which imparts a harsh, penetrating sound to the instrument. The Cremonese violins are especially famous for the superior quality of their varnish, but after 1760 its secret seems to have been lost. The strings also are an important consideration in the production of tone. The best are made in Italy—highly finished, durable, and with a pure, sympathetic tone. Next in rank are those made in Germany (Saxony). Owing to occasional overbleaching, German strings are more frequently found to be false than Italian strings. French strings rank next. Although well made, they are not as durable as either Italian or German strings. English strings are chiefly made in the cheaper grades. They are durable, but lack finish. The material from which all gut strings are made is the intestines of sheep. The number of strings varied at different times (from only two to six), but since the determination of the true violin model four strings have been universally used. The strings are tuned in fifths, g, d^1, a^2, e^3. In order to reduce the lowest string to a moderate thickness it is wound with silver or copper wire (overspun).

In playing the violin 11 positions are recognized. By means of shifting, the compass of the violin is extended to almost four octaves, g to c^4. Skillful players can go even beyond this compass. A peculiar veiled tone is obtained by placing a mute (q.v.) (sordino) upon the bridge to check the vibrations. The quality of tone depends chiefly upon the method of bowing. In many compositions the bowing is specially marked. The up-stroke is marked v, the down stroke ⊓; all the notes under a legato curve are to be played with one continuous stroke. A peculiar effect is obtained by plucking the strings with the finger. (See PIZZICATO.) By playing with the bow close to the bridge the tone becomes very hard and metallic. This effect is called for by the words "sul ponticello." Harmonics are tones of a very ethereal character and are produced not by pressing the string against the finger board, but by touching it lightly at certain points. (See HARMONICS.) Chords can be played when the different tones are produced on different strings. This is called double stopping. In the orchestra the violins are the principal instruments, being divided into first and second. See ORCHESTRA.

The art of violin making was at its height in Italy during the eighteenth century. For the sake of convenient arrangement, the principal makers—for such only it is possible to consider—will be grouped into schools.

1. **School of Brescia.** The founder of this school is Gasparo di Bertolotti (c.1542–1609), commonly known as Gasparo da Salo He made chiefly viols and violas and very few violins. The latter are of a large pattern with very large sounding holes. The workmanship is clumsy and crude, but the wood and varnish are of excellent quality. His pupil, Giovanni Maggini (1581–1631), greatly improved Da Salo's model, and was among the first, if not the first, to introduce the use of corner blocks. With the rise of the opera, especially after Monteverde's reforms of the orchestra (1608), violins came into great demand. Maggini's instruments show a steady advance. In his later years he was evidently influenced by the beautiful models of Amati. Giambattista Ruggeri (c.1690) was a pupil of Amati and began his art in Cremona, but later removed to Brescia.

2. **School of Cremona.** The masters of this school produced the finest instruments. While Da Salo was making violins in Brescia, Andrea Amati (c 1520–80) set up a shop in Cremona, and thus became the founder of Italy's most famous school. His instruments are graceful, with a sweet but not powerful tone. Andrea's sons, Antonio and Geronimo, worked together from 1575 to 1625. They adopted their father's graceful model, but improved the playing qualities, so that their instruments are very sonorous. Geronimo's son Niccolò (1596–1684) is the most famous representative of the Amati family. Up to about 1650 Niccolò used the model of his father and uncle. But then he gradually introduced those changes which finally led to the model known as the Grand Amati, whose body is 14 inches long and strengthened throughout. Niccolò exerted a lasting influence upon the art of violin making, for among his pupils we find masters like Antonio Stradivari, Stainer, Albani, Grancino, and G. B. and F. Ruggeri.

The greatest of all violin makers was Antonio Stradivari (1644–1737). A pupil of Niccolò, it is natural that his earliest violins should be after the Amati pattern. In fact, the instruments made between 1670 and 1685 are known as Amatesse Stradivaris. When Amati died in 1684 he bequeathed all his tools, models, and large stock of choice wood to Stradivari. It is no wonder, then, that after 1685 a remarkable advance is noticeable in Stradivari's instruments. By 1690 the master had completely given up the Amati model and had established his own —a combination of Amati's feminine grace and his own masculine strength. Although Stradivari is not known to have possessed a technical knowledge of acoustics, he attained results for which modern science has established the underlying principles. The period from 1700 to 1720 is known as Stradivari's golden period. The later instruments show, indeed, no falling off in the quality of tone, but are not quite so

beautiful in appearance. Carlo Bergonzi (1715–47), a pupil of Stradivari, made instruments remarkable for brilliancy and mellowness. His work has been imitated chiefly by French makers. Francesco Ruggeri (1630–1720), a pupil of Amati, occupies a prominent place. His instruments are mostly modeled after the Amatis. Giuseppe Antonio Guarneri (1683–1745) is a master whose instruments are by many regarded as equal to those of Stradivari There were several other members of the Guarneri family who made good violins, but none of them excelled those of Giuseppe Antonio, or Guarneri del Gesù, as he is usually known, on account of his labels, which generally bear the letters I H S, surmounted by a cross. Vuillaume divides the work of Guarneri into four periods The instruments of the second period are small and elegant, those of the third and fourth are larger Lorenzo Guadagnini (1690–1742), a pupil of Stradivari, rose to prominence through the excellent tone of his instruments, although their external finish is not as careful as that of others. His model is rather larger than the average His son, Giovanni Battista (1711–86), surpassed him in the beauty of the wood and varnish. Lorenzo Storioni (1760–1800) is generally regarded as the last of the Cremonese masters. His work is not equal to the best of his predecessors, but shows certain characteristics of the school of Cremona.

3. **School of Venice.** This school did not become prominent until after 1700. Matteo Gofriller (c.1670–1724) seldom labeled his instruments, which thus have often been mistaken for Cremonese workmanship. Francesco Gobetti (1680–1720) made instruments on the Stradivari pattern. They are beautiful in appearance and possess a wonderful tone. Santo Serafino (1687–48) rivals the best makers in the surpassing beauty of design and varnish; but his instruments, though of delicate tone, lack power. The greatest of the Venetian masters is Domenico Montagnana (1690–1740). He was a pupil of Stradivari, and from the moment when he settled in Venice occupied the foremost place among violin makers.

4. **School of Naples.** In the number of instruments made Naples comes next to Cremona. Although, as a rule, all the violins have an excellent tone, they are inferior to those of the other schools in workmanship and beauty of finish. Alessandro Gagliano (1650–1730), a pupil of Stradivari, established himself in Naples. Most of his sons and grandsons devoted themselves to the art of violin making. Of these Ferdinando (1706–83) is the most famous. He adopted Stradivari's last model.

5. In addition to the above-mentioned schools fine instruments were made in Rome, Florence, Milan, Bologna, Padua, and other cities. But nearly all such violins can be classed as belonging to one of the four famous schools, because their makers either came from those cities or learned their craft there. David Tecchler (c.1660–?), a German, established himself at Rome. His cellos especially are highly esteemed. Giovanni-Pressenda (1777–?), a pupil of Storioni, was undoubtedly the greatest Italian master of the nineteenth century. He worked in Turin. Carlo Testore (1680–1715) established himself at Milan. He employed chiefly Guarneri's model Giovanni Grancino (1670–1730), also of Milan, shows considerable originality in his work.

6 **French School.** In France the art of violin making was not practiced generally until the eighteenth century. The French masters are rather skillful imitators of the Italians than original makers. The models imitated are those of Brescia and particularly Cremona (Stradivari) Many of the makers resorted to artificial means to give their instruments the appearance of old violins Whereas the Italian masters always strove to produce only the best violins, many French makers, in order to supply the demand, made varying qualities of instruments. The most famous French master is Nicolas Lupot (1758–1824), who copied Stradivari almost exclusively Others worthy of mention are F. Pique (1788–1822), J. B. Vuillaume (1798–1875), P. Silvestre (1801–59), F. Gand (1802–45), G Chanot (1801–83), S. Bernardel (1802–70), J. Germain (1822–70). At the present day the art of violin making seems to have been driven to the wall by the wholesale factories of Mirecourt

7 **German School.** Very few of the German violins rose above mediocrity. One of the earliest makers is also the greatest—Jacob Stainer (1621–83). His model is entirely original, but he adopted the famous Italian varnish. For a long time his violins were in exclusive demand in Germany; and not only German but also English connoisseurs ranked Stainer above the Italian masters. Among the many imitators of Stainer, Kloz and Widhalm deserve especial mention. Other German makers, notably Eberle, Bachmann, Jauch, Hunger, and Stainer's contemporary, Albani, worked after Italian models. But their work was not appreciated until later.

8. **English School.** Before the removal of duties on foreign violins violin making flourished also in England. Jacob Rayman, a Tyrolean by birth, settled in London about the middle of the seventeenth century, and became the founder of the English school. His model is that of Stainer. Barak Norman (1688–1740) in his later years began to copy Maggini, thus helping to bring the Italian models into favor. Benjamin Banks (1727–95) used the model of Amati, which soon was in greater demand than that of Stainer. William Forster (c.1800) did not attain a great reputation until he had abandoned the Stainer pattern and adopted that of Amati. Bernard Fendt (1775–1823) was perhaps the most famous English imitator of Italian models, particularly of Stradivari. For a century after the death of Stainer his instruments as well as those of his imitators were in great demand. But about the year 1800 the superiority of the Italian masters began to be appreciated. The Amati instruments were the first to bring high prices. In 1804 an Amati was sold for $150. Stradivari's instruments were the next to be recognized; then those of Guarneri, Maggini, and Bergonzi. As soon as this demand for Italian violins became general the prices rose rapidly. Paris and London became the principal markets for old Italian violins. Private individuals began to collect them. The man who devoted his whole life to discover old instruments, and thus saved scores of valuable violins, was Luigi Tarisio, who died in 1854. After Tarisio's death Vuillaume bought his whole collection. Among these was a Stradivari, which is valued at $15,000. The value of an instrument to-day depends upon its state of preservation, as well as the period of its maker. Sometimes older instruments are of less value than violins

of more recent date. See QUARTET, QUINTET; MUSIC, HISTORY OF, XVI; MUSICAL INSTRUMENTS

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VIOLLE, vē'ōl', JULES (1841–) A French physicist. He was born at Langres, and was educated at the Ecole Normale Supérieure. In 1870 he took the degree of doctor of science at the University of Paris. In 1883 he was appointed professor at the University of Lyons, and in 1890 became the head of the department of physics in the Ecole Normale. The following year he was made professor of applied physics in the Conservatoire des Arts et Métiers. Violle became best known for his researches in radiation, heat, and photometry, having proposed the platinum standard of light emitted by a square centimeter of melting platinum at the instant previous to its solidification. This was adopted by the International Electrical Congress of 1883, but never came into extensive use as a standard of light, on account of the experimental difficulties involved in preparing the platinum. He delivered two notable lectures, "Du rôle de la physique à la guerre" on Dec 10, 1914, and Feb. 11, 1915, subsequently published. His publications include a *Cours de physique* (2 vols., 1883–86), scientific papers on photometry and other subjects, and contributions to the *Encyclopédie chimique.*

VIOLLE STANDARD. See PHOTOMETRY, *Standards of Light.*

VIOLLET, vyō'lā', PAUL MARIE (1840–1914). A French historian, born at Tours. He studied at the Ecole des Chartes, where he became professor of civil and canon law in 1890. His work, which is most scholarly, deals principally with the history of the old French law. Among his writings are: *Précis de l'histoire du droit français* (1885); *Les établissements de Saint Louis accompagnés des textes primitifs et de textes dérivés* (4 vols., 1881–86); *Histoire des institutions politiques et administratives de la France* (3 vols., 1890–1903); *Histoire du droit civil français avec notions du droit canonique en notes bibliographiques* (1905); *Les communes françaises au moyen âge* (1906); *Le roi et ses ministres pendant les trois deniers siècles de la monarchie* (1912).

VIOLLET-LE-DUC, vyō'lā'-le-dŭk', EUGÈNE EMMANUEL (1814–79). The most prominent architect of the Gothic revival in France, equally well known as an author on architectural subjects. He was born in Paris, and was educated at the Collège Bourbon. After studying architecture with Achille Leclère, he traveled through France in the employ of Baron Taylor (see TAYLOR, I. S. J.) studying mediæval monuments, and became proficient in designs of the Gothic style. He was especially skilled in the restoration of works of mediæval architecture, and did more than any other man to arouse an intelligent interest in its monuments. After some works at Vézelay and Narbonne, he undertook, in association with Lassus, the restoration of the Sainte Chapelle in Paris and important additions and changes in Notre Dame, Paris, for which he designed the present central spire and sacristy. Almost as important was his restoration of civil and military monuments, such as the royal château of Pierrefonds, which he almost entirely reconstructed, and the mediæval walls of Carcassonne, the most marvelous relic of Gothic fortifications. In 1863 he was appointed professor of æsthetics in the Ecole des Beaux-Arts, but, meeting with strong opposition, he resigned, publishing his lectures, *Entretiens sur l'architecture,* the following year. At the time of his death he was engaged in restoring the cathedral of Lausanne.

He wrote a number of important books, admirable in their scholarly text and unrivaled illustrations. Among them are *Dictionnaire raisonné de l'architecture française* (10 vols., 1854–68) and *Dictionnaire raisonné du mobilier français* (6 vols., 1858–75). In his *Histoire d'une forteresse* (1874) and *Histoire d'un hôtel de ville et d'une cathédrale* (1878) he draws an imaginary history of these typical mediæval buildings. Others of his works are *L'Art russe: les origines* (Paris, 1877); *Monographie de Notre Dame de Paris* (ib., no date); *De la décoration appliquée aux édifices* (ib., no date). Consult Sauvageot, *Viollet-le-Duc et son œuvre* (Paris, 1880), and Saint-Paul, *Viollet-le-Duc, ses travaux d'art, etc.* (ib., 1881).

VI'OLONCEL'LO, *Ital. pron* vē'ō-lōn-chĕl'lō (It. diminutive of *violone,* augmentative of *viola,* viol). A large instrument of the violin class, held by the performer between his knees. It has four gut strings, the lowest of them covered with silvered copper wire, and is tuned in fifths: C, G, d, a. Its compass extends from C to a^2, and even higher. Its signature is usually the bass clef, the tenor or treble clef being used for the higher notes. In its present form the instrument dates from the latter half of the sixteenth century. Up to the eighteenth century its quality was little known, but since the time of Haydn the instrument has steadily gained in favor It soon superseded the viola da gamba. The musical literature for the violoncello is exceedingly meagre. Consult L. Grillet, *Les ancêtres du violon et du violoncelle* (2 vols., Paris, 1901), and E. van der Straeten, *The Violoncello and the Viols* (London, 1915). See Plate of VIOLINS.

VIONVILLE, vyôN'vĕl', BATTLE OF. The most desperately contested battle of the Franco-German War, fought on the plateau of Vionville, 12 miles west of Metz, between about 130,000 French under Marshal Bazaine and a German force of 67,000 under Prince Frederick Charles, Aug. 16, 1870; also known as the battle of Mars-la-Tour. The battle was one of the series of conflicts that prevented the retreat of the French army on Chalons, being preceded by the battle of Colombey-Nouilly on the 14th and succeeded by that of Gravelotte (q.v.) on the 16th. The battle began at 10 in the morning with an attack by the Third Prussian Corps on the French under Frossard at Vionville. It lasted for nearly 12 hours and was marked by great cavalry charges on the part of the Germans and desperate fighting on both sides. Bazaine overestimated the German strength and held himself on the defensive until the enemy had been reënforced sufficiently to repel all French attempts to break through their lines. The

Germans lost 711 officers and 15,079 men; the French 879 officers and 16,128 men.

VIOTTI, vē-ot'tē, GIOVANNI BATTISTA (1753–1824). An Italian violin player, born at Fontanetto, in Piedmont, and chiefly educated under Pugnani at Turin. After holding for a short time the appointment of first violinist in the royal chapel at Turin, he relinquished that office (1780) in order to travel in Europe with Pugnani. In Berlin, St. Petersburg, Paris, and London his playing created a furore. He first visited London in 1782. An attempt to found an Italian opera was frustrated by the Revolution of 1791, and Viotti again went to London as a soloist. A groundless charge against him of being a revolutionary agent drove him from England; but after living a while in retirement at Hamburg he returned to London, where he became manager of the Italian opera, and in 1795 director of the opera concerts. Ill success caused his return to Paris, where he was director of the opera (1819–22). His compositions include violin concertos and quartets for violin, tenor, and violoncello, violin duets and solos, and a few pianoforte compositions. His playing was characterized by vigor and brilliancy. His compositions are still in use. Consult F. Baillot, *Notice sur Viotti* (Paris, 1825).

VIPER (Lat. *vipera*, viper, adder, serpent, for **vivipara*, fem. sing. of *viviparus*, bearing living young, from *vivus*, alive + *parere*, to bear, produce). A venomous snake of the subfamily Viperinæ. (See VIPERIDÆ.) Nine genera and about 40 species are recognized by Gadow, all denizens of the Old World, and many known by other names and elsewhere described. (See ADDER; ASP; DEATH ADDER, PUFF ADDER; RATTLESNAKE; TREE VIPER.) The real vipers of the genus *Vipera* are European and Asiatic, and are typically represented by the common adder, viper, or kreuzotter (*Vipera berus*), whose range extends from Great Britain (except Ireland) to Sakhalin Island, and which is the only serpent in England except the water snake (q.v.). It rarely exceeds 2 feet long, and is very variable—gray, yellowish, olive, brown, red, or black, marked along the back with a zigzag band, most distinct in the lighter specimens. The head is flat and triangular, the neck small, the body comparatively thick, and the tail short and pointed. Vipers prefer stony places, where they can retreat to crevices. They do their hunting at night, when they are likely to creep near camp fires, as do other nocturnal venomous serpents. They gather into tangled masses when mating in the spring, and the young are born in the following July or August. They hibernate during cold weather in holes, several entwining, and they vary the degree and length of dormancy with the climate. Their bite is not as a rule fatal to a healthy man, but is followed by great depression and nervousness, and the wound is long and troublesome in healing.

The Mediterranean countries, along both shores, have another species (*Vipera aspis*), the asp (q.v.). From Italy to Armenia occurs the sand viper (*Vipera ammodytes*), which bears a fleshy horn upon its nose; and a third species (*Vipera latasteï*) inhabits Spain and Portugal. The African vipers are the death adder, puff adder, and saw vipers (qq.v.). One, especially characteristic of the Egyptian deserts, but known from Algeria to Palestine, is the horned viper (*Cerastes cornutus*), which burrows in the sand during the day, leaving only its nostrils and eyes exposed, but goes abroad at night in search of the small animals upon which it lives, and then is most likely to approach Bedouin camp fires. It is a yellowish, faintly spotted snake, about 2½ feet long, and above each eye stands a large horny, spikelike scale. It is more vicious and aggressive than most vipers, and is greatly feared, for its bite is usually fatal. Another species (*Cerastes vipera*) is hornless.

The largest, most ornate, and deadly viper is that scourge of India, Ceylon, Burma, and Siam, Russell's viper (*Vipera*, or *Daboia, russellï*), called tic-polonga in Ceylon, bora around Calcutta, jessur, and sometimes carpet snake or chain viper, by Anglo-Indians. Its markings are shown on the Plate of FOREIGN VENOMOUS SERPENTS under SNAKE. It reaches a length of 5 feet, and its poison is swift and sure in fatal effect. Fortunately the snake is sluggish and not easily provoked; and its hisses when disturbed warn men away, so that fewer human lives are lost by it than by cobras. For an explanation of the poison apparatus, effects of poison, and bibliography, see SNAKE.

VIPER, DR. A character in Samuel Foote's (q.v.) play *The Capuchin*. It depicted, under a thin disguise, an Irish clergyman named Jackson, a tool of the notorious Duchess of Kingston (q.v.). Jackson suborned a servant to prefer infamous charges, of which Foote was acquitted in court.

VIPER, RAT-TAILED. See FER-DE-LANCE.

VIPER FISH. See LANTERN FISH.

VIPERIDÆ (Neo-Lat. nom. pl., from Lat. *vipera*, viper, adder, serpent). The most specialized and venomous family of snakes, ranked as the highest of ophidians. It is characterized by a wide, angular, depressed head, causing the neck to appear small in comparison; a short thick body; and a tail tapering suddenly to a point. The head is mostly covered with scales, rarely plates (or only a few about the eyes and lips), or with extremely fine plates. The scales are carinated, often rough, even spinous. The ventral shields are broad, and the subcaudal plates in two rows. The nostrils are large, and in some species they close with a valve. The highly venomous serpents of this family are furnished with a pair of long, curved proteroglyph fangs attached on each side to the upper maxillary, which is movably articulated, and by special muscles swings or rocks to and fro, carrying the fang with it. When at rest, the fang, protected by a membranous sheath, lies supine along the jaw. The fang has a canal in its interior, connected with a poison gland, the contents of which are ejected into the wound made by the fang in the act of biting. (See illustrations under SNAKE.) Behind the pair of functional fangs, others, in a rudimentary stage, are found, and come forward to take their place when one or both of them are broken or shed. The lower jaw has numerous solid teeth of the ordinary form. All vipers except the African genus *Atractaspis* are viviparous, and produce comparatively few young. The family includes terrestrial, arboreal, semiaquatic, and burrowing types, and is almost world-wide in its distribution, but most numerous and highly developed in the tropics; Australia, Madagascar, and cold northern regions are free from these baneful serpents. The family includes two well-marked groups—the *Viperinæ*, or typical vipers (q.v.), which have no external pit between the

eyes and the nose, and the maxillary not hollowed out above, and which belong wholly to the Old World; and the American and Asiatic *Crotalinæ*, or pit vipers, which have a deep cavity between the eye and the nose lodged in the hollowed-out maxillary bone. The last named are frequently ranked as a separate family. See CROTALIDÆ; RATTLESNAKE

VIPER'S BU'GLOSS, also called BLUE THISTLE (*Echium*). A genus of large, hairy herbs or shrubs of the family Boraginaceæ. The flowers are often very beautiful The common viper's bugloss (*Echium vulgare*), a large biennial plant, is a native of most parts of Europe, and introduced and spreading in many parts of the United States It grows in dry places, not infrequently in grain fields. Its flowers while in bud are reddish, and afterward blue. It derives its name, viper's bugloss, from spots on its stem, which somewhat resemble the spots on a viper, and the property of healing viper's bites was, therefore, ascribed to it.

VIQUE, vē'kā. A town in Spain. See VICH.

VIRACOCHA, vē'rā-kō'cha (CON TICI VIRACOCHA or TICI VIRACOCHA). A man with superhuman attributes in the traditions of Peruvian Indians. While accounts from various early sources vary greatly, he is generally represented as being much lighter in color than the Indians and as wearing a long beard. The Indians of to-day speak of all white men as viracochas. One account of this tradition runs that Viracocha appeared in the Province of Collasuyu in very ancient times when the land was in darkness, having neither light nor day. That he went to the village called Tiaguanaco, where, being moved by the condition of the people, he created the sun and caused it to move in its course, after which he made the stars and the moon. According to another version there had been two successive creations by Viracocha. On his first appearance he had created the earth, the sky, and the people, and disappeared, leaving darkness everywhere. Later he had come out of Lake Titicaca and created the sun, the stars, and the moon and regulated their course in the heavens.

Still another version relates that at a time long before the Incas had ever been heard of, the Indians were a long time without seeing the sun, and in their distress offered up many prayers and vows to their gods. Presently the sun, shining very brightly, came forth from the Island of Titicaca, at which every one rejoiced. Then appeared a white man of great stature who, by his aspect and presence, called forth great veneration and obedience. This man had the power to change plains into mountains, and great hills into valleys, and to make water flow out of stones. The Indians say he performed other wonders, giving life to men and animals, and that through him marvelous benefits were conferred on the people. It is stated by the early chroniclers Francisco López de Gomara and Agustín de Zárate that Viracocha signifies froth or grease of the sea.

VIR'BIUS. See DIANA.

VIRCHOW, fir'kō, RUDOLF (1821–1902). A German pathologist, anthropologist, and political leader, born Oct. 13, 1821, at Schivelbein, Pomerania. He graduated in medicine at Berlin (1843), where he became prosector of anatomy, sharing the companionship of Henle, Schwann, Brücke, Helmholtz, Du Bois-Reymond, and other scholars who were destined to become distinguished as the discoverers of important medical facts He became in 1847 lecturer at the University of Berlin Soon afterward he was commissioned by the government to investigate the cause and cure of typhus in Silesia In his report he severely condemned the Prussian government for its lax hygienic and social laws, and made a strong appeal for a democratic form of government He founded at this time the *Archiv für pathologische Anatomie und Physiologie*, of which he remained editor till his death, and which is celebrated the world over by its official title *Virchow's Archiv*. The political commotions of 1848 dragged him, in common with many other votaries of science, into the revolutionary vortex. He established a journal entitled *Medizinische Reform*, and helped to found a democratic club, where he soon distinguished himself as an orator. On account of his political opinions Virchow lost his post in 1849, and, though reinstated afterward, he accepted in the same year a call to the chair of pathological anatomy in Wurzburg. His lectures at that university were widely popular for the novel views which he advanced, particularly in cellular pathology. His reputation grew so great that he was recalled in 1856 to Berlin, where he occupied until his death the chair of pathological anatomy, and rendered it the most famous of its kind in Europe. In the same year he finished his researches on embolism, showing that a thrombus is the primary condition in phlebitis, thus overthrowing the older theories, which made the thrombus secondary In 1861 he became a member of the Municipal Council of Berlin, and did much to improve city conditions. In 1862 he was chosen Deputy to the Prussian Diet, and soon rose to the leadership of the opposition, and proved a most effective antagonist of the encroachments made on the constitution by the conservative party under the cover of the royal prerogative. He was one of the founders of the Fortschrittspartei (Progressists), and both as such and as a subsequent member of the deutsch-freisinnige party he was one of the most prominent figures of the German Reichstag from 1880 to 1893. He was especially active as an opponent of Bismarck's policies, both domestic and foreign.

The first edition of his masterwork, *Cellularpathologie*, was published in 1858, and attracted at once the attention and admiration, and later won the acceptance of the medical world, displacing the former pathological systems and theories for all time. (See PATHOLOGY.) His views were so clear, his theory so perfect, and his grasp of the matter so comprehensive that his fame was at once assured. His work upon tumors is of especial value, as it holds the practical and clinical aspects of the matter as of prime importance—a circumstance that is remarkable in view of the fact that Virchow was not a practitioner of medicine. His views combated the dogmatic theories of Rokitansky and the prevailing Vienna school of pathologists. His work in pathology is distinctly a creation, establishing the biological principle that the laws working in disease are not different from those in operation in health, though subject to different conditions, *omnis cellula e cellula*, "a new growth of cells presupposes already existing cells." The cellular theory was finally established in 1858. During the wars of 1866 and 1870–71, Virchow devoted himself to arranging, equipping, and drilling hospital corps and am-

bulance squads, and directed the management of numbers of hospital trains, also taking charge of the immense Berlin military hospital, as well as of the sanitary arrangements of the troops in the field. The Franco-Prussian War ended, Virchow became a member of the Sanitary Bureau of the city of Berlin, with its great problem of the disposal of sewage. Under his direction immense sewage farms were established after such a plan that they have kept pace in adequateness with the tremendous growth of the city, while the revenue from them is sufficient to meet and defray the expense of their maintenance. But his researches in pathology and hygiene were many He excelled also as a parasitologist, making discoveries in trichiniasis (q.v.). But the newer discoveries and views of Koch and Behring relative to toxins and antitoxins he did not accept readily.

Virchow was also distinguished as an archæologist. His advice and learning were of great advantage to Schliemann in the latter's researches in Hissarlik, and in the plains of ancient Troy. Archæological anthropology gained much from his description of the Neanderthal skull and of the bones found in the graves at Koban He contributed more than 100 articles on anthropology, especially well known being his *Crania Ethnica Americana* (1892).

On Oct. 13, 1901, upon the celebration of his eightieth anniversary at a complimentary dinner in Berlin, a *Festschrift* was presented to him by a score of former students. Simultaneously testimonial dinners were given in other cities, notably New York and Chicago, in the United States, at which many physicians vied with each other in recounting the discoveries and sounding their praises of the great scientist, teacher, physician, and legislator. He died at Berlin Sept. 5, 1902.

Perhaps Virchow's greatest material monument is the Pathological Institute and Museum in Berlin, erected by the government in accordance with his desires. It contained 23,000 specimens at the time of his death, and by far surpasses all similar collections in the world.

He was a very voluminous writer. Among his works are *Mittheilungen uber die Typhus-Epidemie* (1848); *Die Cellularpathologie* (1858; Eng. trans, 1860); *Handbuch der speciellen Pathologie und Therapie* (1854–62); *Vorlesungen über Pathologie* (1862–72); *Die krankhaften Geschwülste* (1863–67). He also wrote on political and social questions and on a variety of other topics—the gorilla, prehistoric syphilis, mediæval leprosy, plague in its relations to public health, Goethe, Morgagni, Schoenlein, Johannes Müller, spedalska (a disease peculiar to the Norwegian coasts), the relation between lupus and tuberculosis, etc. From 1866 he published with Von Holtzendorff *Sammlung gemeinverstandlicher wissenschaftlicher Vortrage*. Consult Becher, *Rudolf Virchow* (Berlin, 1891), J. L. Pagel, *Rudolf Virchow* (Leipzig, 1906). A *Virchow-Bibliographie* was published in 1901 (Berlin).

VIREO, vĭr'ē-ō (Lat. *vireo*, greenfinch, from *virere*, to be green, vigorous), or GREENLET. The common name of a family of about 50 insectivorous birds, having a plumage more or less tinted with green and olive In the genus *Vireo* the bill is short, straight, notched, and hooked at the tip; wings long and pointed; toes of moderate length; tail moderate and even. There are about 30 species in this genus, a dozen of which occur in the United States, most of them migrating to and from South America and the West Indies It has been subdivided into several genera Many of these birds are singers, and the variety of song in the genus is great All subsist exclusively upon insects, and are of immense service to the gardener and orchardist. All agree, also, in constructing a very artistic nest in the form of a cup of ribbon-like materials, such as grape-vine bark, ornamented with cobwebs, lichens, and the like, the typical form is shown on the Plate of PENSILE NESTS OF BIRDS, under NIDIFICATION.



RED-EYED VIREO

The most familiar and widespread species in the United States is the red-eyed vireo (*Vireo olivaceus* or *Vireosylva olivacea*), about 6 inches long; back and tail bright olive-green, crown ashy, and a characteristic double line, dusky and white, over the eye, the iris of which is red. The white-eyed vireo (*Vireo noveboracensis*, or *griseus*) is very similar, but has a white iris. A more southerly species is *Vireo barbatulus*. Of the others, the most striking is the yellow-throated (*Vireo*, or *Lanivireo*, *flavifrons*), which is bright olive-green above, pure white beneath, and with the throat and breast bright yellow.

VIRGIL. See VERGIL.

VIRGILIA (Neo-Lat, named in honor of the Latin poet *Virgilius*, *Vergilius*, *Vergil*, in allusion to his agricultural poem, the *Georgica*). A genus of leguminous trees, natives of South Africa. The only species, *Virgilia capensis*, is a handsome tree 15–20 feet tall occurring abundantly along streams in Cape Colony. The wood is light, soft, and easily worked, and is much used for yokes, spars, etc. See CLADRASTIS.

VIRGIN. See MADONNA; MARY.

VIRGIN. An instrument of torture. See MAIDEN.

VIRGIN, THE RED. See MICHEL, LOUISE.

VIR'GINAL (OF., Fr. *virginal*, from Lat. *virginalis*, maidenly, from *virgo*, maiden). A keyed instrument, one of the precursors of the pianoforte. It resembled in form a small pianoforte, with a compass of four octaves, furnished with a quill and jack like those of the spinet, and a single string to each note. Generally the case was elaborately ornamented.

VIRGIN BIRTH. In theology the term signifies the virginity of the mother of Jesus at his birth. The claim of her virginity is made in the story of Jesus' birth in Matthew and in Luke (see GOSPELS; MATTHEW), but nowhere else in the New Testament. Evidently the belief was not essential in the creed of the earliest Church. In the second century the acceptance of the virgin birth is attested by Ignatius, Justin Martyr, Aristides, and Irenæus. It was rejected only by the Gnostics and some Ebionites (qq.v.). After the passing of these sects the doctrine was universally held by the Church and found a place

in the creeds. The doctrine was forced into prominence by the high esteem in which virginity was held in the Church. It was used to emphasize the divinity and the sinlessness of Christ While the divinity of Christ was seldom made dependent on his virgin birth, it was a common belief that a miraculous birth befitted a miraculous being. His sinlessness involved his freedom from original sin, which was held to consist of concupiscence and to be transmitted by natural generation. With the passing of this emphasis on the sexual in original sin, the Catholic church affirmed the doctrine of the immaculate conception (q.v.) of Mary as a means of assuring the release of Jesus from original sin, and the Protestant churches usually held that the sinlessness of Jesus was not due to his birth, but to his sanctification by God. In modern times the doctrine of the virgin birth has been attacked as being, according to the New Testament itself, not a necessary doctrine; as being based on biblical narratives whose accuracy is not above suspicion, as finding its natural explanation in Old Testament and pagan stories of miraculous birth; as constituting a degradation of marriage; and as being needless to the divinity of Christ. These objections have risen from the critical study of the Bible and from the modern objection to miracles. In 1892 the refusal of C. Schrempf to assent to this article of the Apostles' Creed created widespread discussion of the subject in Germany. In English-speaking churches the problem has been less acute Many Protestant churches have ceased to maintain that belief in the virgin birth is essential to Christian faith.

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VIRGIN'IA. A city in Saint Louis Co., Minn., 75 miles north-northwest of Duluth, on the Duluth, Missabe, and Northern, the Duluth and Iron Range, the Great Northern, and the Duluth, Winnipeg, and Pacific railroads (Map: Minnesota, E 3). It is an important iron mining and lumbering centre, and has flour mills and a brewery. There is a Carnegie library. Pop. 1900, 2962; 1910, 10,473; 1915 (U. S. est.), 14,432; 1920, 14,022.

VIRGINIA. See APPIUS CLAUDIUS CRASSUS.

VIRGINIA (Neo-Lat., named in honor of Queen Elizabeth, the "Virgin Queen"). One of the South Atlantic States of the Union, between lat. 36° 30′ and 39° 40′ N. and long. 75° and 84° W. It ranks thirty-third in size among the States, its total area being 42,627 square miles, of which 2365 square miles are water surface included in landlocked bays, harbors, and rivers. The extreme length from east to west is about 440 miles, and the greatest breadth from north to south is about 200 miles.

Topography. Virginia is divided into three major provinces, (*a*) coastal plain, (*b*) piedmont plateau, and (*c*) Appalachian Mountains, which differ markedly in the nature and origin of surface features and in the age and kind of rocks The coastal plain is the easternmost province and comprises the area between the Atlantic Ocean and the piedmont plateau. It is more than 100 miles wide and includes approximately 9500 square miles, or about one-fourth the total area of the State. It is a low, flat-lying area, whose elevation gradually increases from sea level at the coastal border to a few hundred feet at its western edge Much of the land over parts of it is marshy. In the southeastern corner is the great Dismal Swamp (q.v.), within the centre of which is Lake Drummond, having an area of 5 square miles The coastal plain is composed of loose and partly consolidated sediments, chiefly sands, clays, and marls, which range in age from Lower Cretaceous to Quaternary. The beds may be locally indurated. They strike in general from north to south, with a low but variable easterly dip. The rivers within the coastal plain are tidal with low velocities and are navigable as far westward as the piedmont border, the "fall line." The piedmont plateau is bordered by the coastal plain on the east and extends to and along the southeastern base of the Appalachian Mountains Its width increases from about 40 miles in the northern portion along the Potomac River to nearly 175 miles along the Virginia-Carolina boundary. Its surface is broadly undulating and shows a gently eastward slope from an altitude of 1000 feet at the western edge to near sea level along the eastern margin. The streams cross it in rather deep and narrow channels. Less reduced areas of the harder rocks, rising several hundred feet above the upland surface of the plateau, are not uncommon over the region, especially towards the western margin.

Geology. Geologically the region is formed of a complex of highly metamorphosed sedimentary and igneous rocks of early Paleozoic and Pre-Paleozoic age, largely concealed beneath a cover of residual material, with exposures of fresh rock less numerous than farther north. The rocks are crystalline and include chiefly gneisses and schists intruded by granitic and gabbroic rocks. Within the Virginia piedmont are areas of Triassic sediments (sandstones, conglomerates, and shales), one of the most important of which is the Richmond basin, where was mined the first coal in the United States. Over parts of the south-central portion of the province are areas of altered volcano-sedimentary rocks which extend southward into North Carolina. The schistosity, developed in most of the rocks from metamorphism, is in general coincident with the trend of the province, northeast and southwest, but varies in dip. The Appalachian Mountains embrace the western portion of the State. Its eastern boundary is the southeastern slope of the Blue Ridge. Like the piedmont and coastal plain, this province extends northeast and southwest far beyond the limits of Virginia. The topography of the Appalachian Mountains province is varied and picturesque. Three divisions of the province are recognized, which are (*a*) the Blue Ridge, (*b*) the Great Valley, and (*c*) the Alleghany Ridges. The Blue Ridge, the easternmost range of the Appalachian Mountains system, extends from Harper's Ferry in a southwesterly direction across the State. At Harper's Ferry it has a height of about 1200 feet, but it increases south-

westward, reaching elevations of more than 4000 feet. Southwest of Roanoke the Blue Ridge is of plateau-like character, having a steep descent to the southeast and a gentle slope to the northwest. It is crossed by the Potomac, James, and Roanoke rivers, which flow southeastward to the Atlantic, and by New River, which flows northwestward to the Ohio. The Blue Ridge is composed largely of Pre-Cambrian igneous rocks, flanked on the northwest side by Cambrian sandstones and shales and on the southeast side in places by siliceous sediments of the same age. Considered broadly, the Great Valley region, including the Shenandoah Valley and Alleghany Ridges, is composed of narrow valleys and linear ridges arranged in more or less complex relations. It is composed of Paleozoic sedimentary rocks (limestones, shales, and sandstones) which range in age from Cambrian to Carboniferous. The rocks have been folded and faulted and subsequently greatly eroded, resulting in the development of the well-known Appalachian type of topography.

Hydrography. The drainage of much the greater part of the State is directly into the Atlantic Ocean or its arm, Chesapeake Bay, through the Potomac, Rappahannock, York, James, and Roanoke rivers and their tributaries. These streams flow across the piedmont plateau and coastal plain provinces in parallel southeastward courses. The Blue Ridge forms the principal watershed in the State. West of the Blue Ridge lies the Great Valley province, the northern part of which is drained by the Shenandoah northward to the Potomac, the middle part by the headwaters of the James and Roanoke and farther southwest by New River, which flows northwestward to the Ohio, and the extreme southwestern part by the Holston and Clinch rivers and the tributaries of the Big Sandy.

Climate. The climate is variable, and differerences in temperature and precipitation are noted between the three larger topographic divisions of the State. Temperatures over the coastal plain are more equable than over the more elevated piedmont province to the west, and sudden and decided changes to warmer or colder weather are comparatively rare. In the mountain province, where elevation and topography produce marked effects, greater daily and monthly ranges of temperature are shown. The annual mean temperature varies from 57° in the coastal plain to 55° in the piedmont plateau and to 53° in the mountain province. East of the Blue Ridge the mean temperature for January is 36° and for July 78°; west of the Blue Ridge the mean temperature is 33° for January and 73° for July. The precipitation is abundant and fairly well distributed through the year, the annual average being 42 inches for the coastal plain, 43 inches for the piedmont plateau, and 41 inches for the mountain province. The annual snowfall varies from an average of 12 inches in the coastal plain to 16 inches in the piedmont plateau and to 25 inches in the mountain province.

Soils. The soils of the coastal plain are dominantly light gray to gray in color and are chiefly of the sandy-loam and silt-loam types with the clay loam less abundant. In the piedmont province the soils have been derived from the weathering of metamorphic crystalline rocks in place and vary in character according to the kind of rock from which they have been derived. In general they may be said to range from light sandy types to deep-red clay types, showing wide range in fertility and adaptability to farm crops. The soils of the Appalachian Mountains province have been derived from weathering of sandstones, shales, and limestones. The sandstone and shale soils are less productive than the limestone soils. The limestone soils of the Great Valley region form the most important agricultural region in the State.

Mineral Resources. Virginia has a large variety of minerals produced on a commercial scale, and, though ranking high in this regard, it ranked twenty-eighth in 1914 among the States in value of products. The value of the coal produced represented more than 50 per cent of the total mineral production for 1914. Coal is supposed to have been first mined in the United States in the eastern part of Virginia, from a small basin near Richmond. The chief production, however, is from the southwest portion, in the Appalachian region. The production in this region dates from 1883, and in 1888 there were produced more than 1,000,000 tons. The State ranked thirteenth in the value of coal produced and ninth in quantity in 1914. The production in that year amounted to 7,959,535 short tons, valued at $8,032,448. The production of pig iron in 1914 amounted to 197,981 long tons, valued at $2,481,197. This value is not included in the total mineral production. Coke, also not included in the total, had a production of 780,984 short tons, valued at $1,582,419. Clay is next in importance, and in 1914 the product was valued at $1,472,348; about 80 per cent of the production is common brick. Stone ranks third among the primary mineral products. The chief varieties produced are limestone and granite, the combined value of which in 1914 amounted to $2,152,378. Virginia ranks first in the production of iron pyrite (used in the manufacture of sulphuric acid), about 50 per cent of the entire supply in the United States coming from there in 1914. The production amounted to 141,276 long tons, valued at $556,091. Virginia also leads in the production of soapstone. The production, including that of talc in 1914, was 21,687 short tons, valued at $547,202. Other minerals produced in commercial quantities are barytes, cement, copper, feldspar, lead, mica, mineral paints, sand and gravel, slate. The value of the total mineral production in 1914 was $16,400,347.

Agriculture. Of an approximate land area of 25,767,680 acres, 19,495,636 were in farms in 1910. The area of improved land was 9,870,058 acres and the number of farms 184,018. The total value of farm property, including land, buildings, implements, and machinery, domestic animals, poultry, and bees, was, in 1910, $625,065,383. The average acreage per farm was 105.9, valued at $20.24 per acre in 1910, and the average value of farm property $3397. Of the total number of farms 135,289 were operated by owners and managers and 48,729 by tenants. The native white farm operators numbered 134,155, the foreign-born white 1749, and the negroes 48,114. The owners among the native whites numbered 99,862 and among the negroes 32,228. The acreage operated by whites was 17,257,416 in 1910; by negroes, 2,238,220.

The following table shows the acreage, value, and production of the most important crops as estimated by the United States Department of Agriculture for 1915.

cent of the total number of wage earners and produced 44 per cent of the total value of manufactured products. Richmond, which gave employment in 1914 to 17,282 wage earners and turned out manufactured products valued at $62,491,000, is the most important city. Norfolk, the second in importance, gave employment to 5900 wage earners and turned out products valued at $14,955,000. Lynchburg comes third, with 3445 wage earners and an output valued at $9,919,000. See articles on these cities

40 branches The issue was strictly limited to three times their capital, and directors were made liable to loss Because of the branch system these banks were very strong and did a profitable business This called forth a large number of private or unchartered banks of issue, but they were all prohibited by the Law of 1816. In 1837 a free banking law was passed and a large number of banks of issue organized under it, and a still larger number of banks of deposit and discount. In 1860 there were

SUMMARY OF INDUSTRIES FOR 1904 AND 1909

THE STATE — TEN LEADING INDUSTRIES

INDUSTRY	Census	Number of establishments	PERSONS ENGAGED IN INDUSTRY: Total	PERSONS ENGAGED IN INDUSTRY: Wage earners (average number)	Capital	Wages	Value of products	Value added by manufacture
					Expressed in thousands			
All industries	1909	5,685	120,797	105,676	$216,154	$38,154	$219,794	$94,211
	1904	3,187	88,898	80,285	147,989	27,943	148,857	65,208
Lumber and timber products	1909	2,617	37,931	33,287	28,392	9,962	35,855	21,963
	1904	938	17,000	15,134	13,253	4,972	18,727	11,836
Tobacco manufactures	1909	104	8,978	7,882	13,131	2,162	25,385	14,196
	1904	143	8,597	7,931	23,478	1,829	16,768	10,104
Flour-mill and gristmill products	1909	458	1,817	1,014	8,700	398	17,598	2,434
	1904	365	1,597	957	5,503	349	13,832	1,661
Cars and general shop construction and repairs by steam-railroad companies.	1909	28	7,943	7,588	3,998	4 082	9,956	4,701
	1904	29	7,746	7,345	2,740	3,663	8,693	4,116
Leather, tanned, curried, and finished	1909	39	1,730	1,590	11,090	589	8,267	1,822
	1904	44	1,169	1,055	4,635	358	5,830	1,111
Fertilizers	1909	45	2,199	1,956	9,767	760	8,035	2,646
	1904	37	1,935	1,801	4,872	571	4,659	1,418
Peanuts, grading, roasting, cleaning, and shelling	1909	25	1,662	1,516	2,865	258	7,933	807
	1904	26	1,458	1,332	1,115	196	7,055	906
Cotton goods, including cotton small wares	1909	10	5,123	5,057	14,070	1,480	7,490	2,791
	1904	10	3,501	3,456	7,067	884	4,484	1,682
Boots and shoes, including cut stock and findings	1909	10	2,973	2,711	3,999	805	5,809	1,789
	1904	6	1,801	1,738	975	369	2,627	712
Iron and steel, blast furnaces	1909	14	1,425	1,320	6,305	546	5,389	971
	1904	10	1,150	1,081	3,157	346	3,343	626

Transportation. Virginia is fairly well supplied with water transportation. The James River, navigable for small steamers to Richmond, is one of the chief waterways. Besides this are the Rappahannock, Potomac, and other tidal streams, several canals, and a coast line with a number of good harbors. Virginia took an early interest in the construction of railroads and in 1840 had a mileage of 147 miles; in 1860 it was 1379. The mileage of main line single track in 1914 was 3793. The most important roads and their mileage in that year are: the Norfolk and Western, 954; the Chesapeake and Ohio, 537; the Southern, 420; the Virginian, 329; the Seaboard Air Line, 157.

Banks. Though there are no records of organized banks in Virginia before 1792, the banking business was known in the State for a century before and was conducted by private individuals. The special Act of 1777 prohibiting the issue of currency by private persons shows how common a practice it was. Lack of instruments of exchange forced the State to issue notes, and the necessities of the Revolutionary War increased their number, but the rapid depreciation of these notes left the State without a stable currency. In 1792 the banks of Alexandria and Richmond were established In 1795 branches of the Bank of the United States were organized. In the first two decades of the nineteenth century there developed half a dozen large banking institutions with a great number of branches all over the State—altogether over 24 banks of issue with 41 branches and between 150 and 200 banks of deposit and discount. Not a bank survived the war. The national bank, however, soon appeared. State banks began to reappear in 1869, after the new constitution was adopted. There was no regulation at all of the State banks until 1885, when a law was passed requiring reports to the State Auditor. Not only the Legislature but circuit courts are empowered to issue banking charters. After 1885 the number of State banks greatly increased.

The condition of the banks in 1915 is shown in the following table.

	National banks	State banks
Number	136	231
Capital	$18,629,000	$7,044,000
Surplus	12,279,000	4,937,000
Cash, etc.	5,706,000	1,902,000
Deposits	97,824,000	39,477,000
Loans	113,513,000	43,741,000

Government. The constitution of the State in its present form dates from 1902. Amendments may originate either in the Senate or in the House of Delegates, but to become a part of the constitution must be passed by both of these bodies and by the Legislature next succeeding and be approved by the voters at large.

Legislative.—The legislative power is vested

in a General Assembly, consisting of a Senate and House of Delegates The Senate consists of not more than 40 or less than 33 members. They are elected every four years. The House of Delegates consists of not more than 100 and not less than 90 members, who are elected every two years. A reapportionment of senatorial and house districts is made every 10 years, dating from 1902. The General Assembly meets every two years on the second Wednesday in January succeeding the election of its members.

Executive.—The chief executive power of the State is vested in the Governor, who holds office for four years, beginning on the first day of February succeeding his election. He is ineligible for immediate reelection. The Lieutenant Governor is elected at the same time and for the same term as the Governor and is President of the Senate. Other executive officers are the Secretary of the Commonwealth, State Treasurer, and Auditor of Public Accounts. These are all elected and hold office for the same term as the Governor.

Judiciary.—The judiciary department consists of the supreme court of appeals, circuit courts, city courts, and such other courts as may be established by law. The supreme court of appeals consist of five judges, any three of whom may hold court. It has original jurisdiction in cases of habeas corpus, mandamus, and prohibition, but in all other cases it has appellate jurisdiction only. Judges of the supreme court of appeals are chosen by the joint vote of the two Houses of the General Assembly and hold office for 12 years. The State is divided into 31 judicial circuits, for each of which a judge who holds office for eight years is chosen by joint vote of the two Houses. For the purposes of a judicial system all cities in the State are divided into two classes. Those with a population of 10,000 inhabitants or more are of the first class, and all cities with less than 10,000 are of the second class. In every city of the first class there is in addition to the circuit court, a corporation court.

Suffrage and Elections.—Every male citizen of the United States, 21 years of age, who has been a resident of the State for two years, of the county, city, or town one year, and of the precinct in which he offers to vote 30 days, next preceding the election, and who has registered and paid his poll tax at least six months prior to the election in which he offers to vote, is entitled to vote. Any person is permitted to register for voting who prior to the adoption of the constitution served in the time of war in the army or navy of any of the States of the United States or of the Confederate States, or who is the son of such a person, or who owns property upon which for three years preceding that in which he offers to vote State taxes aggregating $1 have been paid, or who is able to read any section of the constitution submitted to him by the officers of registration, and to give a reasonable explanation of the same, or if unable to read such section is able to understand and give a reasonable explanation thereof, when read to him by the officers. The General Assembly may prescribe a property qualification not exceeding $250 in value for voters in any county, city, or town as a prerequisite for voting in any election for officers other than members of the General Assembly. A new primary law which went into effect in 1915 provided that primaries for the nomination of candidates to be voted upon at the general election be held on the first Tuesday of August of each year Nominations for primaries are to a certain extent optional.

Local and Municipal Government.—All places of over 5000 in population are cities. Cities are governed by a mayor and city council, elected for a term of four years. Several of the cities are independent of county government. Provision is made for a special form of government for cities of 50,000 inhabitants or more.

Miscellaneous Constitutional and Statutory Provisions.—There is a child-labor law. The conduct of corporations is under strict control. A prohibition measure was approved by the people on Sept. 22, 1914, becoming effective on Nov. 1, 1916.

Finances. During the Colonial days the financial needs were very small, and for almost a century the budget increased hardly 50 per cent, being £4200 in 1660, £4500 in 1700, and £6500 in 1754. The main sources of income were a poll tax and an export duty on tobacco. The Revolutionary War necessitated expenses for which there was no provision in the system of taxation, and thus a debt of about $2,000,000 was created. The debt was assumed by the Federal government in 1790, and until 1820 the debt of Virginia consisted only of $343,139, borrowed only for purposes of the War of 1812 Several small issues of bonds were made between 1820 and 1835.

The idea of public improvements, which developed in the thirties, found enthusiastic supporters in the State. In 1835 the debt amounted to hardly $2,500,000, but, during the short period 1835–38, $4.132,700 was loaned, the main purpose being the construction of canals and railroads. By 1851 the debt had reached $12,000,000, and by 1861 it was $33,897,074 During the war part of the interest could not be paid and more loans were made; and although these loans for war purposes were repudiated by order of President Johnson, the overdue interest payments swelled the debt considerably. This interest was funded by special Act in 1867, and for a year Virginia met her obligations, but, passing under military control, was again forced to stop payment of interest. By 1870 the debt had grown to $45,872,778. A complicating circumstance was the organization of the western counties into a new State, West Virginia. Virginia, holding that the new State was responsible for part of the debt, was willing to pay only two-thirds of the interest, viz, 4 per cent. In 1871 the whole debt was funded. One-third of it was designated as the part of West Virginia, and the funding of this part was made dependent upon settlement with that State. This settlement was referred to the United States Supreme Court, which in 1915 declared that West Virginia should pay Virginia $12,393,929 as its share of the net debt. (See WEST VIRGINIA, *History.*) The rest of the debt was to be funded at its full value and old rate of interest, with the coupons made receivable for taxes. This clause is mentioned because it was the main political question in Virginia for the following 20 years. In the following year the readjusters, i.e., those who advocated the necessity of reducing the debt of the State, were victorious. Coupon-killing acts were passed in 1872, 1873, 1876, and until 1885; most of them were declared unconstitutional by the United States Supreme Court, which held that the objectionable clause

was a contract and therefore inviolable The struggle lasted for 20 years. Meanwhile an effort was made to settle the question by an act passed in 1882. The basis of this act was the elimination of about $7,000,000 of compound interest since 1861, and the total debt was calculated at $21,035,377. Some of the bondholders refused to avail themselves of this offer, though under the Riddleberger Act of 1882 $15,013,973 were available for funding. The final adjustment came only in 1892, after long negotiations between the State and a committee of English bondholders, when the total debt of the State which was not yet refunded, estimated at $28,000,000, was funded at the rate of 19 to 28 by 100-year bonds, bearing 2 per cent for 10 years and 3 per cent for the rest of the time On June 1, 1915, the State debt amounted to $24,183,882. A great part of the government income is as yet derived from a poll tax, a real-estate tax, and a personal-property tax, but many other sources have been added since the Civil War, as liquor and other licenses, an inheritance tax, taxes on insurance companies, railroads, oyster grounds, etc. The main items of expenditures are interest on the public debt, schools, and hospitals The total receipts in the fiscal year ending Sept. 30, 1915, amounted to $8,210,615 and the total expenditures to $7,994,571. The balance in the treasury on Oct 1, 1915, was $851,771.

Militia. The males of militia age in 1910 numbered 398,728 The organized militia was composed, on Jan. 1, 1915, of 2743 enlisted men and 202 officers It included four regiments of infantry, a battalion of field artillery, a company of signal corps, and five detachments of sanitary troops.

Population. The population of Virginia at each Federal census was as follows: 1790, 747,610, 1800, 880,200; 1810, 974,600; 1820, 1,065,366, 1830, 1,211,405, 1840, 1,239,797, 1850, 1,421,661; 1860, 1,596,318, 1870, 1,225,163; 1880; 1,512,565, 1890, 1,655,980; 1900, 1,854,184; 1910, 2,061,612, 1915 (est), 2,121,014, 1920, 2,309,187. The average number of persons to the square mile was, in 1909, 51.2. The urban population, i e., that in cities or incorporated towns with 2500 people or more, was 476,529 and the rural 1,585,083. The whites numbered 1,389,809 and the negroes 671,096. In the southeastern section a much larger percentage of the total population than elsewhere are negroes. Of the total white population 94.5 per cent is native born of native parentage More than 90 per cent of the native-born population were born in Virginia. Of that born in other States North Carolina furnished 3.6 per cent, no other State contributing as much as 1 per cent. By sex the population was divided into 1,035,348 males and 1,026,264 females. The males of voting age in 1909 numbered 523,532. The 10 largest cities with their population for 1910 and 1915 (est.) are: Richmond, 127,628 and 154,674; Norfolk, 67,452 and 88,076; Roanoke, 34,874 and 41,929; Portsmouth, 33,190 and 38,610; Lynchburg, 29,494 and 32,385; Petersburg, 24,127 and 25,347; Newport News, 20,205 and 20,504; Danville, 19,020 and 19,859, Alexandria, 15,329 and 15,751; Staunton, 10,604 and 11,485.

Education. The task of popular education in Virginia, as in the other Southern States, is a difficult one, partly on account of the large illiterate negro population and partly from the preponderance of a widely scattered rural population. There were, in 1910, 232,911 persons, or 10.2 per cent of the population, of 10 years of age or over who could not read or write. In 1910 the illiterate whites of native parentage numbered 81,105, or 8 2 per cent There were in the same year 148,950 illiterate negroes, or 30 per cent The school population (ages 6 to 20) in 1910 was 697,649 Of these 392,499, or 56.3 per cent, attended school. The population of school age (ages 7 to 19 inclusive) in 1915, according to statistics furnished by the State Superintendent of Schools, numbered 657,513, of whom 470,000 were enrolled in the public schools The schoolhouses numbered 6733 and the teachers 12,506. There were 12,343 schools, including primary, grammar, and high schools, 11 agricultural high schools, and 6 normal training schools The expenditures for the schools' support in 1915 were $7,201,768 43. The colored schools in the State have made considerable progress in recent years, through the assistance derived from the Jeanes Fund, Hampton Institute, and large private contributions from the colored people themselves.

The system of standardized high schools receives liberal aid from the State. Provision is made for medical inspection, consolidation of schools, agricultural and normal-training courses in high schools, and a uniform system for the certification of teachers. The consolidation of schools has resulted in greatly improved conditions in the rural districts There were 11 agricultural high schools in the State in 1915.

The school system is administered by a State Board of Education, a superintendent of public instruction, division superintendent of schools, and county, district, and city school boards. Valuable service is performed by the Coöperative Education Association in arousing public interest in education and reënforcing the efforts of school authorities for betterment of the schools. There are State normal schools for women at Farmville, Harrisonburg, Fredericksburg, and Radford, while the College of William and Mary offers normal instruction to men. The Virginia Normal and Industrial Institute at Petersburg provides training for male and female teachers of the negro race. The Hampton Normal and Agricultural Institute at Hampton is also for colored persons. There are many institutions of collegiate rank in the State. Of these the more important are the University of Virginia at Charlottesville, Richmond College at Westhampton (a suburb of Richmond), Randolph-Macon College at Ashland, Hampden-Sidney College at Hampden-Sidney, Washington and Lee University of Lexington, College of William and Mary at Williamsburg. These are all for men only. Standard colleges for women are the Martha Washington College at Abingdon, Hollins College at Hollins, Randolph-Macon Women's College at Lynchburg, Westhampton College at Westhampton, Elizabeth College at Salem, and Sweet Briar Institute at Sweet Briar. The Virginia Polytechnic Institute at Blacksburg is an institution for scientific and agricultural training, while the Virginia Military Institute at Lexington offers military as well as technical instruction

Charities and Corrections. The supervision of the charitable and correctional institutions is in the hands of the State Board of Charities and Corrections. These institutions include the Virginia Penitentiary at Richmond, the State

Farm at Lassiter Post Office, the Central State Hospital at Petersburg, the Eastern State Hospital at Williamsburg, the Southwestern State Hospital at Marion, the Western State Hospital at Staunton, the Virginia State Epileptic Colony and Virginia Colony for the Feeble-Minded at Madison Heights, and the Catawba Sanatorium at Catawba Educational institutions under the supervision of the board are the Virginia School for the Deaf and Blind at Staunton, the State School for the Colored Deaf and Blind at Newport News, and the Virginia Home and Industrial School for Girls at Bon Air Institutions supported by the State, but owned and controlled by independent boards, are the Laurel Industrial School at School Post Office, the Negro Reformatory Association of Virginia at Hanover, the Industrial Home and School for Wayward Colored Girls at Peaks, and the R. E. Lee Camp Soldiers Home Convicts are employed at work on the State roads The State Board also has supervision over city and county almshouses and jails.

Religion. The Baptists number about one-half of the religious communicants, while the Methodists represent about one-fourth. Other important denominations, but much less numerous, are the Presbyterians, the Roman Catholics, and the Episcopalians.

History. The name of Virginia was given by Queen Elizabeth to the country explored by the expedition under Amadas and Barlow, sent out by Sir Walter Raleigh in 1584. (See NORTH CAROLINA.) Virginia in history proper begins, however, with the grant by James I on April 10, 1606, of territory 200 miles wide, between lat. 34° and 45° N., to two companies, usually called, from the residences of their chief incorporators, the London and the Plymouth companies. (See MASSACHUSETTS.) By this charter the London Company could colonize between 34° and 41° and the Plymouth between 38° and 45°, provided the Colonies were 100 miles apart. The government was vested in a Royal Council of Virginia in London, superior to resident councils nominated by the crown and governing by royal instructions. Sealed instructions provided for a local constitution and an annual president in the Colony. The land was to be held in free and common socage, and the settlers and their children were "forever to enjoy all liberties, franchises, and immunities enjoyed by Englishmen in England." The Virginia Company of London, holding the southern grant, was organized under Sir Thomas Smith, treasurer. With its Colony, 120 emigrants in three ships, Christopher Newport cleared England, December-February, 1607, reaching Cape Henry, April 26, 1607. Having explored Chesapeake Bay, they entered James River and founded on a peninsula 40 miles up the river Jamestown (Jamesfort). May 14, 1607, the first permanent English settlement in America. Malaria, Indian hostility, unaccustomed labor, and insufficient provisions left on Newport's return to England, reduced the Colony to half by September. Dissensions arose, and when Captain Newport returned, Jan. 12, 1608, bringing "near 100" more men, only 38 were left, Wingfield was a prisoner, Smith condemned, and Archer's "parliament" summoned. In the latter part of 1608 the Indians refused to sell corn, and but for the energy and tact of Capt. John Smith (q.v.) as president the Colony must have perished. In 1609 a new charter strictly incorporated the London Company, enlarged its territory, and vested the Colony's government in the company's Treasurer and Council in London, endowed with sovereign powers. On June 1, 1609, large reënforcements were sent, consisting of nine ships carrying 500 persons, including women and children. One ship sank, and one was wrecked on the Bermudas, now discovered by Somers Seven ships with 300 persons reached Jamestown, and Smith returned to England on one of these ships. The winter was known as the "starving time," and the Colony was reduced from 500 to 60 within six months. Though 140 arrived in the *Sea-Venture*, Lieutenant Governor Gates abandoned Jamestown, June 7, 1610, and was halted only by the opportune arrival of Lord Delaware, the Governor. Delaware left George Percy as Deputy Governor in 1611 with some 150 colonists. Percy was succeeded by Sir Thomas Dale and Sir Thomas Gates.

Dale and Gates brought 500 colonists with cattle, built new towns (Henrico, Bermuda, Charles City), and by Dale's harsh martial rule effectually quelled lawlessness. Communism remained, but favored classes (officers, tenants, farmers, artisans) in 1613 and 1616 received conditional freedom for self-maintenance A new charter in 1612 had added the Bermudas, established elective and legislative courts in the company, exempted it from duties, and authorized lotteries. John Rolfe established tobacco culture, and his marriage (1613) to Pocahontas, daughter of the powerful Indian sachem Powhatan, won that chief and further brightened Colonial prospects. Mismanagement by Sir Thomas Smith and the court party produced dissensions in the company; Sir Edwin Sandys (q.v.) and the popular party gained control in 1618 and commissioned Sir George Yeardley Governor to replace the rapacious Argall and establish personal freedom. On July 30, 1619, the first representative assembly in America (a Council elected by the company and a House of Burgesses chosen by the free colonists) met. The same year 21 negro servants (see SERVITUDE) were introduced by Dutch and English privateers. Women were sent as wives to the Virginia settlers, the husband paying 120 pounds of tobacco for his wife. The Laws of 1619 were approved by the company, and in 1621 a written constitution, the work of Sir Edwin Sandys, was granted. By 1620 the population of the Colony had reached 4000, including apprentices, indented servants, and some petty convicts sent over by the King, who was becoming bitterly hostile to the company. In the midst of this prosperity the Indians rose and massacred "about 400" of the settlers, March 22, 1622. The King's hostility to democracy in the company led to quo warranto proceedings in 1624. The charter was revoked June 26, and Virginia became a royal Colony.

Charles I (1625) reëstablished the government under two councils, depriving the Virginians of control over public officials and expenditures; but their acquiescence in his ecclesiastical and civil policy, and royal revenues from tobacco won his favor. His reign was marked also by the settlement of some Puritans in northeast Virginia, and by the grant of a part of the territory to Lord Baltimore in 1632. William Claiborne seized and claimed disputed territory, Kent Island, for Virginia, having settled it in

1631 Maryland by force and diplomacy from 1634 to 1654 vindicated her claims. A popular insurrection deposed Governor Harvey, who was arbitrary and supported Maryland. Though reinstated, he was soon (1639) succeeded by Sir Francis Wyatt. With the coming of Sir William Berkeley as Governor in 1642, a strong figure appears. The divine right of the King and the maintenance of the Established church were his creed. He captured Opechancano, who in his second massacre (1644) had killed 300 colonists and driven many Puritans into Maryland and New England On the execution of Charles I thousands of cavaliers flocked to Virginia Its Assembly alone resisted Parliament and declared guilty of treason all persons refusing to acknowledge the "King that now is" In retaliation Parliament in 1650 forbade all trade with Virginia and appointed (1651) four commissioners (two in Virginia) to force the surrender of the Colony Virginia surrendered (1652) to Commissioners Bennett and Claiborne, stipulating that the act be regarded as "voluntary," not a "conquest," that full indemnity be granted, a year without oath be allowed for dissatisfied persons to remove, the use of the Prayer Book be permitted for a year, and that Virginia enjoy her ancient boundaries In reality during the whole period of the Commonwealth the Assembly elected the governors and there was entire religious and political toleration. The circumstance of acknowledging Charles II sooner than any other part of the kingdom gave to Virginia the name of the Old Dominion. On the collapse of the Commonwealth the loyal Assembly elected Berkeley Governor before Charles II was crowned Charles encouraged the servant and slave traffic, burdened the Colony with navigation acts (1663–72), and granted it in part to court favorites and wholly in 1673 for 31 years to Lords Arlington and Culpeper. These acts, restriction of the suffrage to freeholders, and Berkeley's refusal to protect the frontier from Indians precipitated a popular rebellion Nathaniel Bacon (q.v.) asked for a commission to go against the savages in 1676, and, when it was refused, made a successful campaign without authority. Berkeley evasively answered a second popular demand for Bacon's commission, and upon his advance against the Indians proclaimed him and his forces rebels. A contest for the possession of Jamestown ensued. Bacon won, established a government, burned Jamestown to defeat Berkeley, and, preparing to pursue him to Accomac, suddenly died from previous hardships. Rumors of his poisoning are discredited. Berkeley regained power and took severe measures against his opponents, of whom 23 were executed, eliciting from Charles II the remark, "That old fool has hanged more men in that naked country than I have done for the murder of my father."

After this war on Berkeley and the crown, and reconstruction by English commissioners, royal governors (Jeffreys, Chicheley, and Culpeper) by incompetence or rapacity increased popular dissatisfaction In 1677 a lasting Indian peace was secured, and in 1692 William and Mary College, the second oldest college in America, was chartered. A striking exception among royal governors was Alexander Spotswood (1710–22). He led the Knights of the Golden Horseshoe over the Blue Ridge in 1716, established iron manufactures, aided the Carolina colonists in their struggle with the Tuscarora Indians, and sent out an expedition which killed the notorious pirate John Teach (Blackbeard) and captured his men. The first newspaper in the Colony (the Virginia *Gazette*) was established in 1736, and Postmaster-General Spotswood organized a postal system in 1738. The population had steadily increased and by 1700 was fully 70,000, chiefly of English descent. In 1699 the Huguenot immigration was large, and under Queen Anne a number of German Palatines came over. After 1732 large numbers of sturdy Scotch-Irish and Germans from Pennsylvania filled the valley and piedmont Virginia with dissenters, liberty-loving freehold farmers, restive under British oppression. Col. William Byrd's project (1733) for founding Richmond and Petersburg instances expanding English settlement. The great article of export from the Colony was tobacco, the returns from its sale enabling the wealthier planters to surround themselves with luxuries of every kind and the refinements of European civilization.

The Charter of 1609 had fixed the limits of the Colony at 200 miles north and 200 miles south of Point Comfort and west and northwest from sea to sea. Under this vague description Virginia claimed that the northwest line was the upper one, and hence her territory increased as it went westward. Maryland and Pennsylvania had included territory that she claimed, but her title to the northwest was undisputed until French colonization expanded. Towards the middle of the eighteenth century English occupation of the territory began. The Ohio Company (chiefly Marylanders and Virginians) was formed in 1749, for the exploration of the territory which the French also claimed by Marquette's discovery. (See OHIO.) George Washington was sent by Governor Dinwiddie in 1753 to ask the removal of the French forts, but to no purpose. The French and Indian War (q.v.) followed. The Virginians saved Braddock's army from utter annihilation, and the pioneers organized by Washington held the Virginia frontier against the Indians and the French. Settlements were constantly made beyond the Alleghanies in spite of the King's proclamation in 1763. From 1750 to 1769 Walker, Gist, and Boone explored here. Kentucky was made a separate county of Virginia through the influence of George Rogers Clark in 1776.

On the announcement of the policy of parliamentary taxation of America Virginia became a leader in resistance. The colonists' claim of the rights of Englishmen and full representation, and pride in the Colony's relative position made her taxation without representation impossible. Patrick Henry (q.v.) and the jury in the Parsons' Cause defied the King. Henry's famous speech in opposition to the Stamp Act, delivered (1765) in the House of Burgesses at Williamsburg, was quoted everywhere, and three of his five resolutions were adopted denying Parliament's right to tax. They were heralded as the first important protest against this tax. "Virginia gave the signal to the continent," said General Gage. The Burgesses memorialized King and Parliament against the Tax Act of 1767 and in 1769 passed resolutions against this parliamentary "tyranny" and transportation of offenders to England for trial. They proposed Colonial correspondence and circulated an invitation for Colonial concurrence. Dissolved by Governor Botetourt, they met in revolutionary convention at the Raleigh Tavern and signed

and circulated Mason's nonimportation agreement After the rude and unscrupulous Lord Dunmore succeeded Botetourt, the Assembly in 1773 appointed a standing legislative Committee of Correspondence (Jefferson, Lee, Carr, and others) for Colonial concert. When the news of the Boston Port Bill arrived, the Assembly passed sympathetic resolutions and was promptly dissolved (1774) by Dunmore. Its members met at the Raleigh Tavern and proposed a Virginia convention for August and a general congress of the Colonies. Committees of safety were organized and forces raised in every county. Dunmore attempted disarmament by seizing the magazine and removing the gunpowder, but was driven by a mob (June, 1775) to take refuge on shipboard. George Washington was elected commander in chief of the Continental armies, Patrick Henry of the Virginia forces, and in the Colony a remarkable group of leaders was developed (Jefferson, Henry, Richard Henry Lee, George Mason, Edmund Pendleton, and others) who pushed Virginia towards independence. Colonel Woodford defeated the British at Great Bridge, and Dunmore burned Norfolk, but was driven from Virginia by Andrew Lewis (1776). A State convention met in May, 1776, and passed resolutions asking Congress for a Declaration of Independence, afterward moved by R. H. Lee and drafted by Jefferson. On June 15 the convention adopted Mason's famous Virginia Declaration of Rights. This was followed by the adoption of a constitution on the 29th. Patrick Henry became Governor, and Jefferson afterward secured acts for religious freedom and the abolition of entails. Virginia troops won distinction in the battles of Brandywine and Saratoga, and George Rogers Clark captured (1778 and 1779) the Northwest Territory for Virginia, furnishing the United States its title by conquest against British claims. Virginia was invaded in 1781 Benedict Arnold burned Richmond, and Tarleton's cavalry devastated the James River region and nearly captured Governor Jefferson and the Assembly at Charlottesville. Finally Cornwallis was penned in at Yorktown and surrendered. The conflicting claims of other Colonies and land companies and the refusal of Maryland otherwise to join the Confederation led Virginia (1781–83) to cede her Northwest Territory to the Union, reserving only a small portion to her veterans. The transfer was conditioned on the erection therein of new States and was formally executed March, 1784.

Virginia was prominent in advocating a general convention to make necessary changes in the Articles of Confederation. When that body produced the Constitution of the United States, many able patriots (Lee, Mason, Monroe, and particularly Patrick Henry) bitterly opposed its ratification as destructive to State rights. Finally, after long debate, it was ratified, June 25, 1788, but by only 10 majority and chiefly through the ardent championship of James Madison. The addition of a Bill of Rights and 20 amendments was recommended. Lee, Grayson, and Madison helped to secure the first 10 amendments to the Constitution. The State was jealous of its rights, and on account of the passage of the Alien and Sedition Acts (q.v.) in 1798, put forward Madison's Virginia Resolutions (see VIRGINIA AND KENTUCKY RESOLUTIONS), which declared for a strict construction of the Constitution. Priority of settlement, character and amount of population, valuable staples, and distinguished men made the Colony powerful and kept the State prominent in the early years of the Republic. During the first 36 years of the nation a Virginian was President for 32, and the proportion of her citizens in other high offices was very large. The title "Mother of Presidents" as well as "Mother of States and Statesmen" seems deserved. The famous trials of John T. Callender and Aaron Burr at Richmond in 1806 intensified issues between Federalists and Republicans and brought into prominence John Marshall and John Randolph of Roanoke The burning of the Richmond Theatre marked 1811 with public mourning In 1813 Admiral Cockburn was repulsed at Craney Island and Norfolk saved from the British. The University of Virginia, planned by Thomas Jefferson and founded in 1819, was the first American university for advanced work Slavery had been recognized by statute in 1661, but Virginia's first Assembly had prohibited the slave trade (1778), and Jefferson in his joint revision of the Virginia Code with Wythe and Pendleton in 1779 proposed emancipation and colonization of slaves. In 1796 St George Tucker offered another plan for the abolition of slavery, while Monroe, Randolph, and the Legislature promoted the African Colonization Society (1800–16). A slave, Gabriel, futilely plotted (1800) to massacre the whites of Richmond. In 1831 an insurrection (see TURNER, NAT) by 40 negroes in Southampton County killed 60 persons, alarming Virginia and the South. Thomas Jefferson Randolph's bill for emancipation was fully and freely discussed with other plans and lost by a mere majority. In the Federal convention Virginia had fought for the immediate prohibition of the slave trade against a combination of New England and the extreme South demanding extension. A new or amended constitution, adopted by the State convention (1830), extended the suffrage, and its work was continued by a similar convention in 1850 This emphasized the opposition between eastern and western Virginia on the question of a mixed basis or white basis for representation and, reagitated by the Legislature (1845–46), hastened their separation in 1862. During nullification Virginia opposed the coercion of South Carolina, but endeavored to act as a pacificator.

In spite of the capture of Harper's Ferry in 1859 by John Brown (q.v.) and his plan to raise a general slave insurrection, the State opposed secession. It suggested the peace convention of the States and sent commissioners to Washington to endeavor to prevent hostilities. The State convention met Feb 13, 1861, and as late as April 1 it voted (89 to 45) against secession. Two days after President Lincoln's call for troops to coerce the seceding States, an ordinance of secession and adhesion to the Confederacy was voted (88 to 45), April 17, which was ratified by a popular majority of 16,241. Meanwhile a temporary convention was formed with the Confederate government in July, 1861. Robert E. Lee followed his State and eventually became commander in chief of the Confederate army. Richmond became the strategic capital, and Virginia a great battleground of the Confederacy. Western Virginia had little sympathy with secession, and on May 13 delegates from 25 counties met at Wheeling, declared the ordinance of secession null and void, and called a convention to meet June 11, which elected Francis H. Pierpont (q.v.) Governor. Later the Restored Gov-

ernment of Virginia was established. Pierpont continued to exercise his office until the establishment of West Virginia (q.v.) as a separate State. In 1863 he moved his government to Alexandria under the guns of Washington and asserted authority over those counties within the Federal lines, and in 1864 a new constitution was adopted by these counties. At the close of the war Pierpont was recognized by the Federal authorities as the lawful Governor and moved to Richmond; he put the constitution of 1864 into limited effect, military authority still being paramount.

The Reconstruction Acts gave negroes the right to vote for convention delegates, and a new constitution was adopted in 1868 embodying negro suffrage and other new features, but so great was the popular feeling against it that it was not submitted to the people until a new act of Congress allowed a separate vote on the disfranchising clauses. These were rejected, but the State was readmitted Jan. 26, 1870, and at once came under control of the native-born whites. Trouble began, however, with legislation regarding the State debt (See *Finances*) In 1901–02 a constitutional convention was held, having for its chief objects retrenchment and suffrage restriction. The new constitution was proclaimed without submission to the people, May 19, 1902. One result was largely to suppress the negro vote. From the beginning the State has been Democratic in national politics. The hold was never broken until 1860, when the vote was cast for the Constitutional Union candidate, John Bell. Since its readmission the vote has been steadily cast for the Democratic national candidates, with the exception of 1872, when the Republican candidate, Grant, was preferred to Greeley, an old Abolitionist.

The chief political activity since 1905 has centred about the question of railroad regulation and prohibition. In 1907 a conflict arose between the Federal and State governments over the question of enforced legislation. (See STATE RIGHTS.) In the presidential election of 1908 Bryan received 82,906 votes and Taft 52,573. In November, 1909, William H. Mann, Democratic candidate, was elected Governor. In the presidential election of 1912 Wilson received 90,332 votes, Taft 23,888, and Roosevelt, 21,777. Henry C. Stuart, Democrat, was elected Governor on Nov. 4, 1913. On Nov. 22, 1914, a measure providing for State-wide prohibition was adopted by the people, to go into effect on Nov. 1, 1916.

GOVERNORS OF VIRGINIA

UNDER THE COMPANY

Edward Maria Wingfield, President King's Council. 1607
John Ratcliffe, President King's Council . . .1607–08
Capt John Smith, President King's Council .1608–09
Capt. George Percy, President King's Council . . .1609–10
Sir Thos. Gates, Deputy Governor . . . 1610
Thomas West, Lord Delaware, Lord Governor . .1610–11
Thomas West, Lord Delaware, Lord Governor (absentee) 1611–18
Capt George Percy, Deputy Governor . . 1611
Sir Thomas Dale, High Marshal, Deputy Governor. 1611
Sir Thomas Gates, Lieutenant Governor . . .1611–14
Sir Thomas Dale, Marshal and Deputy Governor 1614–16
George Yeardley, Deputy Governor . .1616–17
Capt Samuel Argall, Admiral and Deputy Governor. 1617–19
Nathaniel Powell, President of Council 1619
Sir George Yeardley, Governor. 1619–21
Sir Francis Wyatt, Governor. 1621–24

UNDER THE CROWN

Sir Francis Wyatt, Governor. 1624–26
Sir George Yeardley, Governor. 1626–27
Francis West (elected by Council). 1627–29
John Pott (elected by Council) 1629–30
Sir John Harvey, Governor 1630–35
John West (elected by Council). 1635–36
Sir John Harvey, Governor 1636–39
Sir Francis Wyatt, Governor 1639–42
Sir William Berkeley, Governor . 1642–44
Richard Kempe, President of Council. 1644–45
Sir William Berkeley, Governor 1645–52

UNDER THE COMMONWEALTH

Richard Bennett, Governor 1652–55
Edward Digges, Governor . . . 1655–58
Samuel Matthews, Governor 1658–60

UNDER THE CROWN

Sir William Berkeley, Governor . . . 1660–61
Francis Morrison or Moryson (acting) 1661–62
Sir William Berkeley . 1662–77
Herbert Jeffreys, Lieutenant Governor . 1677–78
Sir Henry Chicheley, Deputy Governor 1678–80
Thomas, Lord Culpeper, Governor 1680–83
Nicholas Spencer, President of Council . 1683–84
Francis, Lord Howard of Effingham, Governor 1684–88
Nathaniel Bacon, Sr, President of Council 1688–90
Francis Nicholson, Lieutenant Governor . 1690–92
Sir Edmund Andros, Governor . . 1692–98
Francis Nicholson, Lieutenant Governor . . 1698–1705
Geo Hamilton, Earl of Orkney, Governor (absentee) 1704–37
Edward Nott, Lieutenant Governor 1705–06
Edmund Jennings, President of Council, Lieutenant Governor after 1708 1706–10
Robert Hunter, Lieutenant Governor (appointed but captured by the French) . . 1707
Alexander Spotswood, Lieutenant Governor . . 1710–22
Hugh Drysdale, Lieutenant Governor . 1722–26
Robert Carter, President of Council . . 1726–27
William Gooch, Lieutenant Governor . . 1727–40
William Keppel, 2d Earl of Albemarle, Governor (absentee) 1737–54
James Blair, President of Council 1740–41
Sir William Gooch, Lieutenant Governor 1741–49
John Robinson, President of Council 1749
Thomas Lee, President of Council . . 1749–51
Lewis Burwell, President of Council 1751
Robert Dinwiddie, Lieutenant Governor 1751–58
John Campbell, Earl of Loudoun, Governor (absentee) 1756–63
John Blair, President of Council 1758
Francis Fauquier, Lieutenant Governor . . 1758–68
Sir Jeffrey Amherst, Governor in Chief (absentee) . . 1763–68
John Blair, President of Council . . . 1768
Norborne Berkeley, Baron Botetourt, Governor in Chief 1768–70
William Nelson, President of Council . . . 1770–71
John Murray, Earl of Dunmore, Governor in Chief 1771–75
Interregnum 1775–76

STATE

Patrick Henry 1776–79
Thomas Jefferson. 1779–81
Thomas Nelson, Jr. 1781
Benjamin Harrison 1781–84
Patrick Henry 1784–86
Edmund Randolph 1786–88
Beverley Randolph 1788–91
Henry Lee 1791–94
Robert Brooke. 1794–96
James Wood . . . Democratic-Republican 1796–99
James Monroe. . . " " 1799–1802
John Page . . " " . 1802–05
William H. Cabell . . . " " . . .1805–08
John Tyler, Sr. . . " " . 1808–11
James Monroe . . " " 1811
George William Smith (acting) " " (1 mo) 1811
Peyton Randolph (acting) . . (1 week) . . . 1811–12
James Barbour 1812–14
Wilson Cary Nicholas. Republican. 1814–16
James Patton Preston " . . . 1816–19
Thomas Mann Randolph " . . . 1819–22
James Pleasants, Jr. " . . . 1822–25
John Tyler. 1825–27
William B. Giles. 1827–30
John Floyd . . . Democrat. 1830–34
Littleton Waller Tazewell " 1834–36
Wyndham Robertson (acting) " 1836–37
David Campbell. 1837–40
Thomas W. Gilmer . . . . Whig 1840–41
John M Patton (acting) . . " 1841
John Rutherford (acting) . . . " 1841–42
John Munford Gregory (acting) " 1842–43
James McDowell. . . " 1843–46
William Smith . Democrat 1846–49
John Buchanan Floyd . " 1849–52
Joseph Johnson " 1852–56
Henry Alexander Wise " 1856–60
John Letcher. . . . " 1860–64
William Smith . " 1864–65
Francis H. Pierpont, Provisional (Republican) . . 1865–68
Henry H. Wells, Provisional 1868–69
Gilbert C Walker . Republican. 1869–74
James Lawson Kemper, Conservative 1874–78

Frederick W. M. Holliday		1878–82
William E. Cameron, Readjuster		1882–86
Fitzhugh Lee	Democrat	1886–90
Philip W McKinney	"	1890–94
Charles T O'Ferrall	"	1894–98
J Hoge Tyler	"	1898–1902
Andrew J Montagu	"	1902–06
Claude A Swanson	"	1906–10
William H Mann	"	1910–14
Henry C Stuart	"	1914–18
Westmoreland Davis	"	1918–

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VIRGINIA, University of. An undenominational institution of higher learning at Charlottesville, Va., 4 miles from Monticello, the home of Thomas Jefferson, its founder. It was chartered in 1819 and opened in 1825. The group of college buildings, planned by Jefferson and erected under his personal supervision, together with the recent additions made to harmonize with and complete his designs, constitute one of the most characteristic and artistic pieces of academic architecture in America. The quadrangle is about 1000 feet long and 300 feet wide. The dominant structure is the Rotunda, set centrally at the northern end, and modeled from the Roman Pantheon It is now devoted to the university library. The courses of instruction are comprised in five departments: academic, engineering, law, medicine, and agriculture, comprising in all 24 schools, of which each affords an independent course under professors who are responsible only to the board of visitors, appointed by the Governor. The courses are purely elective. The degrees of bachelor of arts, law, and science, master of arts, doctor of philosophy, medicine, civil, mechanical, mining, and electrical engineer are conferred only upon examination after residence. No honorary degrees are given. Qualified persons may be licensed by the faculty to form classes for private instruction in any school of the university. The university had in 1916 a student attendance of 1050 with 79 instructors, and a library of 100,000 volumes. In the same year its endowment was $2,211,472, its income $350,000, and its grounds, buildings, and equipment were valued at $2,207,000. The president in 1925 was E. A. Alderman, D.C.L., LL.D

VIRGINIA AND KENTUCKY RESOLUTIONS. Two series of resolutions adopted in 1798 and 1799 by the Legislatures of Kentucky and Virginia in protest against legislation by Congress and in support of the strict constructionist view of the constitution. The resolutions were called forth by the steady extension of the powers of the Federal government at the expense of the States as a result of the liberal interpretation which the Federalist authorities were placing upon the constitution, and in particular by the enactment of the Alien and Sedition Acts (q.v.) in 1798. The Kentucky Resolutions were nine in number, were drafted by Thomas Jefferson, then Vice President, and were adopted by the Legislature in November, 1798. They affirmed that the Union was a compact; that whenever the Federal government assumed undelegated powers its acts were unauthoritative, void, and of no force; that the government was not the exclusive or final judge of the extent of the powers delegated to itself, since its discretion and not the constitution would then be the measure of its powers; but that, as in all other cases of compact among parties having no common judge, each party had an equal right to judge for itself as well of infractions as of the mode and measure of redress. The resolutions then formally denied the power of

Congress to pass the Alien and Sedition Acts, and declared that these acts were void and of no force. In the following year the Kentucky Legislature further resolved that 'the several States, being sovereign and independent, have the unquestionable right to judge of the infractions of the constitution, and that a nullification by those sovereignties of all unauthorized acts done under color of that instrument is the rightful remedy."

The Virginia Resolutions, passed in December, 1798, were eight in number, were drafted by Madison, and were much milder in tone. They described the Union, however, as a compact, and declared that in case of a deliberate, palpable, and dangerous exercise of powers not granted by the said compact, the States, as parties thereto, had the right, and were in duty bound, to interpose for arresting the progress of the evil and for maintaining the rights and liberties appertaining to them. The resolutions of the two States were transmitted to the executives of the other States to be laid before their respective Legislatures. Responses were made by Delaware, Rhode Island, Massachusetts, New York, Connecticut, New Hampshire, and Vermont, but none of them were sympathetic, that of Massachusetts expressly denying the right of the State Legislature "to judge of the acts and measures of the Federal Government." Only Vermont, however, denied the compact theory of the Union The replies of the various States were referred to a committee of the Virginia Legislature of which Madison was chairman, and on Jan 7, 1800, this committee made an elaborate report The texts of the resolutions may be found in Macdonald, *Select Documents of United States History, 1776–1861* (New York, 1898); Jefferson's draft of the Kentucky Resolutions may be found in Jefferson's *Works*, vol. ix (ed. 1856); and the answers of the State Legislatures and the text of Madison's report of 1800 are given in Elliot's *Debates*, vol. iv (ed. 1836). Consult: Warfield, *Kentucky Resolutions of 1798* (New York, 1887); Von Holst, *Constitutional History of the United States*, vol i (Chicago, new ed, 1899); Bassett, *Federalist Supremacy* (New York, 1906).

VIRGINIA CITY. A city and the county seat of Storey Co, Nev., 52 miles southeast of Reno, on the Virginia and Truckee Railroad. It is situated at an elevation of 6205 feet in a region noted for its extensive mineral deposits (Map: Nevada, B 3). The mines here, known as the Comstock Lode (q.v.), were discovered in 1859, and the consolidated output since 1860 has been $900,000,000. The most important shaft in the belt is the Virginia, which for 40 consecutive months produced $1,800,000 worth of ore. The courthouse, the School of Mines, and the Miners' Union Library are noteworthy features of the city. Virginia City grew up around the Comstock Lode, and was called successively Ophir and Washoe. It received its present name from James Finney, an early settler who was familiarly known as Old Virginia. Pop., 1900, 2695; 1910, 2244.

VIRGINIA CREEPER. See IVY.

VIRGINIA MILITARY INSTITUTE. A State institution at Lexington, Va., established in 1839, when the General Assembly, in place of the company of soldiers hitherto stationed at the western arsenal at Lexington, authorized the creation of a company of cadets, who, in addition to the duties of an armed guard, should pursue a course of scientific and military studies In 1861 the cadets marched for Richmond and were employed in drilling the recruits at Camp Lee. The school was reopened in 1862 on the demand of the Confederate military authorities, but was burned by order of Gen. David Hunter in 1864 After the close of the war the buildings were restored and the course of instruction was enlarged and extended The courses are partly prescribed and partly elective. A cadet who attains the prescribed proficiency in one of the elective courses, in addition to the degree of graduate, may receive the degree of bachelor of science or bachelor of arts. Nearly the whole body of graduates prior to 1865 were officers in the Confederate army. Since 1898 about 170 alumni of the institute have been officers in the United States armies. Stonewall Jackson was professor of physics and artillery instruction from 1851 to 1861. The institute in 1916 had 390 cadets, 25 instructors, and a library of 14,000 volumes Its grounds and buildings were valued at $775,000. It has no endowment, being supported by the State. The superintendent in 1916 was E W. Nichols.

VIRGINIANS, THE. An historical novel by Thackeray, a sequel to *Henry Esmond*. It was published in 1859, with illustrations by the author.

VIRGINIA POLYTECHNIC INSTITUTE AND AGRICULTURAL AND MECHANICAL COLLEGE. An institution for scientific and agricultural training, founded in 1872 under the Morrill Land Grant Act of 1862. It offers courses in general science, agriculture, horticulture, applied biology, applied chemistry, veterinary medicine, chemical engineering, agricultural engineering, applied geology, applied metallurgy, civil, mechanical, electrical, and mining engineering, and shorter courses in agriculture. Agriculture, engineering, and the applied sciences are given the foremost place in the curriculum, but every course includes elements of general culture. They are all arranged so as to give as nearly as possible an equal amount of lecture work, and of laboratory and field work The degrees conferred are B.S. in the undergraduate work, and M.S., M.E., E E., C.E, and E.M. for graduate work. Students are required to take military drill The total enrollment in all departments in 1915–16 was 567, and the instructors numbered 53. The value of the property is about $1,000,000, and the annual gross income about $220,000. The library contains 26,000 bound volumes, and 80,000 pamphlets. The president in 1916 was G. D. Eggleston, A.M

VIRGINIA RAIL. See RAIL.

VIRGINIA SNAKE ROOT. See ARISTOLOCHIA; SERPENTARIA.

VIRGINIA THEOLOGICAL SEMINARY. A seminary of the Protestant Episcopal church, near Alexandria, Va. It had its inception in 1815, began its work in 1818, was transferred to the College of William and Mary in 1821, and removed to Alexandria in 1823. In 1827 the seminary was removed to its present location. In 1854 it received from the Legislature a charter the provisions of which were enlarged in 1884. Since 1899 it has granted the degree B D. to graduating students who have attained a certain high standing. It also confers the honorary degree of Doctor of Divinity. In 1916 the faculty numbered 6, the students 46, and the alumni 1199, of whom 586 were living. The

endowment fund amounted to $500,000, exclusive of a library fund, and the library comprised about 30,000 volumes The entrance requirements are relatively high and the course of study occupies three years. The seminary holds a unique work, having founded all the foreign missions of the Episcopal church. Of its alumni, 38 in 1916 had been advanced to the episcopate, including Phillips Brooks, Bishop of Massachusetts, and Henry C. Potter, Bishop of New York

VIRGIN ISLANDS. A group of the Leeward Islands, consisting of upward of 100 islands, situated immediately east of Porto Rico (Map: West Indies, F 3). The area is estimated at about 465 square miles, of which one-third is inhabited and under cultivation. The climate is comparatively healthful. There are two wet and two dry seasons. Hurricanes and earthquakes are somewhat frequent. In the geological formation figure chalk limestone, serpentine, and eruptive stone. Fishing is good, nut trees abound in the forests, and there is fine pasturage Among the exports are sugar, indigo, cotton, and salt. St Croix, St Thomas, and St. John belong to the United States by purchase in 1917; also Culebra, Culebrita, and Vieques (formerly to Spain), and the rest of the group, Tortola, Virgin, Gorda, and Anegada, to Great Britain. Pop, 1917, 26,051. The Virgin Islands were discovered by Columbus in 1494. See WEST INDIES; WEST INDIES, DANISH

VIRGIN'IUS. A tragedy by James Sheridan Knowles, produced at Covent Garden, May 17, 1820, with Macready as Virginius, Miss Foote as Virginia, and Charles Kemble as Icilius.

VIRGIN'IUS, LUCIUS. A Roman centurion, who killed his daughter to prevent her falling into the hands of the decemvir Appius Claudius Crassus. The story has been a favorite theme. It was the subject of tragedies by the French authors Mairet, Leclerc, and Campistron in the seventeenth century. Lessing in 1772 cast it in a modern Italian setting; and it was also treated by Alfieri in Italy (1773), by Miss Brooke in England (1760), and in France by La Beaumelle (1760), Chabanon (1769), Laharpe (1786), Guiraud (1827), and Latour Saint-Ybars (1845). See also APPIUS AND VIRGINIA.

VIRGINIUS MASSACRE. On Oct. 31, 1873, the *Virginius*, a vessel flying the United States flag, owned by an American, and commanded by Captain Fry, an American citizen, which was carrying arms and men to the aid of the Cuban insurgents, was captured on the high seas off Jamaica by the Spanish man-of-war *Tornado*, and was taken into the port of Santiago de Cuba, where on November 4 four leaders of the Cuban patriots, Céspedes, Ryan, Varona, and Del Sal, who had been captured on board, were executed in pursuance, it was claimed, of prior sentences. The remainder of the passengers and the crew were then hastily tried on a charge of piracy, and on November 7 and 8 Captain Fry, 36 of the crew, and 16 of the passengers were summarily executed, eight of the victims being American citizens. Further executions were prevented by the timely arrival of the British sloop *Niobe*, whose commander, Sir Lampton Lorraine, forced the Spanish officer, General Buriel, to reprieve the remainder of the prisoners. The affair caused widespread excitement in the United States, where the feeling against Spain was already strong by reason of the latter's course in Cuba, and for weeks war seemed imminent, but, after protracted negotiations, a peaceful settlement was agreed upon, and Spain surrendered to the United States, conditionally, the *Virginius* and the survivors of her passengers and crew The vessel was overtaken by a storm on its voyage to New York, was abandoned by her crew, and sank off Cape Fear England exacted and received pecuniary reparation for those of her subjects who were executed Consult *Message of the President Relating to the Steamer Virginius, with Accompanying Documents* (Washington, 1874), and Rhodes, *History of the United States from the Compromise of 1850*, vol. vii.

VIRGIN MARTYR, THE. A tragedy by Massinger and Dekker, founded on the story of the martyr Dorothea. It was licensed in 1620, printed in quarto in 1621, revived at the Drury Lane in 1668, and adapted in 1715 by Griffin

VIRGIN QUEEN. A popular and affectionate name given to Queen Elizabeth, suggested by her resolute refusal to marry The popular conception was adopted by Spenser in the *Faerie Queene*, in his conception of *Belphœbe*

VIRGIN'S BOWER. See CLEMATIS.

VIRGO, vēr'gō (Lat, the virgin) The sixth sign of the zodiac (q.v.), denoted by the symbol ♍ The constellation Virgo was known to the ancients Its principal stars are: α Virginis, or Spica, a star of the first magnitude, attended by a feebly luminous companion, and γ Virginis, a binary with variable components of magnitudes 3 0 and 3 2, their period of revolution being 194 years. There are also several nebulæ, the most interesting being the spiral nebula M 99.

VIRI'ATHUS. A Lusitanian patriot of the second century B.C. Originally a shepherd, he became a guerrilla chief, and supported himself by predatory excursions into the neighboring Spanish territory. This brought him into collision with Rome, and in 151 B.C. the proprætor, Servius Galba, was ordered to reduce the Lusitanians to subjection. At first Viriathus kept mainly to the mountains, and contented himself with harassing the enemy by sudden and fierce descents, but in 147 he gave battle to Vetilius, the Roman proprætor, near Tribola, south of the Tagus, and inflicted on him a severe defeat. In the next two years he repeatedly came off victorious, but in 144 the consul, Q. Fabius Æmilianus, encountered him in Andalusia with a large army and Viriathus was driven back into his native fastnesses. The proprætor, Q Pompeius, was then sent against Viriathus, but the Roman force was crushed at the hill of Venus, and compelled to take refuge at Corduba, while Viriathus wasted all the country round the Guadalquivir. In 142 the Romans were more fortunate. Q. Fabius Servilianus, the consul, succeeded in driving Viriathus once more out of Spain and in annihilating several guerrilla bands: but in 141 the whole of his army was surrounded in a mountain pass and forced to surrender. Viriathus released his captives on condition that Servilianus would allow the Lusitanians to retain their independence. In 140 the consul, Q. Servilius Cæpio (brother of Servilianus), having received the command in Farther Spain, resumed the war against Viriathus, and bribed some Lusitanian envoys to murder their master, which they did while he lay sleeping in his tent. His death

was practically the end of Lusitanian independence See LUSITANIA.

VIRICONIUM. See UROCONIUM.

VI'RI RO'MÆ (Lat., Men of Rome). A popular Latin schoolbook compiled in the eighteenth century by Charles François Lhomond, a professor of the University of Paris. The material is taken from the works of various authors, chiefly Livy and Eutropius, simplified in language and construction.

VI'RUS (Lat., poison, venom, slime). The term used in medicine to denote a palpable morbid product causative of a contagious disease. If the contagium be fixed it is called a virus, while miasm was thought to be volatile. The term "virus" is still applied to the infective agents which cause smallpox, measles, etc., when the specific microorganism concerned has not been identified or is ultramicroscopic.

Virus is also used as a synonym of lymph, in speaking of vaccine material. We also speak of the virus of syphilis, glanders, hydrophobia, etc, meaning the morbific fluid which contains the germs of these diseases and is capable of propagating them if inoculated into the human body. In this way a culture of any bacteria may loosely be called a virus. See BACTERIA; DISEASE, GERM THEORY OF.

VIŚĀKHADATTA, vē-shāk'ha-dŭt'tā. The name of a Sanskrit dramatist, the author of the *Mudrā-rāksasa,* or Signet Ring of Rākshasa. His date was presumably not later than 800 A.D The plot of his elaborate drama turns on a political intrigue in the time of Chandragupta, or Sandrocottus (q.v.). The play has been repeatedly edited, as by Telang (Bombay, 1900), and by A Hillebrandt (Breslau, 1912), and was translated into English by Wilson (London, 1871), into German by L. Fritze (Leipzig, 1886), and into French by V. Henry (Paris, 1888) Consult: Lévi, *Le théâtre indien* (Paris, 1890); A. A. Macdonell, *Sanskrit Literature* (London, 1913); Montgomery Schuyler, *Bibliography of the Sanskrit Drama* (ib., 1906).

VISA'LIA. A city and the county seat of Tulare Co., Cal., 249 miles southeast of San Francisco; on the Atchison, Topeka, and Santa Fe, the Visalia Electric, and the Southern Pacific railroads (Map: California, F 6). It has packing and canning houses, flour mills, and a beet-sugar factory. Pop., 1900, 3085; 1910, 4550.

VISAYA, vī-sä'yà, or **BISAYA.** The name applied to the closely related linguistic groups who inhabit the north coasts of Mindanao and the central islands of the Philippine archipelago. When first encountered by the Spanish they were broken up into many small divisions, each subject to the rule of a petty lord or dato. They understood the working of metals, had developed a crude agriculture, and were carrying on considerable trade with China, Borneo, and Siam. They were in possession of an alphabet and were in other ways somewhat advanced. Because of the habit of tattooing their bodies they were generally referred to by Spanish writers as pintados. They were early converted to the Christian faith, and under the guidance of their Spanish and American teachers made considerable advance towards civilization. See PHILIPPINE ISLANDS.

VISAYAS, vē-sä'yàs, or **BISAYAS.** The central group of the Philippine Islands, lying between Luzon and Mindanao in the Otón or Visayan Sea. It constitutes one of the four main insular groups or territorial divisions of the archipelago, the other three being Luzon with Mindoro, Mindanao with the Sulu Islands, and the Palawan group. The name is derived from the Visaya, the predominating race inhabiting the group. For details, see articles on the separate islands, the chief of which are Sāmar, Bohol, Cebū, Negros, Panay, Romblón, and Masbate.

VISBY. See WISBY

VISCACHA, or **VIZCACHA,** vīs-kä'chà (Sp., probably of Quichua origin). A curious and pretty burrowing rodent (*Lagostomus trichodactylus*) of the chinchilla family, found on the pampas in South America It is nearly 2 feet long. The colors are varied and on the face are so arranged in masses of light and dark as to give it a very peculiar appearance The burrows of the viscacha are so numerous and so deep that they constitute a dangerous feature of the pampas to horseback riders, and in general the habits and economy of these animals are like those of the prairie dogs (q.v.). Their fur has some commercial value Interesting and detailed accounts of them may be found in Darwin, *A Naturalist's Voyage* (London, 1860; new ed, New York, 1908), and in W. H. Hudson, *The Naturalist in La Plata* (4th ed, ib., 1903) See Plate of CAVIES.

VISCAINO. See VIZCAINO.

VIS'CELLI'NUS, SPURIUS CASSIUS. See CASSIUS VISCELLINUS, SPURIUS.

VIS'CEROPTO'SIS. GLÉNARD'S DISEASE, so called after a French physician Frantz Glénard (1819–94). A prolapse or sinking of the abdominal viscera below their natural position. Any or all of the organs may be displaced downward. When the intestines are involved, the condition is known as enteroptosis; when the stomach is found below its normal position, the term gastroptosis is used. The disease exists in all degrees of severity and may give rise to no symptoms whatever. Generally, however, there is loss of appetite, nervous dyspepsia, constipation, or diarrhœa, abdominal distention, headache, vertigo, emaciation, and loss of sleep. Any or all of these symptoms may be present. The condition is brought about by loss of muscular tone, particularly of the abdominal muscles, intestinal autointoxication, with relaxation of the ligaments which hold the viscera in place In women, tight lacing has been held to be a frequent cause. The symptoms may be alleviated by supporting the organs with a properly applied bandage, or other similar device. Rest in bed, attention to diet, hygiene, exercise, and general muscular upbuilding will cure the majority of cases. In others operation may become necessary.

VISCHER, fish'ĕr, FRIEDRICH THEODOR VON (1807–87). A German critic, born at Ludwigsburg, Württemberg. He was educated at Tübingen, after which he was for a year vicar of the country church of Horrheim, near Vaihingen. He then spent the years 1832 and 1833 in developing his æsthetic taste in the art centres of Germany and Austria. He was successively privatdocent (1836–37) and assistant professor (1837–44) in the University of Tübingen, and in 1844 was appointed professor of æsthetics. The too independent tone of his inaugural lecture, however, caused his suspension for two years. In 1848 he was elected to the National Assembly of Frankfort, where he voted with the Left. In 1855 he was called to the poly-

technic institute of Zurich, and in 1866 to that of Stuttgart. He resumed at the same time the professorship of æsthetics and German literature at Tubingen, but from 1869 taught only at Stuttgart As a literary critic and student of æsthetics, Vischer was one of the most distinguished members of the Hegelian school. Among his numerous and valuable publications are *Kritische Gange* (1844, new series, 1860-75), *Aesthetik oder Wissenschaft des Schonen* (1847–58; new ed., 1914); *Faust, der Tragodie dritter Teil* (1862; 4th ed., 1889), a satire on the second part of the tragedy; *Epigramme aus Baden-Baden* (1867), *Der deutsche Krieg 1870–71* (1874); *Goethes Faust: neue Beitrage zur Kritik des Gedichts* (1875); *Auch Einer* (1878; 41st ed., 1908), a novel, *Mode und Cynicismus* (1878, 3d ed., 1887); *Altes und Neues* (1881–82; new series, 1889); *Lyrische Gange* (1882, 3d ed., 1900); *Allotria* (1892); and (posthumous) *Shakespeare-Vortrage* (1898–1905; 2d ed., 1905–07). Consult the monographs by Günthert (Stuttgart, 1888) and Ziegler (ib, 1893).

VISCHER, PETER, THE ELDER (c.1455–1529). A German sculptor and bronze founder, the foremost of the Renaissance Born at Nuremberg, son of the brazier Hermann Vischer the Elder (died 1487), Peter was his father's pupil and assistant, and was admitted to the guild as a master in 1489. His productions increased the reputation of the foundry to such a degree that for half a century it was practically without competition in Germany, and also received important orders from other countries. Five sons assisted Peter in his extensive productions —HERMANN THE YOUNGER (c.1486–1516); PETER THE YOUNGER (c.1487–1528); HANS, who inherited the foundry, but removed to Eichstädt in 1549; PAUL, who died at Mainz in 1531; and JAKOB, about whom information is lacking. While there are scarcely any records of his life, the master's artistic development may be followed in his numerous works, all marked with his monogram and dated, with the exception of his earliest known work, the statue of "Count Otto von Henneberg" in the church at Römhild (c.1487). To his early period also belong several sepulchral slabs in the cathedrals of Bamberg, Wurzburg, Meissen, and Breslau, among which that of Bishop John IV (1496) at Breslau is remarkable for its powerful realism. The most important monument of his early period is the stately memorial to Archbishop Ernst (1495) in Magdeburg Cathedral, with the majestic reclining figure of the Archbishop, and a rich base decorated with statues of the 12 apostles and two other saints. During the following years the transition from the Gothic to the Renaissance appears in Vischer's work. His treatment becomes freer, the design more elaborate, and the forms more refined and truer to nature This is seen in a series of grave slabs designed for the churches of Cracow, of which that of Cardinal Frederick Casimir in the cathedral, completed in 1510, is the most important. It is seen also in the fine monument of Count Herman VIII of Henneberg and his wife in the church of Römhilde (1508), and especially in his master creation, the "Shrine of St. Sebaldus" (1508–19), in the church of that saint, at Nuremberg, the most important monument of German plastic art during this period. It consists of an elaborate Gothic canopy inclosing the silver sarcophagus of the saint, adorned with reliefs, many statuettes (including Peter Vischer himself), and astonishing wealth of Renaissance decoration. The execution of these works shows a difference of style that can only be explained by supposing the assistance of Peter's sons Hermann and Peter the Younger While engaged on the shrine he modeled also the powerful statues of King Theodoric and King Arthur (1513), and the monument of Emperor Maximilian at Innsbruck. The King Theodoric shows mediæval reminiscences; but Arthur, conceived in the spirit of the freedom of the Renaissance, is one of the finest things of its kind produced by German sculpture.

A number of other bronzes, unquestionably the product of Vischer's foundry, are so purely Renaissance in spirit and conception that they are now attributed to his talented son, Peter the Younger, who visited Italy about 1507. They include the grave relief of Margaretha Tucher (1521, Regensburg Cathedral), representing the meeting of Christ with the sisters of Lazarus; the monuments of Cardinal Albrecht of Brandenburg (1525, Stiftskirche, Aschaffenburg), and of the Elector Frederick the Wise (1527, Schlosskirche, Wittenberg). Peter the Younger also designed a number of small bronzes, inkstands, and the like, and two reliefs of Orpheus and Eurydice, the better of which is in the Berlin Museum. The beautiful wooden statue of the Virgin in the Germanic Museum, Nuremberg, claimed by some as his design, is more properly ascribed to the Vischer atelier. Hans Vischer, who inherited his father's foundry, was less able and original than his brother. The best of his works are an "Apollo," a fountain figure in the court of the Nuremberg town hall; the double monument of the Electors Johann Cicero and Joachim I (1530, Berlin Cathedral); and the monument of John the Constant (1534, Schlosskirche, Wittenberg).

Bibliography. The earlier literature has been replaced by the researches of Georg Selger, *Peter Vischer der Jungere* (Leipzig, 1897); Weizsäcker and Justi, in *Repertorium für Kunstwissenschaft,* vols. xxiii, xxiv (Stuttgart, 1900–01); and the very readable Berthold Daun, *Peter Vischer und Adam Krafft* (Bielefeld, 1905). Adapted from these are the popular monographs by Cecil Headlam (London, 1901), and Louis Réau (Paris, 1909).

VISCOID. See CELLULOSE.

VISCONTI, vēs-kōn'tē. A celebrated family of Lombardy. The first of the name who appears prominently in history is OTTONE, who became in 1078 Viscount of the archbishopric of Milan. In 1262 another OTTONE (1208–95) was appointed Archbishop of Milan by Pope Urban IV. His appointment was opposed by the popular party, headed by Martino della Torre, but Ottone came off victorious in the struggle with the Torriani, and established his sway in Milan. The contest was continued by his grandnephew, MATTEO (1255–1322). Matteo proved himself a prudent and temperate ruler. Expelled by the Torriani and their allies in 1302, he was restored in 1310 by the aid of the Emperor Henry VII, and appointed Imperial vicar in consideration of the payment of 40,000 florins. Pavia, Alessandria, Tortona, Cremona, Bergamo, and Piacenza were forced to acknowledge his authority. A quarrel, however, arose with Pope John XXII, regarding the appointment to the Milan archiepiscopate; and Matteo was excom-

municated Matteo died in the same year, having previously abdicated His son, GALEAZZO I (1277–1328), was chosen his successor, and immediately the Pope proclaimed a crusade against the heretical Visconti, and an army under Raymond of Cardona advanced in 1323 on Milan. The Emperor Louis IV sent aid to the Visconti and the Crusaders were totally defeated at Vaprio, on the Adda (1324). Soon after Galeazzo, by the intrigues of his ambitious brother Marco, was exiled, but his eldest son, AZZO (1302–39), succeeded him, while the Antipope Nicholas V confirmed the third son, GIOVANNI, in the archiepiscopate Azzo was the greatest prince of the race, ruled Milan wisely and well, and extended his sway over almost the whole of Lombardy. The Council General of Milan elected his two uncles, GIOVANNI (1290–1354) and LUCCHINO (1287–1349), as joint rulers to succeed him, on the latter, who was able, resolute, and unscrupulous, devolved the government. Montferrat was added to the dominions of the Visconti and Pisa became a tributary. Lucchino's tyrannical acts provoked enemies, and he died by poison. From this time Giovanni, who had been since 1342 Archbishop, reigned alone. He bought Bologna in 1350, in 1353 accepted the lordship of Genoa, which had been almost crushed by its rival, Venice; and taking up the quarrel of his new subjects, equipped a fleet which, under Paganino Doria, gained a complete victory over the Venetians He was the generous patron and friend of Petrarch. His three nephews conjointly succeeded him, but in 1355 the eldest was assassinated, and his dominions were shared between the other two, GALEAZZO II (died 1378) and BERNABO (died 1385). Bologna, which belonged to Bernabo, fell into the hands of the Pope, who excommunicated Bernabo for attempting to recover possession of it. Urban V proclaimed a crusade against Bernabo, which was joined by all the principal Italian princes; and he was ultimately forced to accept a sum of money in place of Bologna. His brother Galeazzo II, who had established his residence at Pavia, was the Mæcenas of his time, he steadily befriended Petrarch, founded the University of Pavia, and collected a considerable library.

On Galeazzo's death (1378) his son, GIAN GALEAZZO (c 1347–1402), succeeded him in Pavia and its dependencies, and by treacherously seizing and imprisoning his uncle, Bernabo of Milan, became sole ruler of Lombardy. He had all the great qualities and most of the vices of his race, and openly aspired to the sovereignty of Italy. He conquered Padua, Verona, and Vicenza; extended his dominions to the gates of Florence, which he also attacked; and in 1395 purchased from the Emperor Wenceslas the absolute sovereignty of his dominions, with the title of Duke of Milan. He was a great patron of letters and science, gathered eminent men of all classes around him, reorganized the University of Piacenza, established a magnificent library, constructed the famous bridge over the Ticino at Pavia, and commenced the erection of the cathedral of Milan. His daughter, Valentina, married Louis, the younger brother of Charles VI of France, and became the grandmother of Louis XII, who upon this relationship founded his claims to the Milanese. Gian Galeazzo's sons, GIAMMARIA (Giovanni Maria) (1388–1412) and FILIPPO MARIA (1391–1447), reigned in succession; the former, who was cowardly, suspicious, and of a cruelty verging on insanity, was murdered, and the younger brother became sole ruler The Venetians on the east, the Marquis of Montferrat on the west, and the Pope on the south, were rapidly curtailing his dominions, when, by a happy stroke of policy, he espoused Beatrice di Tenda, the widow of a condottieri leader, and thus obtained the services of a veteran band of soldiers His fortunate choice of Carmagnola (q.v) as his general led to the restoration of the former boundary line of his dominions In 1441 he engaged the services of the celebrated condottiere Francesco Sforza (see SFORZA), to whom he gave his natural daughter Bianca in marriage, and on his death the Visconti family was succeeded by that of Sforza (q.v) in the lordship of the Milanese. Collateral branches of the Visconti still exist in Lombardy. Consult: Jakob Burkhardt, *The Civilization of the Renaissance in Italy* (Eng. trans., London, 1898); J. C. L. Simonde de Sismondi, *History of the Italian Republics in the Middle Ages* (Eng. trans., New York, 1906); J. A. Symonds, "Age of the Despots," in *Renaissance in Italy*, vol. i (new ed, London, 1913).

VISCONTI. A family of Italian archæologists and architects. GIOVANNI BATTISTA VISCONTI (1712–84), a native of Sarzana, settled at Rome and succeeded Winckelmann as prefect of antiquities He was employed by Clement XIV and Pius VI to collect works of ancient art for the *Museo Pio-Clementino* in the Vatican. —ENNIO QUIRINO VISCONTI (1751–1818), eldest son of Giovanni, as a youth aided his father in the preparation of the first volume of the engravings of the *Museo Pio-Clementino*. In 1784 he edited alone the second volume of the same series, and in 1787 was appointed conservator of the Capitoline Museum The series of engravings of the *Museo* was regularly issued, the seventh and last volume being published in 1807. During the French occupation of Rome Visconti was a member of the government, but in 1799 was compelled to flee to France, and settled in Paris, where he was made curator in the Louvre and professor of archæology. In 1801 appeared his great work, *Iconographie grecque*, and this was followed by the *Iconographie romaine* in 1817. In 1817 he went to London by express desire of the British government to appraise the value of the Elgin marbles (q.v), and as a result of this visit published *Mémoire sur les ouvrages de sculpture du Parthénon*. He died in Paris, Feb. 7, 1818.—PIETRO ERCOLE VISCONTI (1802–80), nephew of Louis Tullius Visconti (q.v), after studying at the papal archæological academy became in 1836 commissioner of antiquities, director of the collections in the Vatican, and professor at the University of Rome. He left uncompleted his *History of the Noble Families of Rome and the Papal States*.

VISCONTI, LOUIS TULLIUS JOACHIM (1791–1853). A distinguished French architect, born in 1791 in Rome, the son of Ennio Quirino Visconti. He was brought in his eighth year to Paris, where he studied in the Ecole des Beaux-Arts and in the atelier of Charles Percier. Among his varied works in Paris were the architectural designs of the Molière, Louvois, and St Sulpice fountains, plans for a Bibliothèque Royale, and the transformation of the Dome des Invalides into a mausoleum for the remains of Napoleon Bonaparte (completed 1853). To

him is also due the masterly design for the union of the Louvre and the Tuileries, a problem which his master Percier, with Fontaine, had earlier endeavored to solve. This colossal enterprise was begun in 1852 under Napoleon III, and carried out during the following 30 years, chiefly under Visconti's associate, Hector Lefuel, who succeeded him on his death, in December, 1853. While the exterior detail of the new wings is largely Lefuel's, the general disposition of the plan was Visconti's

VISCONTI-VENOSTA, vā-nōs'ta, EMILIO, MARQUIS (1829–1914). An Italian statesman, born in Milan. After his father's death, in 1846, he began to take part as a journalist in Liberal politics He became an ardent follower of Mazzini, whom he left in 1853 to join Cavour, and in 1859, after a narrow escape from arrest by the Austrian authorities, he was named royal commissary to Garibaldi. In 1860 he was appointed adviser to the dictator Farini in Parma and Modena, in the interest of annexation to Sardinia, was elected to the Chamber of Deputies in the same year, and became Minister of Foreign Affairs in the Minghetti cabinet in 1863, but resigned in 1864 because of popular disapproval of the convention of September, which he had concluded with France. In 1866 he became Ambassador to Constantinople, but was recalled to take charge again of the Foreign Office and conclude peace with Austria, after which he was retired. Again in 1869 he was made Foreign Secretary in Lanza's cabinet and held the portfolio until the fall of the Right from power in 1876, when he retired, having put through (1870) the law which offered the Pope certain guaranties. Visconti-Venosta became Senator in 1886, and in 1896 again received the portfolio of Foreign Affairs under Rudini, but was forced out in May, 1898. In 1899–1900 he was Foreign Minister in the Pelloux cabinet, and in 1900–01 held the same post under Saracco The most striking feature in Visconti-Venosta's foreign policy was his eager friendship for France, which bore fruit in the amicable relations established with that country after 1904.

VISCOSE. See CELLULOSE.

VISCOSITY (from Lat. *viscosus*, viscous, sticky, from *viscum, viscus*, birdlime). When currents are produced in fluids, forces are observed which retard the relative motion of the parts. These forces of friction are said to be due to viscosity; and the greater the friction, the more viscous the fluid. It is due to the motions of the molecules between the moving parts of the fluid and to the redistribution of momentum.

VISCOUNT, vī'kount (OF. *visconte, viconte*, Fr. *vicomte*, from ML. *vicecomes*, viscount, from Lat *vice*, in place of + *comes*, companion, count). In English history, originally the officer who acted as deputy to the count or earl, the King's immediate officer within his county. The hereditary title of viscount is a degree of nobility unconnected with office. It was first granted in England to John Beaumont, created a peer by the title of Viscount Beaumont in 1440. A viscount's coronet consists of a chased circlet of gold, round which are ranged usually 12 to 16 pearls, smaller than those of a baron's coronet, and in contact with each other. The mantle is scarlet, and has two doublings and a half of ermine. A viscount is "right honorable" and is styled "My Lord"; his wife is a viscountess; his eldest son has no courtesy title of peerag but all his sons and daughters are styled "ho orable" The title has a not dissimilar histor in France, Italy, and Spain.

VIS'CUM. See MISTLETOE

VISH'NU (Skt. *vishnu*; of uncertain etymology). The second god of the Hindu triad (se TRIMURTI), and regarded as the supreme deit by his worshipers, who are called Vaishnava (q.v.).

In the Rig-Veda Vishnu is the wide-steppin god who goes swiftly and "establishes the vau of heaven" and "measures out the extreme space of earth," while his "dear path" is the heaven o pious men, or along the highest heavens Th deity thus described is obviously the sun though some scholars are inclined to regard th Vedic Vishnu as merely a giant, his famous thre strides through the universe being interprete as across the ground rather than through th sky In the second period of Hindu though however, the union of the sun god and Vishnu complete, and at the same time Vishnu become more generally recognized as one of the supren gods, appearing even as the supreme deity. Th next phase of his character is that of a suprem All-god. About the beginning of the Christia era this pantheistic Vishnu, who represent the esoteric speculations of philosophy, a well as the figure of a popular godling, er tered into so close rivalry with the orthodo supreme god, Brahma, and with the sectaria god, Siva, that to reconcile the conflicting claim of each cult the three were proclaimed to b forms of one supreme god. When this occurre Vishnu became merged with Brahma and Siv and thenceforward he represented only a persona condition of the one All-god. While Brahm tended to become a deity of philosophers an Siva remained an object of fear, Vishnu becam especially the god of the easy-going middl classes, both in northern and southern India and ended his divine career by absorbing mos of the local cults of the Hindu and barbaria natives. He was believed to have descende from heaven and become incorporate in variou guises. These are the famous avatars of Vishnu (See AVATAR.) In them the Vishnu appeare only in part; for being the All-god, the ind vidual form was only a portion of the whol This theory of avatars aided greatly in makin Vishnu a popular god; for, according to it, an local god might be a form of the All-god. Th provided a means of bringing into the Brahman fold the worshipers of the most diverse divinitie

The oldest legends of the avatars have to c with mythical animals; then follow avatars half human form, and finally come the gre human avatars. Among these the oldest is th fish avatar. At first, before Vishnu was reco nized as All-god, we find the legend of a delug and the story of a monster fish, which preserv from death in the flood the ancestor of all ma kind. According to orthodox Brahmanic the logians the saving fish was an incarnation the god Brahma. Only much later was Vishn substituted for the earlier god. In no other i stance is the historical genesis of the avatar plainly preserved as in this, wherein a popul tale is transferred from one divinity to anothe

The numerous avatars of Vishnu are given first as 10, then as 20, then again as 22, and last they become innumerable. First comes t fish avatar already referred to; then the torto and boar avatars. These comprise the fi

group, in which possibly a totemic deity has been identified with Vishnu. The next group comprises the man-lion form of Vishnu and the dwarf form, in which the deity is half beast and half god respectively. The tortoise and boar forms, like that of the fish form, are assumed in order to save earth itself from disaster. Both tortoise and boar raise the sinking land, so that these are also merely forms of a deluge myth. In the dwarf avatar Vishnu tricks an evil demon, who possesses earth, by soliciting as much earth as he can cover with three strides On this request being granted, the god renounces his dwarf form and with his ancient three strides covers the whole earth. The last group of avatars comprises those of the two Ramas and of Krishna (q v), together with the final claim or admission that Buddha was an avatar of Vishnu and the prediction that there is to be another avatar, that of the Saint Kalki. In this last group of avatars, beginning with the older Rama, the evil counteracted by Vishnu in human form is moral, not, as in the earlier legends, merely physical, evil.

The most important of these avatars are those in human form. As Rama or as Krishna, the god Vishnu is worshiped by millions of Hindus, whereas in other forms he has only a restricted circle of worshipers, generally limited to a local cult Especially is this true of the speculative avatars, such as Buddha in the group of 10, or as Kapila (q.v.) in the later group of 22. In regard to these forms it may be said that the god is not really worshiped under them, but they are postulated merely on the general theory that the greatest men of the race, unless positively antagonistic to the Vishnu cult, must have been incarnations of the deity.

All these legends have resulted in swelling enormously the sectarian literature which clusters about Vishnu, and almost every legend has received its special gospel in the shape of a Purana (q.v.) or two.

When freed from all avatars, Vishnu as the supreme god, or as a member of the Trimurti and not as a mere name for the pantheistic All-god, is conceived as having a special heaven, called Vaikuntha. His wife is Lakshmi (q.v.), and he is represented as dark in color, with four hands, his emblems being a disk (due to his solar attributes), a conch shell or trumpet (such as he bore in battle), a lotus (from the heart of which Brahma is supposed to have been born), and a mace or sword. Other representations picture his avatars as a beautiful youth, to typify Krishna or Rama. The epic gives him a thousand names, most of which are epithets describing him as all-glorious, all-powerful, the saviour, or the very great one.

There is, however, another aspect of Vishnu, which may be called his philosophical form. In this form Vishnu becomes a mere name (interchangeable with Brahma or Siva) of the All-god as philosophically conceived. As such Vishnu is not a demiurge (q.v.), which in all sectarian forms is his real position, but a being without parts or passions, having no attributes save those of being and knowledge. He is the name of the world spirit out of which comes and into which returns all the transient group of phenomena which have no real existence, and are due merely to ignorance on the part of those who live conditioned by these phenomena. This is the Vishnu of the Vedanta (q.v), differing both from the Krishna-Vishnu of the sectary and from the Vishnu of the Trimurti. Since Vishnu may be and is worshiped under any of these conceptions, he comes nearest to the all-sufficing notion of God, and his cult appeals alike to all In these phases may be seen a survival of the primitive sun god. On the one hand the identification of the sun's place with the place of departed spirits led to a mystic conception of the god, whose attribute of light was further identified with that of goodness On the other hand, the fructifying power of the sun led to the apotheosis of the generative power in man as in nature, and it is this function which is the chief element in Krishna worship, Krishna being renowned as the amorous shepherd whose thousand wives are his principal delight.

In sharp contrast to Siva, Vishnu is at all times a kindly god, and his cult is indicative of this fact. To him are offered no bloody sacrifices. He desires only the sacrifice of fruit and vegetables, milk and honey. The esoteric rites in honor of his human incarnations are also bloodless, though licentious in their debased form. On the whole he is a deity of light and joy. Gay banners and brilliant illuminations are seen at his feasts, and his many temples are crowned with flowers, not with the skulls of victims. Under the form of Juggernaut, or Jagannath (q.v), the saviour of the world, he has been credited with taking pleasure in human sacrifice, but this is a gross error.

The sacred scriptures of Vishnu are of two sorts. The first are the few early texts which express a belief in Vishnu as the supreme god. Such expressions of belief are always incidental in the first instance, and they would not be of influence if it were not for the later evolution of Vishnu into the All-god. The earliest Upanishads (q.v.) and the still earlier Brahmanas (q.v.) do not recognize Vishnu as in any way a supreme deity. The second class of scriptures includes the *Bhagavad-gītā* (q.v.), in which for the first time Krishna appears as Vishnu incarnate on earth, and the *Visnu Purāṇas*, of which there are several, the oldest being called simply *Visnu Purāna*, and the most popular being the *Bhāgavata Purāṇa*. These, together with a supplement to the *Mahābhārata* (q.v.) called the *Harivanśa* (q.v.) in which are told marvelous tales of Krishna's youthful exploits, are the classic texts in honor of the god, though each of the Vishnu sects (see VAISHNAVAS) has scriptures of its own. Consult: William Muir, *Original Sanskrit Texts* (2d ed., London, 1868); E. W. Hopkins, *Religions of India* (Boston, 1895); A. A. Macdonell, *Vedic Mythology* (Strassburg, 1897); W. J. Wilkins, *Hindu Mythology* (2d ed., London, 1900); A. Hillebrandt, *Vedische Mythologie* (Breslau, 1910), and see VISHNU in Plate of HINDU DEITIES, in the article INDIA.

VISIBLE SPEECH. A form of universal alphabetics, devised by A. Melville Bell (q.v.) in 1848, which is equally adapted to every spoken language. As all phonetic elements can be reduced to their established standard of articulate correctness and accurately represented, visible speech presents the same linguistic sounds in every country. Human speech, however, consists of certain movements of the throat, tongue, and lips, associated in different countries with different sets of letters, so that one may know the letters in connection with a certain language, and yet be unable to pronounce them in

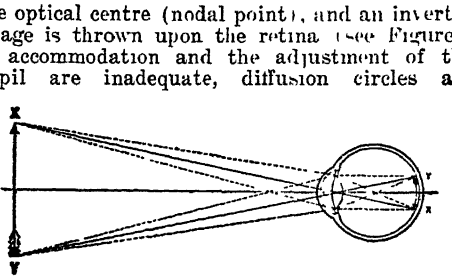
some other language This difficulty is obviated by visible speech, as it consists of a form of writing which depicts the actual movements of the organs of speech. For the characters employed in the system, see DEAF MUTE. To modern phoneticians, however, Bell's alphabet appears cumbersome and insufficiently accurate, and hence has been discarded. Of the numerous alphabets that have been proposed in recent years the one created by Paul Passy (q.v.) and adopted by the Association Internationale Phonétique was in 1916 most universally used. See PHONETICS.

VISIGOTHS. See GOTHS.

VISION, or SIGHT. Vision or sight is, strictly, that mode of experience which is conditioned upon the eye. Generally the term "vision" covers the anatomical description and dioptrics of the eye and the physiological functions of the visual apparatus, as well as the psychological description of visual sensation and visual space perception. Since the mechanics of the eye has been discussed under eye (q.v.), little more need be said upon that topic.

The eye may be likened to a small photographic camera. It consists of a dark chamber, lined with a membrane, the choroid, which is pigmented with a coloring matter of dark brown. At the front of the chamber is a diaphragm, the iris, which has a small opening for the admission of light (the pupil) The size of the pupil automatically increases or diminishes according to the degree of illumination. The refractive media consist of the cornea, the aqueous humor, the lens, and the vitreous humor; most important of these is the lens. At the back of the chamber is a sensitive nervous layer, the retina, which receives the image. Functionally, the most noteworthy parts of the instrument are the focusing apparatus, by means of which the lens is adjusted to near and far objects (accommodation) and the retina.

Accommodation. When we look at a distant object, the lens is kept flat by the relaxation of the ciliary muscle, which is attached to the choroid and pulls upon the suspensory ligament, a membrane surrounding the edge of the lens. As a consequence the refractive power of the lens is decreased. For near vision the ciliary muscle contracts, the tension of the suspensory ligament is thereby lessened, and the lens by its own elasticity assumes a greater curvature. The fatigue of the eyes which follows upon their protracted use in near vision results from the prolonged contraction of the ciliary muscle; and it is this muscle also which furnishes the sensations of accommodation which are of importance in the visual perception of space (q.v.). In the emmetropic (normal) eye the range of accommodation is from infinite distance to about 6 inches; in the myopic (shortsighted) eye both the far and the near points are brought closer to the eye, and in the hypermetropic (far-sighted) eye the near point is abnormally distant. After the age of about 45 years the human lens becomes less elastic, and as a result there is a gradual loss of power to accommodate the eye for near distances (presbyopia or old sight). The accommodation of the lens, together with the size of the pupil, conditions the formation of a clear image upon the retina. The pupil admits only a small number of the rays which emanate from the object of vision, and the rays are so refracted that they cross in the optical centre (nodal point), and an inverted image is thrown upon the retina (see Figure) If accommodation and the adjustment of the pupil are inadequate, diffusion circles are



FORMATION OF AN IMAGE UPON THE RETINA.

formed, and the image is indistinct. Faulty accommodation is also thought to explain irradiation (q.v.). The technology which, without the use of drugs, corrects inadequate accommodation by fitting proper lenses is known as optometry (q.v.).

Retina. The sensitive film of the optical instrument consists of a thin and transparent membrane composed of several layers The superficial layer is a neuroepithelium, consisting of small end structures called rods and cones, which are thought to be the receptors of the physical stimuli Except at the point where the optic nerve enters the eyeball, and where both rods and cones are wanting, these receptors are irregularly distributed over the entire retina. The area which lacks rods and cones is called the blind spot (q.v.). At the posterior pole of the eyeball is situated a small area impregnated with a yellow pigment and hence named the macula lutea or yellow spot. At the centre of the yellow spot is a small depression, the fovea, where only cones are found. Here the cones are more slender and elongated than elsewhere; the diameter of a single cone has been variously estimated at from 2.5μ to 5.4μ. The rods contain in their end members a reddish-purple pigment, called the visual purple, which bleaches on exposure to light and is regenerated in darkness. It is significant that the temporal course of regeneration of the visual purple corresponds with that of dark adaptation, and that the relative amount of the light of different wave lengths absorbed by the visual purple is coincident with the distribution of tints in the spectrum of twilight vision (see VISUAL SENSATION). The cones undergo slight contractions under the influence of light and electrical stimuli; but the further effect of stimulation is not known; it is generally supposed, however, to be photochemical in nature. The inner layers of the retina, through which light must pass before it reaches the rods and cones, are, as has been said, transparent in the living eye, and the innermost layer contains blood vessels whose contents under certain conditions may be seen as floating spots or disks. The inner aspect of the eye may be readily observed by means of the ophthalmoscope, an instrument devised by Helmholtz for this purpose.

Duration of Visual Sensations. When the retina has been subjected to a bright stimulus, the excitation persists for some time after the stimulus has been removed. It is owing to this persistence of excitation that the spokes of a rapidly revolving wheel appear solid, or that black and white rotating disks will fuse into a grey. The time required for such fusion is about 24 revolutions per second. The duration

of persistence is conditioned upon the intensity and duration of the stimulus.

Visual Space Perception. The visual appearances of forms and objects, distances and depths, localities and magnitudes, are not simple but complex experiences: they are visual perceptions. All such experiences, when analyzed to their lowest terms, reduce to sensations, principally to visual sensations of light and color. The problem of visual space perception, therefore, is, as in perception (q.v.) in general, to determine the nature of the combination of these elements, the pattern in which they go together, and to distinguish between those that are essential to the perception and those which furnish its meaning (q.v.). Such an analysis has already been made, so far as present knowledge permits, in the case of the more important visual space perceptions. See LOCALITY; EXTENSION, EXTENT; ILLUSION.

There are two facts, however, which are important in all space perceptions. (1) The first is binocular vision, the fact that although we have two eyes we perceive, for the most part, as if we had but one. The two eyes are so placed in the head that the visual field of the one partially overlaps that of the other eye. These two fields combine in such wise that the result for perception is as if we had a single median or cyclopean eye. The fact that we do not see double is explained by the theory of corresponding points. Every part of the retina of the one eye has a corresponding point on the retina of the other; if we think of the two retinas as laid together, the one within or upon the other, and of a pin driven through them, then the two pin holes represent corresponding points. When an object is fixated, the eyes so converge or diverge, as the case may be, that every point of the object falls upon corresponding points of the two retinas; the object is accordingly seen as single. All other points in the field of vision except those which fall within the horopter (q.v) are seen double. (2) The second fact is the importance of eye movement in visual space perception. Not only does the rotation of the eyes greatly increase the field of vision, but the sensations which take their origin in the muscles involved in eye movement are also, almost invariably, found to be a part of the perceptive complex. Whether these sensations are simply the carriers of meaning, or whether they actually fuse with visual sensations to furnish the perception of space, is a point in dispute. It is known, however, that in monocular vision, where all criteria are eliminated except sensations of accommodation, differences of depth may still be perceived; and there are experiments which show that under certain conditions there is a close correlation between the extent of eye movement and that of visual illusions. Consult Joseph Le Conte, *Sight: An Exposition of the Principles of Monocular and Binocular Vision*, in "International Scientific Series," vol. xxxiii (London, 1883); William James, *Principles of Psychology* (new ed., 2 vols., New York, 1905); W M. Wundt, *Outlines of Psychology*, Eng. trans. by C. H. Judd (3d ed., ib., 1907); E. B. Titchener, *Beginner's Psychology* (ib., 1915); and references to W. Wundt and H. Helmholtz under VISUAL SENSATION.

VISION, DEFECTS OF. See AFTER IMAGES; ASTIGMATISM; EYE; MYOPIA; SIGHT, DEFECTS OF.

VISION IN ANIMALS. That sense which is evidenced by a specific response of animals to photic stimuli; or, more narrowly, such a sense when it is dependent upon an eye as an organ. Only in the more general significance are animals, such as the earthworm, which is eyeless and yet sensitive to light, said to possess vision In this general way the capacity to respond to photic stimuli is very widespread. Single-celled organisms tend frequently either to have their activity altered by light (photopathy) or to take up a position with respect to the direction of the light (phototropism). (See PHOTOTAXIS, TROPISM.) In higher forms, such as the flatworms and earthworms, the skin appears to be the light-perceiving organ. It is possible that the skin is sensitive to light even in forms possessing a well-developed eye, e.g., in the frog. In general, however, sensitivity to light increases with the development of pigment spots in the skin, and may be regarded as vision in the restricted sense when the pigment spot becomes an eye. See EYE, COMPARATIVE ANATOMY OF THE

Limits of Vision. The human eye is sensitive to light waves ranging from about 760$\mu\mu$ (red) to 396$\mu\mu$ (violet) in length. Those mammals which have been tested appear to have a lesser range, being insensitive to the longer wave lengths; in other words, they cannot see red light. The shorter wave lengths are probably relatively more effective for them than for man. Thus the eyes of these mammals respond to light somewhat as does a photographic plate.

With birds there is no deficiency in sensitivity to the red end of the spectrum. Many birds, when presented with grain illuminated by the spectrum, peck with avidity at grains in the red and yellow regions, take more hesitantly from the green, and fail to find the grains in the violet region. This observation has led investigators to suppose them insensitive to the shorter waves to which man responds. A recent study of the chick (which shows this form of behavior) has, however, brought out the facts that the limits of vision are practically identical with those in man, that the relative distribution of effectiveness of the wave lengths is approximately the same, and that the failure of the chick to peck at grains in the violet light means simply that the violet end of the spectrum is for the bird, as it is for man, the darkest and least effective region.

Fish, in general, are most sensitive to light which is seen by man as green or yellow green. Fish that tend to collect in the light will gather in the green region of a spectrum thrown on the aquarium. If the green region be shaded, they will select the adjacent regions. Orange and red light at the one end and violet light at the other have at best very little stimulating effect, and may not be discriminated by the fish from the complete absence of light. The range of vision is thus very much restricted.

The frog has a range of vision coextensive with man's. The turtle will snap up food illuminated by red light, when it fails to take the same food in violet light. Compared with man it is possibly defective in the violet region.

Brightness Discrimination. Undoubtedly differences of brightness (tint) play a preponderant rôle in the visual discriminations of most animals. Careful quantitative experiments are lacking; but it appears that the difference of illumination necessary for discrimination

varies from $\frac{1}{10}$ of the absolute value of the illumination with mice and monkeys to as little as $\frac{1}{25}$ with raccoons and porcupines. The implication of such a statement is that Weber's law (q.v.) holds for brightnesses; and in the case of the dancing mouse it has been definitely shown that that is the case. Thus, at an intensity of illumination of 5 hefners the mouse can learn to respond selectively to a difference of $\frac{1}{2}$ hefner; at 20 hefners, to a difference of 2 hefners; at 80 hefners, to a difference of 8 hefners.

Very little work has been done on the sensitivity of submammalian forms to intensity of light. Chicks learn to discriminate between brightnesses; and it has been shown that the less the difference of brightness, the greater is the number of trials necessary for them to learn the selective response. Fish, as we have seen, may respond positively to light. In some species this response seems to be conditioned in part upon the skin. In marine forms, however, the eyes appear to constitute the only organ. Frogs and turtles may discriminate gross differences in illumination.

Color Discrimination. The greater part of the work upon sensitivity to color has been of little significance, because investigators did not arrange their conditions in such wise as to prove conclusively that the animal was reacting to differences in wave length and not to differences in intensity of stimulation. We have seen that different wave lengths may be differently effective in different eyes. In man, e.g., the yellow wave length is a much more effective stimulus than the blue; in some other mammals, however, the blue is more effective than the yellow. Thus it might readily occur that a yellow, seen as brighter than a blue by man, would appear darker than that blue to another animal. It is clearly impossible, then, to say whether an animal, which has learned to act differently to a blue and to a yellow light, is really discriminating a difference in hue, or is responding merely to a difference in brightness. It is of no assistance to know that the two colors are of the same brightness to man; they may be of very different brightnesses to the animal, according to the particular constitution of the animal's retina. In the extreme case, where the spectral range of vision is less for the animal than it is for man, the one or the other of the lights may actually appear as does a lightless space (presumably black). Thus it has been held that red light looks black to the rabbit, and blue light black to the chick. The only assurance of color discrimination would be provided by a demonstration that an animal could learn to discriminate every intensity of one wave length from every intensity of another, zero intensity being included in one of the series to allow for the possibility of the discrimination of the other color on the basis of its complete ineffectiveness.

In the light of this criticism of method it is impossible to say with certainty that any of the mammals possess color vision. It is comparatively easy to train monkeys to reject food dyed with one color and treated with quinine, and to accept the same food dyed with another color and sweetened. They can also learn to take food exclusively from vessels of a particular color. Similar experiments have been made with dogs, cats, mice, and rabbits. Raccoons and porcupines do not respond readily to such tests, and some careful work upon the dog has been mainly negative. But even the careful tests prove nothing with regard to color sensitivity. The cat, e.g., can learn to discriminate colored papers; but for every colored paper there appears to be some tint of gray with which it is confused. Thus, dark grays are equivalent to blue and to green; white is equivalent to yellow; black, to red. The last fact means that the limits of vision for the cat do not extend in the spectrum as far as the red.

The same uncertainty exists concerning the facts of color vision in birds. Experiments indicate a sensitivity to difference in wave length, but do not prove it conclusively. A hen can be taught to pass a test in which a color-blind person fails. If red grains are fastened down to a cloth, the hen soon learns not to peck at them. If now green and gray grains be mixed with the red, the hen will take the green and gray and leave the red. She will likewise now refuse red grains which are not fastened down. She will also refuse violet grains. A partially color-blind person may, however, be unable to separate the red grains from the grays and the greens It has therefore been suggested that the hen is not even partially color-blind—a suggestion which fails to take account of possible differences between the eye of the hen and the human eye. It seems probable that the greens and grays all look light gray to the hen; that the reds and violets, which are at the extreme limits of the visible spectrum, look dark; and that discrimination is therefore made on the basis of differences of brightness. An attempt has been made to demonstrate color sensitivity in pigeons by measuring the effect of colored stimuli upon breathing and circulation. Interpretation of the results meets with the same difficulty, however, that has invalidated so many other conclusions.

Of all the work upon fish, reptiles, and amphibians none is conclusive either for or against color vision. The controversy has been especially keen with regard to fish. It has been maintained both that they are totally color blind and that they can distinguish yellow, green, and blue from all shades of gray. The probability is against color vision.

Adaptation. (See VISUAL SENSATION.) Adaptation to darkness can be measured by determining the intensity of illumination which is necessary, after the animal has been in the dark for a given time, to enable it to see and take food. A chick, after five minutes in the dark, will begin to peck at grains when the illumination is increased to a certain amount; after an hour in the dark, it will peck under a less illumination. In birds which, lacking the retinal rods, have only daylight vision, the course of adaptation is similar to that in man, both in degree and in rate. Birds with twilight vision, like the kestrel, adapt more slowly than man and to a less degree. The owl is an exception, in that it is very sensitive under dark adaptation. In general, however, it appears that birds with daylight vision adapt more rapidly to the dark and discriminate better in the dark than do birds with twilight vision. This fact seems to prove that the visual purple of the retinal rods does not, as has been supposed, explain the adaptive process, for the birds with daylight vision have no rods.

Fish show a very great increase in visual

sensitivity in the dark. Reptiles in darkness may distinguish objects which are invisible to man. Frogs show a less degree of adaptation than does man.

Some animals, which show evidence of dark adaptation, do not seem to require time for the reverse process of light adaptation. Birds and turtles, unlike man, are not dazzled when brought from the dark to bright sunlight, but appear to be capable of normal powers of discrimination.

The Purkinje phenomenon (the shift of the region of most effective stimulation with dark adaptation towards the violet end of the spectrum. see VISUAL SENSATION) occurs in animals as in man. A chick which has been trained to choose the brighter of two white lights may, when light-adapted, choose a given red more often than a given green and, when dark-adapted, choose the same green more often than the red. The implication is that under light adaptation the red appears lighter than the green, but that the Purkinje shift, occurring with dark adaptation, makes the green lighter than the red.

Discrimination of Form. All vertebrates learn readily to distinguish between objects which constitute good and bad food. While absolute brightness and possibly color and at times movement may play a part in this discrimination, there is also probably a perception of size or form or pattern. In the most careful experimental work, monkeys have been taught to distinguish between circles and squares, triangles and hexagons. Dogs learn to give specific reactions to either the form or the size of illuminated areas. Rats have learned to respond to the difference between vertical and horizontal lines, or between large and small circles. Pigeons learn to select a given shape of feeding box from others placed with it in a row. If chicks are presented with triangles and circles cut from peas, the triangles under a pane of glass and the circles above, they learn not to peck at the triangles; later, if the glass is removed, they take only the circles. In the most recent experiments an attempt is being made to provide stimuli which are uniformly variable in size or form and to determine for different animals an exact differential limen of spatial discrimination.

Light has recently been thrown on the ability of some animals to perceive very slight movements. It was discovered that certain horses, which had been trained to answer questions or to perform simple mathematical operations by tapping out the answers with their feet, were unable to reply correctly when they could not see the experimenter or when the experimenter did not himself know the answer to the proposed question. It was shown that the horses took their cue from unconscious movements of the experimenter, movements which sometimes were as small as $\frac{1}{100}$ of an inch. This discovery is important, not only in its bearing upon animal vision, but also as showing the necessity that the experimenter remain out of view during expérimentation upon animals. Many conflicting conclusions have doubtless been due to this source of error.

Consult: M. F. Washburn, *The Animal Mind* (New York, 1908); S. O. Mast, *Light and the Behavior of the Organisms* (ib., 1911); J. B. Watson, *Behavior* (ib., 1914); J. H. Parsons, *An Introduction to the Study of Color Vision* (ib., 1915).

VISION OF DON RODERICK. A narrative poem by Sir Walter Scott (1811).

VISION OF JUDGMENT. A eulogy of George III in English hexameters, by Robert Southey (1821)

VISION OF PIERS PLOWMAN. See LANGLAND, WILLIAM.

VISION OF SIR LAUNFAL, THE. A poem (1848), partly allegorical, by James Russell Lowell, founded on the Arthurian story.

VISIT AND SEARCH. See SEARCH, RIGHT OF.

VIS'ITA'TION, SISTERS OF THE. A religious order for women in the Roman Catholic church, sometimes also known as Salesian Sisters, from St. Francis de Sales, to whom the idea of its foundation was due. It was established in 1610 at Annecy, in Savoy, with the purpose of visiting and caring for the sick and needy. It took its name and its example from the visit paid to Elizabeth, mother of John the Baptist, by the Virgin Mary (Luke i. 39–42). The actual founder, under St. Francis's direction, was St. Jeanne Françoise de Chantal (q.v.). A second house was established in Lyons, but the archbishop of that see, Cardinal de Marquemont, desired St. Francis to change his original plan of a congregation without regular vows into a professed order. This was accordingly done, with the adoption of the rule of St. Augustine. Pope Paul V confirmed it in this form in 1618. It spread through France and Italy, and now numbers about 170 convents. In the United States, to which it came in 1799, it has 21 convents and about 800 sisters, whose principal occupation is teaching. The devotion to the Sacred Heart of Jesus, now so widespread in the Roman Catholic church, had its formal beginning in this order, of which Margaret Mary Alacoque (q.v.) was a member. Consult Currier, *History of the Religious Orders* (New York, 1896).

VISITING ANT. See DRIVER ANT.

VIS MAJOR (Lat., superior force). A term borrowed from the civil law and employed to denote an inevitable accident, i.e., one which results from the operation of the forces of nature and which could not have been prevented by the exercise of care. See CARRIER, COMMON; CONTRACT.

VISON'TIUM. See BESANÇON.

VISSCHER, fis'hĕr, CORNELIS (c.1629–62). A Dutch engraver. He was a native of Haarlem, and is thought to have been a pupil of P. Soutman, but little is known of his life. His portraits and subject pieces, after his original designs, are among the highest examples of Dutch engraving and helped to form the Dutch style. They show a firm, delicate touch and powerful rendering of color. Among the best are the portraits of Gellius Bouma, Guilliam de Ryck, Robertus Junius, Jan de Paep, and the "Seller of Rat Poison." He engraved altogether about 180 plates.

VIS'TULA (Polish *Wisla*, Ger. *Weichsel*). A river of central Europe. It rises on the north slope of the Carpathian Mountains in Austrian Silesia, and its course, a great S, lies first between Galicia and Poland, then across the latter, and finally through the Prussian Province of West Prussia, emptying into the Frisches Haff and the Baltic Sea through several arms (Map: Germany, H 2). Its length is 650 miles. Its upper valley has steep, wooded sides, but in north Poland the banks become low and the

country more open until the river breaks through the Prussian ridge, where the banks are again high. In its lower course it divides repeatedly into parallel arms, inclosing wooded islands The arms of the delta are subject to extensive change in their channels and in the volume of their discharge, and large sums are expended by the Prussian government in works of regulation, partly to keep open a navigable channel, partly to protect the fertile delta region from inundation. The river is navigable for large river craft to the Austrian boundary, and for smaller vessels to Cracow. The traffic in grain, lumber, and other products is considerable, but navigation is rendered very difficult by constantly and rapidly shifting sand banks. The chief cities on the Vistula are Cracow, Warsaw, and Danzig. Its chief tributaries are the San, the Bug, and the Pilica. A canal connects the river with the Oder.

VISUAL SENSATION (Lat. *visualis*, relating to sight, from *visus*, sight, from *videre*, to see). Stimulation of the retina by ether waves gives rise to sensations of color and to colorless sensations. There are three chief characteristics of color sensations (hue, tint, chroma) which correspond respectively to three chief moments (wave length, amplitude, purity) in the physical vibrations set up in the ether. (1) Hue or color tone (as red, orange, yellow, blue) corresponds in the first instance to wave length. The longest wave (answering to red) has a length of about 700 $\mu\mu$; the shortest (which corresponds to violet), a length of about 400 $\mu\mu$. Intermediate wave lengths condition the color qualities orange, yellow, green, blue, etc. (2) Tint or brightness corresponds to the amplitude of the ether wave. A stimulus of wide amplitude gives rise to a sensation of great brightness, i.e., a tint that approaches white. Black, which is as positive a sensation quality as red or white, is correlated with a stimulus of small amplitude or with the total absence of peripheral stimulation. (3) Chroma or saturation depends upon the purity or homogeneity of the stimulus. A light of a single wave length produces a sensation of a high degree of chroma; a light which includes many or all wave lengths of the physical spectrum, a sensation of a low degree of chroma (as a yellowish or reddish white) or one whose chroma is zero (black, white, or gray). While this correlation of physical and psychical moments is a general one, it has, nevertheless, several exceptions and modifications, the most important of which are considered below.

The colorless sensations form a one-dimensional system running through the grays from light to dark, with white at the one end of the series and black at the other. The series may be represented by a straight line, at any point of which there is a quality shading gradually on the one side towards black, and on the other towards white. The place in the series of any given gray is determined, theoretically, by the number of just noticeably different qualities between it and the one or the other end of the series, or practically by the position of the qualities which most resemble it on either side. The capacity for discriminating these qualities is known as sensible discrimination (q.v.) for light. It has been found that for a middle range of lights the relative difference limen, i.e., the ratio of a just noticeable difference to the absolute light value with which the observation is made, is practically constant at about $\frac{1}{100}$; e.g., a gray of 100 photometric units is just noticeably different from one of 101 units. At the two extremes of the series (the dead blacks and the brilliant whites) discriminability is much less. (See INTENSITY OF SENSATION.) It has been estimated, on the basis of experimental work, that there are almost 800 different colorless sensations.

The series of hues runs through the spectrum from red to violet and embraces also the purples. They may be conceived as lying around the periphery of a quadrilateral figure with red, yellow, green, blue at the four corners and the intermediates (oranges, yellow-greens, green-blues, purples, etc.) lying along the sides. A quadrilateral form is chosen instead of a circle because there are distinctive changes at the four points indicated, more or less abrupt changes in direction. The figure also provides for the fact that the ends of the spectrum resemble each other more than either end and the middle. Just noticeable differences have been worked out for hue as well as for the grays Qualitative changes are much more rapid in some parts of the spectrum than in others. Sensible discrimination is greatest in yellow and blue-green and least in red and violet. In yellow and blue-green one can, under favorable conditions, detect a change of hue in a difference of wave length of less than $\frac{1}{1,000,000}$ mm. Under the same conditions (comparison of two spectra bit by bit) about 160 hues can be discriminated in the whole spectrum. It should be noted that language is misleading in regard to the names of color qualities. The compound terms "yellow-green" and "green-blue" indicate that these colors are less simple than red, green, or blue. This is not true. Any one of the 160 qualities is for introspection as simple and as ultimate as any other.

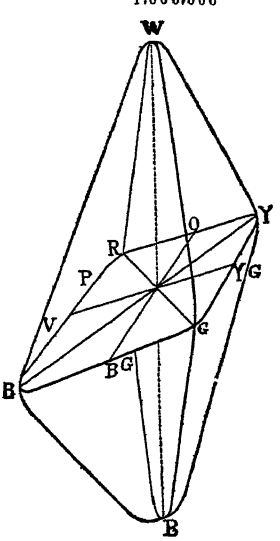


FIG. 1. THE COLOR PYRAMID.

The combination of color with grey or, as it was stated above, the homogeneity or heterogeneity of the stimulus, gives rise to a third moment, viz., chroma or saturation. Chroma denotes the likeness or unlikeness of a color to gray. The relation of chroma to hue and to tint is most easily shown by mixing, in various proportions (e.g., with revolving disks), a color (say, a red) with a gray of the same tint. Whatever the ratio of the two, the hue and the tint remain constant, but the chroma, the richness, the purity, the depth, changes. The more gray is added, the less saturated becomes the color, until finally no hue remains and the chroma becomes zero. The whole number of visual qualities may be represented by a solid figure of the form of a double pyramid with a common base. The tints will lie along the vertical axis of such a figure, the

hues (at their maximal chroma) about the periphery of the base, and the various chromas along horizontal lines connecting the black-white axis with the periphery. The base will be tipped in such a manner that yellow will be nearer than blue to white. This indicates that yellow is intrinsically lighter than blue. Every point on or within the figure will express, then, some definite hue of a certain chroma and a certain tint, while the vertical axis itself represents the series of colorless sensations. It is to be noticed that although change of chroma does not affect hue, it introduces, nevertheless, new visual qualities. A red, or a green, or a violet that is washed over with gray is qualitatively different from the original saturated color. Hence, in making an exhaustive enumeration of visual sensations, we must include the tints, the hues, and the various chromas. The total has been estimated at about 50,000 sensation qualities.

We have seen that hue depends upon wave length. It also depends (1) upon amplitude (intensity of stimulus) and (2) upon the composition of stimulus (mixture of radiations of different wave lengths). (1) If the solar spectrum be made very bright or very weak, the relations of the colors change. In a very bright dazzling series of colors (got, e.g., by looking at the sun through colored glasses) all the colors but yellow and blue tend to change in hue. The green-blues and violet-blues pass over into blue, the yellow-greens, yellow-reds, and even the reds grow yellowish, and the greens become whitish. In the darkened spectrum (called the Purkinje spectrum) it is the red, the green, and a bluish violet that spread at the expense of the other colors. At the same time the lightest point migrates from yellow to green, so that the red end of the spectrum grows dark faster than the violet end The result is that blue, which at a moderate intensity looks darker than red, at a lower intensity grows lighter than red, before it disappears into gray. This shift of brightness in the darkened spectrum is known as Purkinje's phenomenon, after the physiologist who first called attention to it. Adaptation (see below) to the new intensity is, of course, assumed. We shall see later that the range of vision is also changed by decrease of the intensity of stimulus below a certain point: all phenomena thus conditioned are included under the term "twilight vision," to distinguish them from daylight vision or those occurring with intensities above the critical point (2) The production of different hues by the mixture of wave lengths is known as color mixture. It is carried out by the mixture of spectral lights, of colored shadows, or reflections; of pigments, by the irradiation of neighboring colored spots (as in a mosaic); and by the rapid alternation of stimuli by means of revolving disks. There are three chief laws of color mixture. (*a*) The law of complementaries: "For every color there can be found another, complementary or antagonistic color, which if mixed with it in the right proportion gives a sensation of light (white or gray), and if mixed in any other proportion a color sensation of low chroma and of the hue of the stronger component." Some of the complementary pairs are red and verdigris, orange and greenish-blue, yellow and blue, green and purple. (*b*) The law of neighboring colors: "The mixture of any two colors which are not complementaries gives an intermediate color, varying in hue with the relative amounts of the two original colors, and varying generally in chroma with their nearness or remoteness in the color series." The mixtures of yellow and green, red and orange, blue and purple, are instances. (*c*) "The mixture of any two combinations which match will itself match either of the original combinations, provided that the illumination of the colors remain approximately the same." Mix, e.g., a gray made from red and verdigris with a like gray made from yellow and blue. The result is a gray which matches either of the component grays. The fact that this law does not hold when the illumination is diminished (failure of Newton's law of color mixtures)—that the mixture which contains green will then be far too bright—constitutes the phenomenon known as the extended Purkinje phenomenon (i.e., for colorless light).

Visual sensation is not solely conditioned, however, upon the wave length, amplitude, and composition of ether vibrations. It is further dependent upon the time and space relations of the stimulus (1) As a result of the first we have the phenomena of adaptation and negative after-image. By adaptation is meant the change which the visual experience undergoes with continued stimulation. Adaptation may be general (over the entire field of vision) or local (in a part of the field); and it may be adaptation to a stimulus of normal intensity (light adaptation) or to a stimulus of very weak or zero intensity (dark adaptation). When, e.g, the yellow cast which appears as we pass from daylight into an artificially lighted room, or as we put on yellow glasses, gradually fades out, we have a case of general adaptation to a light stimulus. Again, when we go from a light into a completely dark room and after a time the inky blackness gives way to a gray, we have an example of general adaptation to a stimulus of zero intensity. Finally, when we fixate a patch of blue and the sensation gradually loses in chroma until at length the blue disappears and the sensation becomes gray, we have local adaptation. The law of adaptation is that "all sensations of color tend towards neutrality, and all sensations of light towards a middle gray." The negative after-image is an after effect of adaptation. If, after adaptation to the yellow of artificial light, we come out into daylight, all colors and lights are tinged with blue. The typical after-image, however, appears after local adaptation; if, after adaptation to the blue patch, the stimulus is removed, a spot of yellow appears in its stead. The first law of the negative after-image is that "the color or tint of the image is always antagonistic (complementary) to the color or tint of the stimulus." (See AFTER-IMAGE.) (2) As a result of the space relations of the stimulus we have the various phenomena of contrast (q.v.). Here it is necessary only to recall that every patch of light or color in the field of vision affects and is affected by all the others; that contrast is immediate, and therefore opposed to adaptation; and that the contrast effect is always in the direction of greatest qualitative opposition (a yellow makes its surroundings bluish, a black makes its surroundings light).

We have thus far taken for granted the physiological conditions of visual sensation. We should, of course, have no visual experience if we had not an eye with a retina sensitive to

the stimulation of ether waves. The retina, however, is not equally sensitive at all points. In daylight vision stimulation at and around the fovea gives all the color qualities (spectral colors and purples), farther out towards the periphery only yellows and blues are visible; farther out still, only gray, black, and white. As regards color sensitivity, therefore, the retina may be said to be divided into three zones, a black-white zone (outermost), a black-white and blue-yellow zone, and an inner black-white, blue-yellow, and red-green zone. Hence it is found that as a mixed color stimulus moves outward from the fovea the resulting color changes at certain points and finally goes over into a gray. The method of determining the zones is called campimetry (with constant fixation at the centre of a neutral field, a colored object moving out and in, to and from the limits of the field), or perimetry (with constant fixation, the object moving in a similar manner along the arc of a great circle which lies in a hemispherical surface concave to the observer's eye). In twilight vision, on the other hand, the fovea, which in daylight is the place of clearest vision, is blind; a faint star can be seen only in indirect vision. Furthermore, when the intensity of the stimulus is reduced below the limit at which colors appear, stimulation at all parts of the retina, except the fovea, gives only a slightly bluish gray. In daylight vision, then, the outermost zone is color blind, and in twilight vision the entire retina is color blind except for the slight bluish tinge of the gray. There is also an abnormal color blindness (see COLOR BLINDNESS). In the typical and congenital form of the defect (dichromatic vision) red and green sensations are lacking, i.e., the red-green zone is insensitive. There are two modes of dichromatism: deuteranopia, in which the distribution of tint (brightness) in the spectrum is the same as for normal eyes in daylight; and protanopia, in which the distribution conforms to that of twilight vision. The vision of the totally color blind (achromatic), in which both the red-green and the yellow-blue zones are insensitive, resembles twilight vision; the fovea is probably blind, and the brightest part of the spectrum lies in the region of normal green. A few cases of blue-yellow blindness (tritanopia) have been reported; the defect, however, is rare, and usually at any rate is the result of disease. Certain irregularities in normal vision (anomalous trichromatic vision) occur in the central zone; when a yellow is matched with a mixture of red and green, some individuals require much more red, others more green, than the normal amount.

Before we consider the theories of visual sensation, a knowledge of two further sets of facts is important: the nature of that part of the sense organ which is the immediate condition of visual experience, and the results of physical and physiological experiments with pure and mixed spectral lights. The former has already been discussed in another connection (see VISION, *Retina*); the latter will be described in some detail. The physical and physiological experiments with color stimuli are important for psychological theory, even though the points of view of the three sciences are different. The physicist, e.g., seeks to determine the particular wave lengths which produce the colors of the spectrum, and the relations of these wave lengths to one another. The physiologist is interested in the physiological reaction to the various wave trains; while psychology directs its attention to the qualities of visual experience. We have already spoken, in general terms, of the correlation of wave length with hue. The wave lengths usually given for the best blue, green, and yellow of the spectrum are 470 $\mu\mu$, 505 $\mu\mu$, and 576 $\mu\mu$ respectively; spectral red is said to be slightly yellow, so that the best red lies outside the spectrum (Hering). Recent experiments have shown, however, that for some observers a red which is neither yellowish nor bluish is found in the spectrum; and that in the case of the other primary colors individual differences are such that variations from the above values are to be expected, individual variation is least in the case of blue (Westphal). These four best colors may be regarded, psychologically, as the principal colors. The principal colors of physiology are the four stable colors which do not change in hue within the retinal zones to which they belong They have been determined as a purplish red, a bluish green of about 490 $\mu\mu$, a yellow of about 570 $\mu\mu$, and a blue of about 460 $\mu\mu$. It will be noticed that the psychological yellow and blue are practically the same as the physiological.

The physical primaries are a certain triad of colors which, when mixed in proper proportions, produce all the colors of the spectrum. The principal colors of psychology, as we have seen, are four in number, and lie at the angles of the base of the color pyramid (Fig. 1); but the physical primaries and their mixtures, together with the color matches of trichromates and dichromates, can best be shown by a triangular figure (color triangle). The reasons are that the color square does not necessarily show either exact complementaries or the actual changes in chroma which result from color mixture. For instance, yellow and blue, at opposite ends of a diagonal of the square, are complementary colors, but red and green are not complementary; red is complementary to verdigris, and green to purple (red-blue). Moreover, red and green when mixed together give yellow. It is only necessary, however, to substitute a triangle for a square, with red, green, and blue at its vertices, white in the centre, and yellow on the line connecting green and red (Fig. 2) to secure from the physical point of view a good diagrammatic representation of the whole color

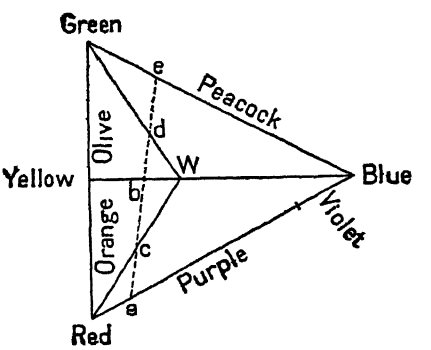


FIG. 2. THE COLOR TRIANGLE (DIAGRAMMATIC).

scheme, including the large body of fact comprehended under the term color mixture. (For different intensities, this plane figure must be made the basis of a double pyramid with intense white and black at the two apices.) The

underlying principle which makes this possible is, in the first place, that color sensations constitute a twofold continuum (intensity being kept constant), since they vary by just perceptible degrees in both hue and chroma. The further condition that is satisfied in the actual representation is (among others) that all colors that can be got by the mixture of any two are on a line joining the points which represent those two, and nearer to the point representing the color that they most resemble. Thus if a certain color *c* (Fig. 2) can be composed from two parts of one color *a* and one part of another color *b*, then it must be represented on the color plane by a point on the line *ab* twice as far from *b* as from *a;* this is the point which would also be the centre of gravity of weights of two pounds and of one pound suspended respectively at the points *a* and *b*. All complementary colors, when mixed in the right proportion, make white light; hence all such colors are on opposite ends of lines which pass through a common point, *W*. Any color can be made up (with some loss of chroma) out of mixtures of a certain three, red, green, and blue (or violet). Hence the general outline of the figure is a triangle. The fact that these mixtures lack something of chroma requires the assumed fundamental colors to be taken at least outside of the actual spectral color line (Fig. 3).

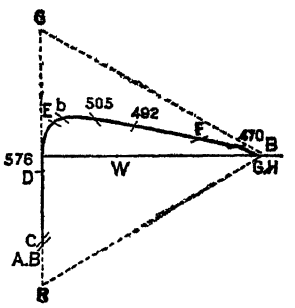


FIG. 3. THE ACTUAL COLOR TRIANGLE.

The color triangle of Fig. 2 expressed (as do all the color diagrams of Hering) the vague idea of the representation of the color continuum by the points of a plane. Clerk-Maxwell was the first to construct a triangle which should represent exact quantities obtained by experiment. The one here given is that of König; it is the result of a vast amount of work done with the aid of the color-mixing apparatus of Helmholtz. This curve is therefore at once the expression of a large number of definitely observed facts, and also, in consequence, extremely serviceable in enabling one to keep all these facts in mind (Ebbinghaus). The choice of the exact wave lengths which represent the pure red, yellow, green, and blue is based upon observations made on the color blind, to be mentioned below. The proportions in which the three physical color constituents must be mixed in order to reproduce all the colors of the spectrum is shown on a different plan in Fig. 4. These curves are also the result of actual measurement, of the most exact kind; the color triangle, in fact, represents the same measurements in terms of trilinear coördinates.

It is unfortunate that nomenclature is in a very backward stage in the subject of light and color. Both these words are used with perfect ambiguity to denote now the sensation and now the physical cause of the sensation; viz., certain trains of ether waves, the photogenic radiations For instance, the fact of color which is exhibited in the color triangle is that

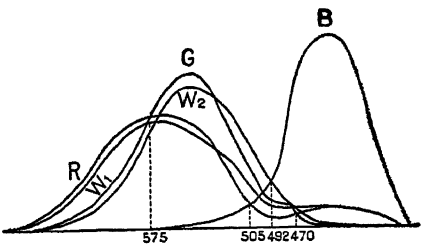


FIG. 4. THE CONSTITUENTS OF THE COLORS OF THE SPECTRUM.

erythrogenic radiations mixed with chlorogenic radiations in a certain proportion suffice to produce the yellow-color sensation. This has nothing to do with the question whether yellow, in the subjective sense, is a color blend of green and red—it is evidently not that. So white (the sensation) is not compounded of yellow and blue sensations, but it is caused by the working together of the causes (physical and physiological) of the sensations of yellow and of blue If these two very different things were to be kept distinct, there would be no difficulty in reconciling the different views in regard to color; the facts of three-color mixture would be accepted by the psychologists, and the physicists would not imagine that they constitute a theory of color sensation. Helmholtz called his book *Physiological Optics*. The psychological facts of color are to-day so much more in evidence that one writing on the subject now would write on psychological optics.

The color triangle should therefore be thought of rather as consisting of four contiguous color triangles, or, to make use of a convenient device of the mathematicians, portions of different sheets of four coincident planes, each the locus of the (more or less unsaturated) four possible binary color blends. If, e.g., a slightly bluish green have added to it more and more of a slightly purplish red (*a*, Fig. 2), there will result four separate series of color changes: a series of whitish bluish greens (*c* . . *d*), greenish yellows (*d* . . *b*), yellowish reds (*b* . . *c*), and reddish blues (*c* . . *a*).

The characteristics of color blindness may now be restated in the light of these physical measurements. All the color equations of the dichromates are accepted by those having normal eyes, but many distinctions which are made by the latter are not recognized by the former. The fundamental colors of the color triangle (Fig. 3 or Fig. 4) can be chosen (and have been here so chosen) that all the sensations of the red-green blind can be reproduced by mixtures of those elements in the proportions represented by either the pair of curves W_1 and *B* or the pair W_2 and *B;* in both instances, however, the sensations perceived are yellow and blue. Red-green blindness is therefore of two types, according as the distribution throughout the spectrum of the undifferentiated yellow sense follows the curve of red or the curve of green. The sensations of the achromate would be represented on a line at right angles to the plane of the color triangle through the point *W*. The color scale of the yellow-blue visioned (yellow, whitish yellow,

white, bluish white, and blue) will be represented on the line *YB* (Fig 2). The degree of chroma of the different spectral colors will be got by projecting the spectrum upon the yellow-blue line by means of lines drawn through the points *R* or *G* according to the type of blindness. Thus the neutral points of the defectives of the first class are the points in which the line *RW* cuts the color curve; that of the defectives of the second class the points in which that curve is cut by the line *GW*. As there is only one particular hue which is a pure green or a pure red with no admixture of blue or yellow, it follows that most of the reds or greens of nature appear to these defectives to be not absolutely colorless, but either blue or yellow (brown) of a very poor chroma. Hence they learn to use the fourfold nomenclature of the normal person with a remarkable degree of good luck; it is no worse for them to say scarlet for the whitish yellow in which they see the soldier's coat than for us to coin a fresh term, pink, for what is merely a whitish red.

We are now ready to discuss theories of visual sensation. An explanation must consist in a hypothetical statement of the physiological conditions which underlie the various psychological phenomena Historically, there are two principal theories; the one sets out from the physical, the other from the psychological facts. All subsequent theories, with perhaps a single exception, may be regarded as modifications or amplifications of these two. They are known as the Young-Helmholtz and the Hering theories.

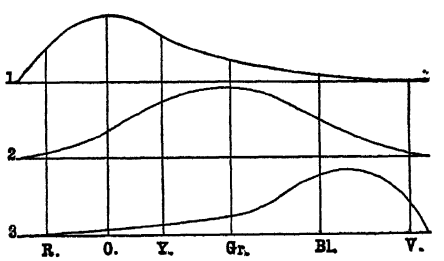


FIG. 5. The Young-Helmholtz theory. The letters *R*, *O*, *Y*, etc., designate the spectral colors. The three curves show roughly the relative values of the excitatory process, 1, in the red-sensitive fibres, 2, in the green-sensitive, and 3, in the violet-sensitive.

The Young-Helmholtz theory sets out from the laws of color mixture as derived by Newton. It posits the existence, in the visual apparatus, of three kinds of nerve fibres, a red fibre, a green fibre, and a blue or violet fibre, each one of which if it were excited alone would give its particular sensation. These three colors, red, green, and blue, are chosen as the primary colors because they give, by mixture, all the various colors and lights at a relatively high degree of saturation (although approximately the same result may be obtained with other combinations of three). Any light stimulus is said to excite all three kinds of nervous elements, but in varying proportions. Red, e.g., excites the red fibre maximally and the green and blue fibres minimally. The color seen under any kind of stimulation depends upon the proportion in which the three kinds of nervous apparatus are affected. Yellow, e.g., results from a strong excitation of the red and green fibres and a weak excitation of the blue fibre. White is due to the equal excitation of all three fibres.

The Hering theory says that there are three visual substances which undergo metabolic changes under the influence of light rays. Each substance is the seat of antagonistic processes: processes of dissimilation (decomposition) and assimilation (recomposition). Dissimilation in one substance gives white, assimilation black; dissimilation in a second gives yellow, assimilation blue; dissimilation in a third, purplish red, assimilation bluish green. From these six principal sensations all others are derived by com-

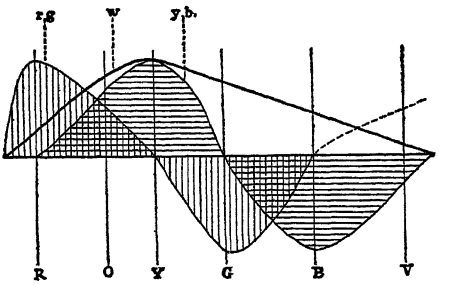


FIG 6 The Hering theory. The line *rg* shows the effect of rays of different wave lengths on the red-green visual substance; the effect is dissimilative to the point *Y*, assimilative from *Y* to *B*, and then again dissimilative to the end of the spectrum (broken line) The line *yb* shows the effect upon the yellow-blue substance The line *w* indicates the dissimilation of the black-white substance throughout the whole length of the spectrum.

bined excitation of the three substances. We may call these three substances the *Bk-W*, the *R-G*, and the *B-Y* substances. They are not equally distributed over the retina; all are present in the central zone; only the *Bk-W* is in the outer; and *R-G* substance is wanting in the intermediate zone. In dichromatic vision the *R-G* substance is congenitally lacking.

Both theories have been extraordinarily fruitful in stimulating further investigation, but neither has proved adequate to all the facts. The most important addition, in principle, that has been made to them is von Kries's theory of dual vision. It is supposed that the rods are the organs of twilight, and the cones the organs of daylight vision. The theory explains the blindness of the fovea at night, the Purkinje phenomenon, and the failure of the third law of color mixture with low intensity of stimulus. Dark adaptation is said to be a function of the visual purple. For daylight vision von Kries accepts the principle of the Young-Helmholtz theory, though with numerous amendments.

G. E. Müller, on the other hand, has added important hypotheses to the Hering theory. Black and white in color mixture seem to follow the second law; they mix to give a gray; but in adaptation and contrast they seem to follow the first law. Hering regards them as antagonistic, and, since a balance of assimilation and dissimilation means an absence of function, the gray of the *Bk-W* mixture is unaccounted for. Müller excludes gray from the retina and posits a cortical gray, a sensation of central origin, which is always present in visual experience. Müller's theory differs further from that of Hering in that he assumes four peripheral processes corresponding to the four pure colors, and six central values, red, yellow, green, blue, black, and white. The stimulation of a peripheral process excites usually three central values. This tendency to go to the brain for supplementary hypotheses has also found expression in the theories of Donders and von Kries.

Numerous other theories have been devised with a view to meeting the outstanding difficulties of visual sensation. Thus the Franklin theory supposes that at an early period of development the eye is sensitive only to luminosity and not to color; at this period it possesses only a gray-perceiving substance, present in all parts of the retina, which is affected by all luminous vibrations, but most markedly by those corresponding to the middle of the spectrum; stimulation of this substance produces the sensation of white of all shades. In the course of development of the eye, this gray-perceiving material becomes differentiated in the cones first into two different substances, which are especially affected by the two halves, respectively, of the spectrum, this is the stage of development which corresponds to the yellow-blue color system of the partially color blind, and also to that of the intermediate zone of the normal retina In the final stage of development, the yellow constituent becomes again differentiated into two substances which respond respectively to red and to green light. The mixed colors are produced by simultaneous stimulation of two or more color substances in varying proportions. The Hering theory is formulated in static, not in genetic, terms; but if we put a genetic interpretation upon it, we must say that for it, too, the black-white substance is the earliest, the blue-yellow the next, and the red-green the last to appear in the course of evolution. Such an interpretation is borne out especially by the facts of color blindness and of indirect vision, as understood by Hering and his school.

Another important theory is that of Wundt, who posits only two excitatory processes, a chromatic and an achromatic, and regards the former as a multiform, the latter as a uniform, photochemical process. Wundt thus gives up altogether the idea of primary components of visual sensation (the three ultimate colors of Helmholtz or the four of Hering) and substitutes for these component theories a theory of gradations within a single process. It may be remarked that Wundt's recognition of a separate achromatic process antedates the formulation of Hering's theory.

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VIŚVĀMITRA, vĭsh-vā'mĭt-rā. A celebrated sage of ancient India. He belonged originally to the Khatriya or warrior caste (see CASTE), being King of Kanauj (q.v.), but by extraordinary acts of religious austerity he exalted himself to the dignity of the priestly class, an example without parallel in ancient India In the *Rig-Veda* (see VEDA), especially in the third book, a number of hymns are ascribed to him, and his bitter rivalry with the sage Vasishtha (q.v) for the position of chief priest of King Sudās, together with his competitor's greater success, form incidents that are reflected on an historic background. The traditional rivalry between the two appears likewise in the epic and in the *Purānas* (q v.). The first book of the *Rāmāyaṇa* (q.v.) gives a legendary account of the way in which Viśvāmitra rose. An incident of Viśvāmitra's life also forms the subject of Kshemisvara's *Caṇḍa-Kāuśika*, or Wrath of the Descendant of Kuśika, which is one of the best of the Sanskrit dramas. Consult: William Muir, *Original Sanskrit Texts*, vol. i (2d ed., London, 1868); Kaegi-Arrowsmith, *The Rigveda* (Boston, 1886); W. J. Wilkins, *Hindu Mythology* (2d ed., London, 1900); A. Hillebrandt, *Vedische Mythologie* (Breslau, 1910). See HARIŚCHANDRA.

VIS'-VI'VA. A term devised by Leibnitz (1695) and formerly used to denote the product of the mass of a body into the square of its velocity. It was applied to one-half this quantity, or $\frac{1}{2}mv^2$, by Coriolis. This is now known as kinetic energy. See ENERGETICS.

VITA'CEÆ (Neo-Lat nom. pl, from Lat. *vitis*, vine, from *viere*, to twine; connected with Eng. *withy*), or THE VINE FAMILY (or AMPELIDACEÆ). A family of climbing woody vines or erect shrubs, including about 10 genera and over 500 species, widely distributed. The most important genus is *Vitis* (grape), which includes about 50 species, natives of warm temperate regions, about half of which occur in the United States. *Ampelopsis* and *Parthenocissus* (Virginia creeper or woodbine) are also well-known members of the North American flora, the latter genus often being called *Psedera*.

VITA'LIA'NUS, SAINT, POPE (657–672). He was born in Campania and came to the papal throne when the Greek Emperor Constans II (died 668) was persecuting those who opposed monothelitism. Tactfully he ignored this opposition and cultivated friendly relations with the Emperor, with such success that the latter made him a visit at Rome in 663. He also put Constans's successor Constantine IV under obligation to the papal see by helping him in his campaign against a rival. This Pope is also remembered as the sender of the distinguished Theodore (see THEODORE OF TARSUS) to the see of Canterbury. Consult Sangen, *Geschichte der römischen Kirche*, vol. ii (Bonn, 1885).

VITA'LIS, ORDERICUS (1075–c.1143). A Norman historian. He was the son of Odelerius, confessor to Roger of Montgomery, and was born at Atcham, near Shrewsbury, England. He entered the monastery of St. Evroult in Normandy in 1085, and with the exception of short intervals spent the remainder of his life there. At the suggestion of Rober du Sap and Guérin des Essarts he began to compose the annals of St. Evroult, and afterward expanded his work into a general history of 13 books, bearing the title *Historia Ecclesiastica*. The work, which begins with the apostolic era, is of value chiefly for the period in which Ordericus himself lived. The original manuscript is now in the Bibliothèque Nationale at Paris. It was first pub-

lished in Duchesne's *Historiæ Normanorum Scriptores* in 1619. There is a French translation in Guizot's *Collection des mémoires relatifs à l'histoire de France* (1825–27), and an English translation in Bohn's *Antiquarian Library* (4 vols., 1853–55).

VITAL STATISTICS (Lat. *vitalis*, relating to life, from *vita*, life, from *vivere*, to live). That branch of statistics which studies the growth and changes of population. The facts which it seeks to interpret are derived from two main sources, censuses and registration reports. Censuses give information regarding population at a certain day, and show the changes and growth of population only by comparison between the results of two or more censuses. Registration reports are obtained by tabulating the records of certain important events made at or near the time of their occurrence. The scope and accuracy of these registration reports vary greatly with time and place. They usually include deaths, marriages, and births, and sometimes divorces, with various statistical facts about each. The number of such occurrences is controlled mainly by the number of people in the community for which the report speaks. To exclude this, the most important cause of difference in the figures, it is usual to compute the average number of births, deaths, or marriages occurring in a fixed unit of time, usually a calendar year, and in a fixed unit of population, usually 1000. The result of such a computation has been named a rate. The death rate means the average number of persons dying in a year to each 1000 of the population. The marriage rate and the birth rate have similar meanings, except that the first term of the ratio is the number of persons marrying or the number of children born, respectively. Rates of this class are sometimes known as crude or simple rates in distinction from refined or corrected rates in which the unit of population may be a group each of whom possesses certain specified characteristics. Thus death rates are computed for a specified age and sex and occupation and race, both terms of the ratio being correspondingly limited, as for example the death rate of negro married women between 25 and 34 years of age

The main statistical facts regarding population being found under the heading STATISTICS, the present article is confined to the statistical results derived from rates.

General Death Rate. Perhaps the highest death rate for great countries where records are kept occurs in Russia, with 31.2 per 1000 on the average for 1901–05; Chile, with 30 4 for 1901–08; and Rumania, with 25.8 for 1901–08. The lowest death rates are found in the Australian Commonwealth, Great Britain, the Scandinavian countries, Holland, and some of the American States. The lowest averages for the years 1906–10 were: New Zealand, 9.7; Australian Commonwealth, 10.7; Denmark, 13.7; Norway, 13.8; England and Wales 14.7; and United States (registration area) 15.1. The death rate is usually somewhat higher in cities than in rural districts, but with the increase of sanitary precautions and the development of preventive medicine the difference between city and country is steadily decreasing. Thus in the United States in 1890 the average death rate of the cities of the registration States was 22.1 and that in the rural districts 15.3. In 1913 the death rate of the cities had fallen to 15 1, while that of the rural districts had fallen to 14.1, so that the apparent difference between the two was nearly eliminated. Deaths are recorded with less completeness in the rural districts, and it is probable that the foregoing figures for the rural districts understate the true death rate.

Sex. Wherever records exist the average death rate for males of all ages is higher than the death rate for females. Thus, in England and Wales on the average of the five years 1901–05 the death rate of males was 17.1 and that of females 15.0, and similarly in the registration area of the United States in 1913 the death rate of males was 14 9 and that of females 13.1.

Age. The first year of life and the years of extreme old age are those in which danger of death is greatest. Thus the death rate of male children in England during the first year of life was 161.0, a rate that is not equaled for any subsequent year of life until the age of 81 is reached. The lowest death rate for each sex is reached at about 11 to 13 years of age, when the death rate in healthy communities is from 4.0 to 5.0, not more than one-fourth of the average for all ages. The ages from three to 50 or slightly above 50 are the healthy years of life, or the years at which the death rate is below the average for all ages. The larger the proportion of the population belonging to these ages, the lower the death rate is likely to be. Cities usually contain a much smaller proportion of persons over 50 than do the country districts about them and not much if any larger a proportion of children. They also contain a larger proportion of females than the country districts in their vicinity. These differences in age and sex composition of the population of cities, giving them a disproportionate number of the healthy ages and the healthier sex, tend to mask the real difference between the death rate of city and country districts.

Age and Sex. The lower death rate of females holds for nearly all periods of life, the main exception being during 10 or 15 years below the age of 20, when the death rate of females is as high as or a little higher than that of males. Modern civilization has so reduced the perils of childbirth that women in early adult years, although subject to this special danger in addition to those common to both sexes, have a death rate lower than men of the same ages. The death rate of English women, ages 25 to 34, was five for the years 1896–1905, that of English men of the same age, 6, and the relation in other western nations is similar. The following figures give the death rate of each sex in England and Wales in the 10 years 1896–1905:

AGE	Death rate		Ratio of male rate to female taken as 100
	Of males	Of females	
Under 1	191	153	124
1–4	22	21	105
5–14	3	3	100
15–24	4	3.5	114
25–34	6	5	120
35–44	10	8.5	117
45–54	18	14	128
55–64	33	26	127
65–74	68	57.5	118
All ages	18	16	112

The salient fact shown by the figures is that the differences are at a maximum during the years of infancy and above the age of 45, and at a minimum at the healthiest period of life. This minimum is explained in part by the effects of child bearing. In Servia the death rate of females appears to be higher than that of males for all ages combined, while Denmark, Holland, Spain, Italy, Austria, Hungary, and Russia show higher rates for females for one or more age groups.

Infant Mortality. The death rate of children constitutes a very sensitive barometer of sanitary conditions, partly because that class of the population migrates little, but mainly because of its extreme sensitiveness to sanitary and hygienic conditions There is hardly any difference between different countries, different social classes, or different periods of time, more pronounced than in infant mortality. In Norway, Sweden, and Ireland only about 10 per cent of the children born alive die before they reach one year old; in Prussia, Bavaria, and Russia the proportion rises to one-fourth. In Massachusetts about one-seventh of the children born die under one year of age. The combined statistics for Washington, D C., Baltimore, and New Orleans show that in 1911 the death rate of whites under one year of age was 134, that of the negro 315, indicating that the infant mortality of the colored population exceeds that of Prussia, Russia, or Bavaria.

Race. The influence of race upon vitality is one which cannot be clearly distinguished from that of other factors usually associated with it. In the countries of Europe which still furnish most of our information regarding vital statistics the differences of race are elusive, and in consequence this distinction is seldom, if ever, drawn in the vital statistics of those countries. For the native population of Australia and New Zealand vital statistics are almost entirely lacking, but what indications there are point to a high death rate and a low vitality. Statistics on this subject from South Africa have been but recently organized and are still too slight to be significant. The largest body of evidence on this topic is that furnished by the vital statistics of the United States.

The report of the Bureau of the Census on "Mortality Statistics 1911" gave data for the registration area which included 63 per cent of the total population of the country. It reported 779,770 deaths of whites and 59,514 deaths of colored persons. Of the colored 94 per cent were negroes. The death rate for whites was 13.7 and for colored, 23.7. The census of 1900 had reported a rate of 30.2 for negroes, so that a marked reduction is shown. The colored population shows a higher death rate than the white for both sexes and for every age group. This is no doubt due largely to differences in economic and social conditions as well as race. The mortality of the colored population is more than twice that of the native whites in the age groups under 20 years. Thereafter the difference is decidedly less, though it does not decline uniformly. In the age groups 20 to 44 years inclusive the colored mortality is two-thirds greater than that of the native whites; it rises to nearly double that of the whites in the age group 45 to 54, but thereafter the difference in the two rates falls steadily, nearly disappearing after age 75.

Various studies of vital statistics of negroes in northern cities have shown that their death rates nearly equal their birth rates and that consequently the increase in number is due mainly to migration from southern States. Thus the Department of Health of New York City found that in 1914 the death rate of negroes was 26 31 per 1000 as compared with 13.40 for the entire city. The deaths from tuberculosis were four times as great proportionately as among whites. The infant death rate was 181 per 1000 for negroes and 95 for whites.

Marital Condition. The death rate of married men is almost always, if not always, less than that of the unmarried of the same age. Thus, in Prussia in the decade 1896–1905 the death rates of males were as follows·

AGE	DEATH RATE OF		
	Single	Married	Widowed and divorced
1–19	9	3 5	
20–39	7	6	17
40–59	26	16	33
60 and over	74	57	110

The death rate of the married is uniformly least and that of widowers, uniformly greatest. Various reasons for the difference have been assigned. Among them are the more regular life of husbands, their better economic condition, and their better health at the start, the weak and sickly being unable or unwilling to enter matrimony. Probably all of these reasons are at work. An interesting evidence of the beneficial influence of marriage upon the health of men has been drawn from the figures for Norway and Sweden. As a rule the death rate rises slowly but steadily from the minimum in the early teens to the maximum at the end of life. But if marriage is a healthier state than single life, then during the years when large numbers of men are passing from the less healthy to the more healthy condition the tendency to an increase of the death rate with age might diminish or disappear. And that is precisely what is observed. The death rate of bachelors and of husbands taken separately increased steadily with age, but the death rate of all males between 30 and 34 was less than between 20 and 24, an anomaly which Kiaer explains by pointing to the much larger proportion of married men at the later age period. The effect of marriage on the vitality of women is not so clearly beneficial. During the early years of married life the difference is decidedly to the disadvantage of wives compared with spinsters, due doubtless to effects of child bearing; it gradually declines, disappears at about the age of 40, and at later ages the health of wives is better than that of unmarried women. This change, however, may be due mainly to the selection of the more vigorous and healthy women for marriage.

Occupation. The leading source of information regarding the mortality in various occupations is the English statistics. It should be noted in the first place that the mortality of occupied males of ages 25 to 65 is less than that of all males of the same ages and only one-third that of the unoccupied males of these ages. The English data show that the death rate of occupied males in cities is somewhat

above the normal, and that the rate in agricultural districts is only three-fifths that in industrial districts. For the purpose of comparison between the several occupations the comparative mortality figure is computed. This takes as the basis of comparison a mortality rate of 1000 for all males of ages 25 to 65. A comparative rate of more than 1000 signifies that the mortality of men engaged in the occupation indicated is greater than the normal rate for men of ages 25 to 65 and vice versa. These comparative rates for the six healthiest occupations in 1900–02 were: clergymen, 515; gardeners, 527; gamekeepers, 586; farmers, 562; railway engine drivers and stokers, 582; farm laborers, 572. The rates for the six occupations with highest mortality were: copper miners, 1609; innkeepers, publicans, and spirit dealers, 1669, inn and hotel servants, 1767, costermongers, 1778; general laborers, 1987; tin miners, 2169 In the decade 1891 to 1901 there was a decline in the mortality rate in nearly every occupation in England. The comparative rate for all occupied males ages 25 to 65 in 1891 was 1102 and in 1901, 925. But the rate for general laborers rose from 1413 in 1891 to 1987 in 1901 and the rate for tin miners from 1628 to 2169. In recent years widespread study of occupational, health, and accident hazards has shown that the mortality from diseases incident to various occupations is astonishingly high In the United States the annual number of deaths from industrial accidents is from 25,000 to 30,000 while metallic poisons, noxious gases, vapors, fumes and fluids, irritant dusts, organic germs, and such conditions as compressed air, excessive humidity, light, or heat affect adversely the mortality rate of numerous occupations.

Birth Rate. As a rule in old and long-settled countries the birth rate is high where the death rate is high. The converse, however, is not true, a number of countries having a moderate or high birth rate and at the same time a low death rate. The birth rate of female children is lower than that of males. It is usual to state these facts by computing the number of males born to every 100 or 1000 females. In general there are from 104 to 106 male children born to every 100 female. In the United States there are no trustworthy statistics of births for any large sections of the population. An indication of the birth rate may be found by computing the number of children under five years of age reported by the census to each 1000 women between 15 and 44. The children under five are selected rather than those under one, because many of the latter class are erroneously reported as one year and a smaller number are omitted by the enumerators. In 1890 there were 529 children in the United States under five years of age to each 1000 women between 15 and 44. In 1900 the ratio had declined to 518, and in 1910 to 488, indicating that in the United States, as elsewhere, the birth rate has slightly declined. The figures for the whites fell from 517 in 1890 to 509 in 1900 and to 477 in 1910, while those for the colored, mainly negroes, fell from 619 in 1890 to 584 in 1900 and to 515 in 1910, indicating that the birth rate among the colored is decidedly higher than among the white, but that the decline among them has also been more rapid, so that the birth rates of the two races are approaching equality. The facts may be obtained separately at each census for the cities having at least 25,000 inhabitants and for the rural districts. They show that the proportion of children in the rural districts has declined only slightly while the ratio in the cities has declined sharply. This indicates that the birth rate in cities having at least 25,000 inhabitants is lower than it is elsewhere and that the difference between city and country is increasing. The census data show for the colored population, mostly negroes, that the difference in birth rate between city and country is far greater than it is for the white, the proportion of negro children in cities being much less and the proportion of negro children in country districts much greater than the corresponding proportions among the whites.

It is also shown that the lowest birth rates are found in some of the New England States while the highest rates are found in some of the new agricultural States, as North Dakota and Oklahoma.

Whether the native population of the United States is maintaining itself by excess of births over deaths is a much-disputed question regarding which the statistical evidence is so meagre as to afford no certain reply. It is probable that in the New England States the native population is not maintaining itself, but it is inadmissible to generalize from conditions there to those throughout the country. Indeed, the figures for the country as a whole seem to indicate that the native population is increasing from its own loins.

In western nations generally and in Australia and New Zealand, the birth rate has declined since 1880. The extent of this decline from 1881–85 to 1909 is shown for principal countries in the following table:

COUNTRY	Av. rate 1881–85	Rate in 1909	Per cent of decline
Ireland ..	23 9	23.5	1 6
Spain	36 4	32.6	14.4
Italy .	38 0	32 4	14.7
Prussia ...	37 4	31 8	14 9
Hungary.. ..	44 6	37 0	16.6
Victoria .. .	30 8	24 6	20.1
France. .	24 7	19 6	20 6
Scotland .	33 3	26.4	20 7
England and Wales	33 5	25 8	23 0
New Zealand .	36 3	27.3	25 5
Queensland .	36 5	27 2	25 5
New South Wales	37.7	26 9	28.4
South Australia	38.5	24.7	35.8

Numerous causes are assigned for this decline. It is popularly explained by the postponement or avoidance of marriage, but neither of these conditions are revealed by statistical evidence. An increase of sterility due to rich diet or venereal disease explains it only in slight degree. It is generally agreed that the main cause is conscious limitation of family increase which in turn is directly related to higher standards of living.

Marriage Rate. In most civilized countries the marriage rate declined slightly from 1860 to 1890 but showed a tendency to rise in the 10 years 1895–1905. Thus in England and Wales the mean annual marriage rate per 1000 total population fell from 16.6 for the decade 1861–70 to 14.9 for 1881–90 but rose to 15.6 for 1891–1900. For the past half century Ireland has had the lowest marriage rate of all European countries, the rate per 1000 total population averaging 9.6 in 1891–1900. Sweden,

Chile, and Uruguay also have low rates, while Saxony, Russia, Hungary, and Servia have the highest rates. The following table gives the mean annual marriage rates per 1000 marriageable persons, i.e., bachelors 18 years of age and over, spinsters 15 years of age and over, and all widowed and divorced persons.

AVERAGE ANNUAL MARRIAGE RATE PER 1000 MARRIAGEABLE PERSONS

COUNTRY	1876–85	1886–95	1896–1905
England and Wales	56 8	52 9	53 1
Scotland	44 5	42 1	43 2
Ireland	26 0	24.1	25 3
Denmark	53 9	50 1	50 8
Switzerland	43 1	42.3	45.4
Prussia	58 0	59 1	61.6
Bavaria	47 0	47.1	51 7
Saxony	69 8	69 8	70 0
Netherlands	53.1	49 6	52 0
Belgium	43 6	45 3	55 3
France	49 7	48 2	51.3
Italy	54.2	54.6	54 1

The United States lacks marriage statistics obtained through registration, and in this, as in other fields of vital statistics, is compelled to rely mainly upon inferences derived from the census. Only for the censuses of 1890, 1900, and 1910 has information on this subject been afforded. Of all persons in the United States rather more than one-third (38.9 per cent) were married in 1910; about 1 in 20 (5.0 per cent) were widowed; and nearly 4 in 1000 (0.38 per cent) were divorced, the remainder, not quite three-fifths (55.4 per cent), being single. The proportion of married increased from 35.7 per cent in 1890 to 36.5 per cent in 1900. On the other hand the proportion of single has diminished, the proportion of widowed and divorced changing but slightly. A part of this change is due to the decreasing proportion of children and in consequence the increasing proportion of persons of marriageable age. Yet even when attention is confined to the population over 15 years of age, the proportion of married in the United States slightly increased from 1890 to 1900 and again from 1900 to 1910. Examination of the figures for conjugal condition by sex and age shows that this slight increase in the per cent married was confined to the periods of early adult life. The per cent of married persons among men in the age group 15 to 19 rose from 0.5 in 1890 to 1.0 in 1900 and to 1.1 in 1910; in the age group 20 to 24 the increase was from 18.9 in 1890 to 21 6 in 1900 and to 24 0 in 1910 For the age group 25 to 34 the proportion married fell from 61.5 in 1890 to 60.6 in 1900 but rose to 62.8 in 1910. The per cent of married females from 15 to 19 years of age increased from 9.5 in 1890 to 10.9 in 1900 and to 11.3 in 1910; in the age group 20 to 24 there was a decline from 46.7 per cent in 1890 to 46.5 per cent in 1900 but a rise to 49 7 per cent in 1910; while in the age group 25 to 34 the percentages for the three censuses were respectively 75.2, 73 0, and 75.1. Moreover for both sexes there was a very slight increase in the proportion of those of ages 35 to 44 who were married. This tendency to marry earlier than 10 or 20 years ago was shown by every nativity class, i.e., by the native whites of native parentage, native whites of foreign or mixed parentage, foreign born, and negro. These increases in early marriages are probably an index of the unusual prosperity of the country They indicate clearly that any decline in the birth rate in the United States is not to be explained by a tendency to avoid or postpone marriage.

Birth Control. The respective advantages and disadvantages of both overbreeding and underbreeding have been understood for many centuries, and even ancient Greece had its Malthusian dread of overpopulation; while Plato and Aristotle advocated strict limitation of families. Whether overbreeding meant an asset depended wholly on the outcome· if it led to conquest and domination it might be praiseworthy, but should a militaristic policy be crushed by a general uprising of opponents, as in the late World War, then it would be ill-advised.

While limitation of families seems to have been a civilized and humane sequence to the practices of infanticide and of active elimination of the unfit, the subject of birth control, whether by moral restraint or interference with the processes of reproduction, is entirely modern and was apparently one of the first fruits of the French Revolution The birth rate of France began its steady decline in the closing years of the eighteenth century, while Malthus's work on birth control was published in 1798. As early as 1841 artificial restriction of births had progressed so far in France that the priest, it is said, forbore to ask in the confessional questions which bore on suppression of parenthood; it having been shown that fathers of families would not attend confession if asked such questions.

Malthus showed convincingly that overpopulation would not only outstrip the food supply, but that in the meantime social perils of all kinds would be active; and that by a moral restriction of births most of the poverty, crime, disease and immorality is preventable. His teachings were accepted by various writers on the then new science of sociology, including the Mills and Owens The facultative sterility which is said to have been first adopted by the French, as above stated, received no publicity until the early thirties of the nineteenth century, when Knowlton and R. D. Owen (both Americans) and F Place published pamphlets, which, however, for the time being fell flat.

A much more serious effort was G. Drysdale's *Elements of Social Science* which appeared in England in 1854, and this volume appears to be regarded as the bible of the advocates of birth control There followed a latent period of more than a score of years. In 1876 the British birth rate, long known to be on the increase, attained the high figure of 36.3 per 1000 inhabitants. Either by mere coincidence, or as owing to the ripeness of the occasion, Charles Bradlaugh and Mrs. Besant republished the tractate of the American Knowlton already mentioned, entitled "The Fruits of Philosophy," and caused its distribution by thousands of copies.

The prompt decline of the British birth rate which followed this manifesto until it eventually reached the low mark of 24 is accredited by the birth control advocates to this propaganda, which will be discussed later. One friendly critic thinks that 70 per cent of this decline may be thus explained. This judgment may be challenged because other European countries without propaganda showed a similar high point succeeded by a steady decline. The true reason for the increasing birth rate of Europe

during the nineteenth century appears to be the adoption of the industrial system with improvements in agriculture and transportation. Biologists know that increase of food supply in the lower human strata is followed by increased procreation.

The general decline of the birth rate following its maximum is a phenomenon still unexplained and is the more remarkable because all of the dominant elements of society were in favor of unlimited procreation. Ecclesiastics, politicians, militarists, manufacturers and all others who thrive on large followings may be said to have conducted a centuries' old propaganda for large families. The lowered birth rate is best understood as due to unconscious racial instinct uninfluenced by any kind of publicity or dogmatism: in other words evolution best accounts for the phenomenon. As the human organism rises in the biological scale it follows the law that the higher creatures are small breeders. Man can breed like the rat and rabbit. It is possible in theory for one woman to bear as many as fifty children, reckoning the possibilities of multiple births. Today the most sanguine advocate of race fertility would not demand more than six children of a mother, while it is conceded that she does her duty by bearing one half that number.

To return to the British birth control movement of 1876 Bradlaugh and Mrs. Besant stood trial for the publication of the Knowlton pamphlet. The immediate result was the distribution of thousands of copies throughout the civilized world of the aforesaid pamphlet, along with the *Elements of Social Science* (Drysdale) and Mrs. Besant's *Laws of Population*. In 1877 C. R. Drysdale, brother of the author of the *Elements*, became president of the "Malthusian League," with Mrs. Besant as Honorary Secretary. One year later appeared the first number of *The Malthusian*, a periodical which has appeared continuously over the space of forty-four years. The legal status of the propaganda was then as now bound up in the illegality of spreading knowledge of means to prevent conception, which in theory is to foster immorality among the young, single and profligate.

The Bradlaugh movement met with a prompt response in Holland. As early as 1881 several prominent Dutchmen, including Van Houten, later Minister of the Interior of that country, invited President Drysdale of the Malthusian Society to lecture in Amsterdam. This bit of publicity led to the formation of the Dutch Malthusian League. Apparently without opposition and with the cooperation of women of prominence, instruction of poor Dutch mothers in the technics of voluntary limitation of families was at once begun. This propaganda was extended throughout the kingdom and apparently there has been no serious opposition to the movement up to the present day. Birth control advocates quote statistics of all kinds in support of their contention that only good can result from such publicity. For example there is no evidence of depopulation, or of defective man power. Dr. Jacobs, a Dutch woman physician who was the earliest female champion of the birth control movement, is also the leading woman suffragist of Holland, and this fact leads us to mention that the feministic movement throughout the world seems inclined to foster the birth control movement, for the simple reason that woman cannot compete with man in enjoying and profiting from the benefits of civilization unless she is relieved from the strain of overbreeding.

In regard to the spread of Neo-Malthusianism in other countries the crusade did not appeal to France for several reasons. This country had already practised birth control for nearly a century and a counter-crusade in favor of an increased birth rate was in the air. Instead of birth control France became interested in race conservation. In the effort to prevent depopulation and encourage maternity the new science of puericulture, the great rival of birth control, was fostered. In other words the state was to assist the indigent mother and her offspring, just as it had always assisted the orphan and the foundling.

It is in France that the science of puericulture chiefly flourishes, and it is in the same country that most of the agitation for larger families has originated. France is a habitable and long settled land with small tendency among its inhabitants to migrate and colonize; yet the density of population remains persistently lower than that of Great Britain, the Netherlands, the Teutonic countries and Italy.

It may seem strange that Germany, as far back as 1889, took kindly to Neo-Malthusian ideas, because the dominant classes favored a high birth rate; and while there was a remarkable decline in the latter toward the close of the nineteenth century, the growth of population was still conspicuous.

The claim is made that after the Franco-Prussian war in 1870, the extreme frugality of the French interfered materially with the possibility of a rising birth rate. But while Germany was alive to the drawbacks of overpopulation, the increase in citizenship was sufficient to fortify the expectation of world domination. The fertility of German mothers was looked on as a foil to French sterility. As has been well said, if the German had followed the French precedent of artificial birth control, there would have been no dream of Teutonic supremacy and no World War in 1914. Socialism, as fostered especially in Germany, is distinctly opposed to birth regulation.

Very striking was the response to the Neo-Malthusian propaganda in the ultra-Catholic countries, Austria (1901), Spain (1904), Belgium (1906), and Italy (1913). The church seems unable to stem this movement and attempts to prosecute for the distribution of information on birth control have collapsed. The growth of the feminist movement in some of these countries appears to be coeval with the birth control movement; and women are in favor of assuming the responsibility for the number of children in a family.

After the progressive lowering of the birth rate following the turning point of 1876, British authorities began to show alarm at the possibility of race extinction. Thereafter the existence of two opposed parties must be recognized. In the 80's Neo-Malthusians pointed out that France had abolished poverty through birth restriction. Prominent divines like Haweis and Dawson gave this practice their sanction while the new science of Eugenics pointed out that England was being populated from its inferior stocks. A distinction was made between moral restraint and artificial prevention of reproduction, but some advocates of race conservation have always been bitter against the wealthy

woman whose restraint prevents her normal contribution to the next generation. On the other hand bishops of the Roman and Anglican churches have sanctioned artificial limitation in specific cases, the selection to be left to the medical adviser The selfishness of the poor mother who gives birth to children whom she can never raise is contrasted with the selfishness of the sterile prosperous mother, who is well able to bear and raise a family of half a dozen. To each faction the other is unpatriotic —the alternative seems to be a next generation consisting principally of physical and mental defectives or no next generation at all

In the early part of 1913 the British Malthusian League began for the first time to circulate leaflets to poor people who were over the age of 21 and if not already married about to enter that state, giving instruction in the technics of artificial family limitation. No prosecutions followed. In October of the same year the National Birth Rate Commission began its sessions. The testimony given at this and subsequent meetings shows that the ethics of birth control are far from settled Eminent ecclesiastics, physicians, statisticians, etc., were firmly opposed to promiscuous restriction of families, while the experience of the late war has also shown the need of man power.

Although Knowlton and Robert Dale Owen, two of the pioneers of artificial birth control, were Americans, the movement in the United States dates only from very recent times. In 1913 the American Society of Medical Sociology, which had for years favored birth control, became affiliated with the International Federation of Neo-Malthusian Leagues In the following year Mrs. Sanger visited Europe, where she studied birth control, notably in Holland. Both before and after her journey she had distributed thousands of pamphlets on "Family Limitation" and the experience of Bradlaugh and Mrs. Besant was repeated when she faced trial in 1915. She was not convicted until the following year when she served thirty days in jail, the charge being that of imparting knowledge of family limitation in her birth control clinic at Brooklyn. Among the outcomes of her activities have been the founding of the *Birth Control Review*, the establishment of birth control leagues in many cities and of birth control clinics, the spread of the movement to Mexico and South America, further prosecutions of Mrs. Sanger and other propagandists in connection with alleged objectionable matter in the *Birth Control Review*, the formation in 1919 of the Voluntary Parenthood League in New York City and the espousal of the principles of the birth control advocates by various medical, religious and sociological factions and authorities.

In November, 1921, a mass meeting in New York City to discuss the subject of birth control was broken up by the police and the chief speakers of the evening were locked out. Mrs. Sanger and Miss Winsor were then arrested for attempting to address the meeting in another public hall; but as no one appeared to prosecute the defendants they were discharged by the magistrate. Owing to the rapid evolution of the birth control movement and the high character and numbers of the opposing forces it is difficult to sum up the present status of the movement or to forecast its future.

Bibliography. For general treatment of this subject consult Tarr, *Vital Statistics* (London, 1885); Newsholme, *Elements of Vital Statistics* (2d ed., ib, 1889); M G. Mulhall, *Dictionary of Statistics* (4th ed, New York, 1903), W B. Bailey, *Modern Social Conditions* (ib, 1906). English statistics are summarized in the *Annual Report of the Registrar General* (London) A notable collection of international data will be found in *Statistique internationale du mouvement de la population* (Paris, 1907), also in A D Webb, *New Dictionary of Statistics* (New York, 1911). American statistics in this field are weak and defective, the best sources of information being the volumes of the United States Census and the annual registration reports of a few States, especially Michigan, Massachusetts, and Rhode Island. For mortality tables see LIFE INSURANCE. See also BIRTHS, REGISTRATION OF.

VITAMINE, vī-tăm'ĭn *or* -ēn (from Lat. *vita*, life + amine). A term proposed by Funk to include the peculiar health-giving and disease-preventing element of the rice grain, which exists chiefly in its outer envelope (pericarp), and which is thought to be lost in the usual process of polishing rice. Vitamine now expresses the idea that in addition to the usual proteins, fats, carbohydrates, etc, contained in ordinary foodstuffs there must be present also a sufficient amount of vitamine in order that normal metabolism can be maintained. In all attempts which have so far been made to isolate vitamines in sufficient quantities for experimental studies, only very small amounts have been obtained (See BERIBERI.) The claim has been made by French authors that the discovery of vitamines was very nearly anticipated by the physiologist Magendie, about 75 years ago, in connection with feeding experiments on animals; bnt it was not until 1897 that the Dutch chemist Eijkman announced that an affection closely resembling beri beri in mankind could be produced in fowls by feeding them on decorticated rice, the bran of the latter serving to relieve or prevent the symptoms. This discovery of a necessary food factor in the cortex of cereal grains had doubtless been retarded by the mistaken view that the important substance in the latter was of mineral nature. In 1906 Hopkins made the discovery independently of a special and indispensable food factor in nutrition and shortly afterwards Fraser and Stanton succeeded in relieving the symptoms of human beri beri by administering an extract of rice bran. Scientific study of the disease in question dates from 1898, when the United States government began to study the diseases and sanitation of the newly acquired Philippine Islands. Eijkman's publication of the preceding year pointed to polished rice as the necessary factor in the causation of beri beri and within a short time the rôle of this cereal in the production of the latter was duly recognized.

Thus far the problem had been restricted largely to one type of disease and one cereal: Deprivation of rice cortex in a diet consisting essentially of rice was able to produce a certain type of deficiency disease in men and animals (fowls). Hopkins and perhaps before him Magendie appear to have surmised that the subject was much more extensive, but it remained for Funk to demonstrate the existence of a group of these substances, deprivation of which in the diet could cause a group of deficiency diseases, and to sum up the unknown food factors under the name of *vitamines*. Several Japanese scien-

tists were also independently active in this field and the year 1911 witnessed the revolutionary announcements of both Funk and Suzuki

The problem had been approached from quite a different angle by Osborne and Mendel, beginning in 1909. These scientists studied young rats fed on chemically purified food-elements, and learned that growth on such a ration is impossible in the absence of certain unknown ingredients of crude proteins and fats. In this way the conception first arose of the "growth vitamines," as they were afterward termed. This line of research culminated in the discovery that the "health vitamines," as they may be styled, were identical with the "growth vitamines." That ordinary butter fat was a growth stimulus had been shown independently by Stepp in 1909.

The subject was somewhat confused by the discovery of McCollum in the course of researches begun in 1907 that certain split products of ordinary protein foods well known to chemists were also indispensable for growth. These substances, however, have nothing in common with vitamines, as will appear later, beyond the fact that both are growth stimulants. The protein split products cannot replace the vitamines in the latter capacity.

In 1913 and 1914, articles appeared by Funk which tended to show that scurvy and pellagra were due to deprivation of certain vitamines in the diet. At the present time the latter affection has been temporarily withdrawn from the group of deficiency diseases and placed with rickets in the doubtful class. Both these affections may develop at times in subjects who receive sufficient food ingredients of all kinds, so that some more deepseated process must be involved in which the food is not completely assimilated Nevertheless vitamine deficiency is able to explain part of the diseases phenomena, as will be shown later. Holst and Frohlich in 1907 had in part anticipated the doctrine of Funk that scurvy is a deficiency disease; but years of research were required before this could be demonstrated beyond doubt.

We may now pass from a consideration of the beginnings of the acquisition of our knowledge of vitamines to the present status. In addition to the natural progress of laboratory work the food shortage of the European war proved to be highly educational. Much surprise was expressed that in some of the famine-stricken provinces of Europe there was no wholesale appearance of deficiency diseases. Fortunately the food available was of the sort which was rich in vitamines. Bread was, of course, the mainstay and the war bread contained sufficient bran; the same may be said of the coarse vegetables which furnished one of the chief food sources. Two years ago there had been published over five hundred articles on the vitamines and cognate subjects, the great majority of which proceeded from the laboratories of the world Had it not been for the war interruption this number would probably have been doubled; but this drawback to progress has, as already stated, been in part offset by the practical teachings of the war which support the theoretic conclusions of the laboratory man.

Thus far we are ignorant of the nature of the vitamines, none of which has been definitely isolated. We know of them only through extracts from cereal cortex and the various other products which contain them. There is an extract of rice cortex, a vitamine-containing fraction of yeast, a fatty extract from egg yolk and butter, and so on, in other words the vitamines in the present state of our knowledge are as elusive as are the enzyms themselves, with which substances they are believed by some investigators to be identical. They must therefore be studied like enzymes indirectly through their action If a laboratory animal is first made to develop a deficiency disease by feeding on a given restricted diet the amount of vitaminiferous food necessary to cure the animal is then measured. Thus a pigeon with multiple neuritis due to feeding on polished rice may recover on the following, the weight of the subject being from 300 to 400 grams:

Raw wheat germ, 2.5 gm.; pressed yeast from 3 to 6 gm ; egg yolk 60 gm.; beef muscle 140 gm and dried lentils 20 gm. These various amounts of food therefore presumably contain the same quantity of vitamines. It should now be stated that although the first to be studied the vitamine which prevents beri beri is known as "vitamine B," or the water-soluble vitamine. The term "vitamine A" is applied to the fat-soluble principle found to be necessary for the growth of laboratory rats. It is readily studied through the growth rates of the experiment animals. As will be seen later withholding this vitamine from the diet of adult animals and man sets up a special form of disease known as xerophthalmia which occurs naturally in Japan and was seen to a slight extent in some of the famine countries during the European war.

Just as the "A" vitamine has been studied in the rat and the "B" vitamine in the pigeon, so the guinea pig was found best suited to the study of a third substance known familiarly as "vitamine C." When this animal is so fed as to be deprived wholly of the latter it develops scurvy and this condition may be corrected by adding fruit juice to the diet. This agrees with the clinical experience in human pathology in which after a monotonous diet has produced scurvy the juice of oranges and other members of the citrus family is sufficient to prevent this affection when added to the defective diet. Attempts to show that rickets in man and animals is due essentially to deprivation of vitamine "A" have come to naught and recently McCollom has apparently shown that still another of these mysterious substances is concerned with the development of this affection which he has termed vitamine "D." As rickets can also be shown to be due to disturbance of the ratio between the phosphorous and calcium of the diet it is evident that the fourth of these vitamines may be a factor in maintaining the said ratio. The claims of McCollom have not yet been substantiated by other workers.

In studying the sources in nature of the several vitamines, all of which are absolutely indispensable for life, it must not be imagined that each form occurs in its own special food class, for this could be true only to a limited extent. All of the vitamines must occur side by side in foods which alone suffice for the entire nourishment of the animal type. In the beginning these principles occur in the vegetable kingdom and the herbivors derive them all from the grasses, leaves, seeds, etc. of the plants. The carnivorous animals, including some tribes of mankind, get them from the herbivors, including milk and its products. All of the mammalian nurslings obtain them from the mother's

milk. Generally speaking the three vitamines occur side by side in milk and cheese, lean meat, the germ of the cereals and pulses, certain vegetables as cabbage, carrots, spinach, tomatoes, and lettuce. In contrast fats contain only "vitamine A," while fish and some kinds of meat, as brains and sweetbreads, contain "A" and "B" without "C." This is also true of eggs, the cereal grains, the pulses, yeast, and certain nuts. Potatoes and juices of the citrus family appear to contain only "C," while most fruits and berries contain "B" and "C" without "A." When there is shortage of food and the prospect of a monotonous diet this knowledge may often be turned to advantage Not all oils contain "vitamine A" for olive oil, cocoa butter, lard, etc., contain no vitamine whatever. Margarine in this respect cannot represent butter and the only substitutes for butter and cream are beef and mutton suet, fish oils and nut butter.

Of great significance is the action of heat and cooking on vitamines. The statement sometimes encountered in popular writings that cooking destroys vitamines is only true to a limited extent It does destroy "C," so that man cannot derive vitamines from the potatoes he eats (although one finds the statement that introduction of the potato in Europe was the death blow to mediæval scurvy). Again boiling and pasteurizing milk must also destroy its "vitamine C," and this loss is the chief factor in the development of infantile scurvy.

Vitamines "A" and "B" are far more resistant to heat in general and cookery and a sufficiency of them is always present in ordinary cooked food articles. But since in all of the substances containing all three vitamines the act of cooking is sufficient to destroy "C," one understands the necessity for consuming a sufficiency of articles like fresh fruits and berries, salad vegetables, raw cabbage, tomatoes, raw onions, cheese, etc. It is not necessary to consume a large amount of these articles to obtain a sufficiency of "C"

In addition to cooking, most of the methods of preserving foods involve the sacrifice not only of vitamine "C" but "A" and "B" as well; in other words vitamines are constituents largely of fresh foods as opposed to conserves of any kind. There are, however, exceptions, for some canned tomatoes are said to retain their vitamine and this is true also of raisins. Canned meats are practically without vitamine content, while dried peas and beans contain only "B" and flour made from the same none at all, which is also true of all cereal flour obtained from decorticated grains. Cereal brans are normally without "A" and "C," so that the statement that "man cannot live by bread alone" is also true from the vitamine standpoint. If butter or cheese is eaten with bread vitamine "A" is supplied, while bread and milk eaten together contain all of the vitamines. Whole wheat breads and oatmeal contain both "A" and "B," and in theory might be eaten without butter; the addition to whole wheat or any whole meal bread of raw onion supplies the needed "C."

But the problem of the vitamines is not quite so simple as appears; for example the disease beri beri may be caused by an ordinary innutritious diet even if plenty of vitamine is forthcoming. In other words man must have a sufficiency of protein and carbohydrate in his diet as well as these more elusive and subtle accessory food-substances. This combination of insufficient food plus insufficient vitamine produces a special picture of deficiency disease which differs from the phenomena of ordinary starvation on the one hand and simple vitamine deficiency on the other. Still other factors may enter into the causation of some of the complex deficiency diseases, such as poisoning by spoiled food and complications due to infection. In both pellagra and scurvy there is a possibility of intestinal autotoxemia. In many episodes of pellagra when the diet was not only scanty but defective in vitaminiferous foods the picture which develops does not in the least resemble beri beri, scurvy or xerophthalmia, the latter being the result of deprivation of "A." Nor does the picture resemble that of an unbalanced ration which also contains insufficient calories. The disease, in fact, is *sui-generis* and in some episodes appears to be the result of eating maize known to be spoiled.

Xerophthalmia or "dry eye" is, as already mentioned, endemic at times in parts of Japan and a few cases were seen in the famine districts of Europe during the recent war. While the dryness and softening of the eyes constitute the most noticeable symptom, the subject evidently suffers from a low state of nutrition. Xerophthalmia however does not always develop when in theory it should, and in some cases the pathological state of the eye seems due in part at least to infection from without. Thus in all of these deficiency diseases there is the same suggestion of causal factors which are still unsurmised; not only in the obscure pellagra and rickets but in the much better understood beri beri, scurvy and xerophthalmia. In a few episodes there has been noted a hybrid type in which, for example, symptoms of both scurvy and beri beri assert themselves. Famine oedema, an affection due to simple lack of ordinary dietetic articles without reference to deprivation of vitamines (usually present in sufficient quantities), seems to differ in no essential respect from the swelling often seen in beri beri. Generally speaking our knowledge of vitamines is far from satisfactory. Among the many good monographs on the subject may be mentioned, Eddy, *The Vitamine Manual* (Baltimore, 1921).

VITASCOPE. See KINETOSCOPE; MOVING PICTURES.

VITEBSK' vĕ-tyĕpsk'. A government of west Russia, bordering on the Baltic Provinces Area, about 16,983 square miles, about one-third forested (Map: Russia, C 3). It has a flat and somewhat undulating surface, with low hills in the southeast and the north, and extensive marshes in the west. The region is watered principally by the Düna and its tributaries. There are about 2500 small lakes and ponds. Agriculture is the principal occupation. The peasants migrate for the winter months in considerable numbers to the more industrially developed regions of the country. Pop., 1897, 1,489,246; 1912, 1,875,100.

VITEBSK. The capital of the Government of Vitebsk, in west Russia, situated on the Düna, 387 miles south of St. Petersburg (Map: Russia, D 3). It is an old town (1021) poorly built, but containing some noteworthy specimens of ecclesiastical architecture, notably the Upensky Cathedral (1771), the cathedral of St. Nicholas (1664), and the Roman Catholic churches of St. Anthony and St. Michael, the last possessing an interesting library. At the junction of two important railroads it is of

considerable commercial importance as a distributing point for its own region and the two neighboring governments of Pskov (q.v.) and Mogilev. Pop., 1911, 103,840, of whom the Jews constituted about two-thirds. In the beginning of the eleventh century Vitebsk formed a part of the Principality of Polotsk, and 100 years later it became the capital of the independent Principality of Vitebsk, which was annexed in the fourteenth century to Lithuania and later to Poland. In 1772 it was annexed to Russia. Napoleon entered it in 1812.

VITEL'LIN. See GLOBULINS.

VITEL'LIUS, AULUS (15–69 A.D.). A Roman emperor (January–December 69 A.D.). He was consul in 48 and later served with distinction as proconsul in Africa. He won and kept the favor of Tiberius, Caligula, Claudius, Nero, and Galba. Having been made by Galba commander of the legions in lower Germany, Vitellius won over the soldiers by extreme familiarity and liberality, and on Jan. 2, 69, they proclaimed him Emperor. In this the troops in Gaul concurred; and two armies under Valens and Caecina, who had commanded legions on the Rhine, set out for Italy, and soon secured Rome through the overthrow of Otho (q.v.). Vitellius ruled with great moderation, but by his personal depravity and gluttony he lost favor, and the legions of Pannonia and Illyricum, having proclaimed Vespasian (q.v.) Emperor, advanced into Italy under Antonius Primus. The Vitellian troops were decisively defeated on two consecutive days, near Bedriacum, but further south, Vitellius's brother, Lucius, won several victories. Rome, however, was soon in the possession of Antonius Primus. Vitellius was killed, his head carried about Rome, and his body thrown into the Tiber. Consult his *Life*, by Suetonius; B. W. Henderson, *Civil War and Rebellion in the Roman Empire*, 69–70 A.D. (London, 1908); and the article "Vitellius, 4," in Friedrich Lubker, *Reallexikon des klassischen Altertums*, vol. ii (8th ed., Leipzig, 1914).

VITERBO, vē-tĕr'bō. A city in the Province of Rome, Italy, situated at the foot of the Monte Cimino, 54 miles by rail north-northwest of Rome (Map: Italy, D 3). It is encircled by old Lombard fortifications and has well-built streets. It is noted for its handsome examples of architecture and its interesting palaces. The fine Romanesque-Gothic cathedral, in the extreme southwest corner of the city, contains the tomb of Pope John XXI, while in San Francesco Clement IV and Adrian V lie buried. It dates from the twelfth century, and has a Gothic campanile. The splendid Municipal Palace stands in the centre of the city. It dates from 1264, and has a fine portico and attractive frescoes. It contains the municipal museum of Roman and Etruscan antiquities. The church of Santa Maria della Salute has an artistic portal, and the small church of Sant' Angelo an interesting façade. The former church of Santa Maria della Verità, with a beautiful Gothic cloister, now serves as the public hall. The public garden lies near the north end of the city. In the vicinity of the city are Etruscan cemeteries and also the beautiful pilgrimage church of Santa Maria della Quercia. The manufactured articles of Viterbo include leather, paper, cloth, soap, matches, and playing cards. There are warm medicinal springs in the neighborhood, and mines of alum and sulphur. Pop. (town), 1911, 17,517.

Viterbo was the capital of the patrimony of Peter—the extensive grant to the Pope by the Tuscan Countess Matilda (died 1115). It was often a papal residence, and has been the scene of five papal elections.

VITET, vē'tā', LUDOVIC (1802–73). A French author and political leader, born in Paris. He was educated at the Ecole Normale, but after spending some time in travel gave up the profession of teaching for that of letters. In 1824 he began contributing literary and artistic criticisms to the *Globe*. In his first books, *Les barricades* (1826), *Les états de Blois* (1827), and *La mort d'Henri III à St. Cloud* (1829; the trilogy united in 1844 under the title of *La Ligue*), Vitet opened a romantic vein new to French literature by presenting historical occurrences in vivid dramatic form. After the Revolution of 1830 Guizot created for the young writer the post of inspector of historic monuments. He was a member of the Chamber of Deputies from 1834 to 1848, of the Legislative Assembly in 1849, and of the Constituent Assembly in 1871. In 1845 he became a member of the Academy. He was the author of *Histoire des anciennes villes de France* (1833); *Histoire de Dieppe* (1833); *Fragments et mélanges* (1846); *Histoire financière du gouvernement de Juillet* (1848); *Les états d'Orléans* (1849); *Le Louvre* (1852); *Essais historiques et littéraires* (1862); *Etudes sur l'histoire de l'art* (1863–64); *La science et la foi* (1865); *Lettres sur le siège de Paris* (1870–71); the posthumous *Etudes philosophiques et littéraires* (1874); and *Le Comte Duchâtel* (1875).

VI'TEX (Lat., chaste tree, Abraham's balm). A genus of trees or shrubs of the family Verbenaceæ. *Vitex agnuscastus*, the chaste tree, a native of the Mediterranean region, is downy, with digitate leaves, white on the back, and has an acrid fruit. It derives its name from the practice of Grecian matrons of strewing their couches with its leaves, especially during the sacred rites of Ceres, in order to banish impure thoughts, for which purpose a sirup made of its fruit was also used in convents in southern Europe. *Vitex negundo*, an Indian species, has aromatic leaves, which are bruised and applied to the temples for relief of headache. In Australia *Vitex acuminata* and *Vitex lignum-vitæ* yield close-grained, hard wood used in cabinet-making.

VITI (DELLA VITA), vē'tē (dĕl'lä vē'tä), TIMOTEO (1467–1524). An Italian painter of the Renaissance. He was born at Ferrara, and was the principal pupil of Francia, with whom he studied at Bologna (1490–95), and also of Costa. He then settled at Urbino, where he stood in high favor with the reigning Duke, and became chief magistrate of the town, residing there until his death in 1524. He was the teacher of the youthful Raphael, and his works show those qualities which are called Raphaelesque—subtile grace of line, harmonious balance of all elements, poetic charm. Timoteo's earliest efforts show the influence of Francia and Costa; as, e.g., the "Madonna with Two Saints" (1495, Brera, Milan), formerly ascribed to Raphael; the beautiful figures of Saints Margaret (Bergamo) and Apollonia (Urbino); an "Annunciation" with Saints John the Baptist and Sebastian (Brera); and the fine altarpiece of the cathedral of Urbino (1504). Gradually the Umbrian influence replaced that of Francia; and to this later period belong the "Magdalen"

(1508–09, Pinacoteca, Bologna), a signed altarpiece at Cagli, and another in the cathedral of Gubbio, representing the "Legend of Magdalen" (1521). Consult Morelli, *Italian Painters: Critical Studies of their Works*, vol. ii (London, 1892–93), and Bernhard Berenson, *North Italian Painters of the Renaissance* (New York, 1907).

VITICULTURE. See GRAPE.

VITI (vē'tē) **ISLANDS.** See FIJI ISLANDS.

VITILIGO (Lat., a skin disease). Acquired albinism; leukodermia. A disease characterized by the disappearance of pigment from the skin. Vitiligo is common in tropical countries, comparatively rare in Europe and America. In most cases the pigment disappears so that white patches are formed around whose edges the pigment is darker. The patches grow larger with time, coalesce, and finally the white area may spread so as to cover the whole body. The complete process involves many years. No disturbance of dermal secretion or sensation occurs. Either sex may suffer from it; and, though seen at as early an age as four years, it rarely begins before 10 or after 30 years of age. It is more common in the dark races. The cases of negroes who gradually become white are examples of vitiligo. It is thought to be a tropho-neurosis, and in many instances it has been preceded by wasting illness, such as scarlet fever, typhoid fever, or severe intermittent fever; and may be associated with alopecia areata (a form of baldness), morphea, or exophthalmic goitre. It generally progresses symmetrically, and thus differs from congenital white patches, as well as from the maculo-anæsthetic leprosy of India, with which it has been confounded. Spontaneous arrest may occur, but the prognosis is not hopeful for recovery.

The use of general tonics, especially arsenic, and hygienic measures may stay the progress of the decolorization, while never restoring the pigment.

VITIVERT. See VETIVER.

VITORIA, vē-tō'rē-ä, or **VITTORIA.** The capital of the Province of Alava, Spain, 30 miles south of Bilbao, on the left bank of the Zadorra River (Map: Spain, D 1). The upper, or old town, with some ancient ruins visible, is narrow, gloomy, and dirty, while the new town, on a lower level, is more open and elegant, with finer buildings and charming paseos and plazas. The cathedral of Santa María de Vitoria is a twelfth-century church and fortress, and was restored in the fourteenth century. Its companion fortress church, San Vicente, was reconstructed in the fifteenth century. Among the secular structures the Municipal Building is interesting architecturally and contains many memorials of Isabella the Catholic; the Palace of the Provincial Deputation, a nineteenth-century structure, is filled with mementoes of the life of the province. The poorhouse occupies the former Colegio de San Prudencio. Here was the first modern prison in Spain.

The climate of Vitoria is cold and humid. The occupations of the inhabitants are dependent upon the industries of the city, which comprise the manufacture of chairs, mirrors, picture frames, iron bedsteads, woolens, leather, oilcloth, chocolate, pastas, crockery ware, malt liquors, and chemicals. Pop., 1910, 32,377.

Vitoria appears in history as early as the sixth century, under the Visigoths, but did not attain importance until the tenth century, when it was an important fortress with extensive local privileges. During the Middle Ages there were many fierce conflicts within its walls, between the aristocratic and democratic factions. Its part in the War of the Communes told heavily against it in loss of population and privileges. It was the scene of the decisive victory, June 21, 1813, by which Wellington drove the French out of Spain. Here, in 1833, originated the Carlist struggle.

VITRÉ, vē'trā'. The capital of an arrondissement in the Department of Ille-et-Vilaine, France, 23 miles by rail east of Rennes, on the left bank of the Vilaine (Map: France, N., D 4). The remnants of the fortifications, into some of which the houses are built, the gloomy seventeenth-century houses with their balconies nearly meeting over the narrow streets, and the half ruined fourteenth–fifteenth century castle with its massive restored donjon, give the town a strikingly feudal aspect. In the court of the castle, which now contains a library, a museum of natural history, and a prison, stands a collegiate chapel dating from the twelfth century. The famous Château des Rochers, the occasional residence of Madame de Sévigné, lies a short distance south of Vitré. Hosiery, cloth, and goatskin clothing are manufactured. Pop., 1901, 10,775; 1911, 9874.

VITREOUS TEXTURE. See IGNEOUS ROCKS.

VITRIFIED FORTS (from Lat. *vitrum*, glass + *facere*, to make, do). The name applied to ancient rude structures, a portion of whose walls shows the action of intense heat in solidifying the rocks by fusion. These archæological enigmas are found chiefly in Scotland, but they also exist in Ireland, Germany, Austria-Hungary, and France. They seem to represent a first step in glassmaking.

VITRIOL (OF., Fr. *vitriol*, from ML. *vitriolum*, vitriol, neut. sing of *vitriolus*, variant of Lat. *vitreolus*, glassy, dim. of *vitreus*, glassy, from *vitrum*, glass). A name given by early chemists to certain vitreous or glasslike salts, especially sulphates, including chiefly blue vitriol or copper sulphate, green vitriol or ferrous sulphate, red vitriol or cobalt sulphate, and white vitriol or zinc sulphate. Oil of vitriol or vitriolic acid, the old name given to sulphuric acid, and still retained in manufacturing parlance, refers to the primitive method of production from ferrous sulphate. Elixir of vitriol was the name given to the aromatic sulphuric acid of the Pharmacopœia. See GREEN VITRIOL; ZINC.

VITRUVIUS POLLIO, MARCUS. A Roman architect and engineer of the first century B.C., author of the earliest extant work on architecture. He was probably born in Formiæ in the first quarter of the century and died during the later years of the reign of Augustus (30–14 B.C.). His fame rests chiefly on his great work, *De Architectura;* but he was also the architect of the basilica and Ædes Augusti at Fano, and the custodian of the Imperial engines of war. He was pensioned for life by Julius Cæsar.

The work *De Architectura Libri Decem*, by which he is chiefly known, was composed in the later years of his life, and consists of dissertations upon a wide variety of subjects relating to architecture, engineering and sanitation, practical hydraulics, acoustic vases, and the like. It was long lost, but was rediscovered in the fifteenth century in a manuscript at St. Gall; the oldest manuscript dates from the tenth century, and much doubt has been cast upon

the authenticity of certain portions of the text, which suggest the age of Diocletian rather than of Augustus It has been studied for the past four centuries as a thesaurus of the practice and theory of building in the Augustan age; but the tendency is now to regard it rather as the work of a theorizer and student of Greek authorities than as the product of practical experience. It was the object of special study, comment, and annotation during the period of the Renaissance. The earliest printed edition was that of Sulpitius (Rome, 1486); the standard modern edition is by Rose (Leipzig, 1889); see also Nohl, *Index Vitruvianus* (Leipzig, 1876). English translations are by Newton (London, 1771–91), Gwilt (ib., 1826; reprinted 1874), and Morgan (Cambridge, Mass., 1914).

VITRY, JACOB OF. See JACOB OF VITRY.

VITTORIA, vē-tō'rē-ȧ. A town in the Province of Syracuse, Sicily, 18 miles by rail northwest of Modica (Map: Italy, E 6). The surrounding district produces excellent wine, besides honey, fruit, silk, and cattle Vittoria is reputed to have the largest wine trade in the island. Pop. (town), 1911, 30,832. Near by are the ruins of the ancient Camarina (q.v.).

VITTORIA. A town of Spain. See VITORIA.

VITTORIA, FRANCISCO DI (c.1480–1549). A Spanish theologian and one of the forerunners of Grotius (q.v.) in the study of international law. He was born at Vittoria, in Navarre, was educated at Burgos, Valladolid, and Paris, joined the Dominican Order, was appointed a teacher in the University of Paris (1516), became professor at Valladolid (1522), and (1524–44) held a chair at Salamanca. Through his teaching and his disciples he exercised a profound influence, and has been called the father of the new scholasticism. In dealing with the law of nations he maintained that the Pope's authority was limited to religious matters, that the right to life, liberty, and property could not be denied to the pagans beyond the Atlantic because of their unbelief, that noncombatants—women, children, farmers, strangers, and clergy—should not be slaughtered in war, that slavery was not a legitimate consequence of war, that hostages could not rightfully be put to death on a breach of faith by an enemy, and that looting was illegitimate. Among his works, published after his death, are *Relectiones XII Theologicæ* (1557); *Summa Sacramentorum Ecclesiæ* (1561); *Instrucción y refugio del alma* (1552); *Confesionario* (1562). There is an unpublished manuscript of *Commentaria in Universam Summam S. Thomæ.* On his theological significance consult Joseph Schrœder, "Francis of Vittoria," in the *Catholic Encyclopedia* (New York, 1909); on his importance as a student of international law, E. Nys, *Les origines du droit international* (Paris, 1894); Thomas A. Walker, *A History of the Law of Nations* (Cambridge, 1899); Percy Bordwell, *The Law of War between Belligerents* (Chicago, 1908); The Carnegie Institution has announced a translation into English of the two treatises, *De Jure Belli* and *De Indis Insulis.*

VITTORIA, TOMMASO LUDOVICO DA. See VICTORIA, TOMÁS LUIZ DE.

VITTORIA COROMBONA, kō'rŏm-bō'nȧ. See WHITE DEVIL.

VITTORINO DA FELTRE, vē'tō-rē'nō dȧ fĕl'trȧ (1378–1446). An Italian educator, born at Feltre. His family name was Rambaldoni, but he took from his birthplace the name by which he is commonly known. About 1422 he became professor of rhetoric in Padua, and also opened a school for young men. In 1423 he removed to Venice, and afterward became tutor to the children of the Marchese Gian Francesco Gonzaga of Mantua. In 1425 he with his charges established himself in a villa allotted for the purpose. Other noble youths were permitted to enter the school, and in another department poor youths were received upon an equal footing with those more favored by fortune Throughout the course there was a close contact between student and teacher. Vittorino's methods, which have been compared with those of Pestalozzi, were so successful that his school was looked upon as a model throughout all Italy. A *Vita de Vittorino* was written by Rosmini (Bassano, 1801). Consult also: W. H. Woodward, *Vittorino da Feltre and Other Humanist Educators* (new ed., New York, 1905); J. A Symonds, *History of the Renaissance in Italy* (vol i, new ed, London, 1913; vol ii, 1897)

VITTORIO, vē-tō'rē-ŏ A town of the Province of Treviso, Italy, at the entrance of the vale of Santa Croce, 25 miles by rail north of Treviso (Map: Italy, D 2) It was formed in 1879 by the union of the towns of Ceneda and Serravalle. There is a masterly altarpiece by Titian in the cathedral of Serravalle. Vittorio has saline and sulphur springs and is a pleasant summer resort. The breeding of silkworms is extensively carried on, and woolens, paper, cement, and lime are manufactured Pop. (town), 1911, 11,055.

VI'TUS, SAINT A martyr of the time of the Roman Emperor Diocletian. He is supposed to have been put to death in Lucania or in Rome, and his festival day is June 15. Relics purporting to be of him are preserved at Corvei and at Prague His name is commonly applied to the peculiar nervous disorder scientifically known as chorea. The manner in which the disease came to be known as St. Vitus's dance is in dispute. A probable explanation is that in the Middle Ages sufferers from the dancing mania were accustomed to repair to the chapels of St. Vitus in Swabia and elsewhere for relief, and that in this way a connection grew up between the saint's name and the disease. Another explanation is that in certain places in Germany in the seventeenth century it was believed good health could be obtained for a year by dancing before the saint's image on his festival day, and that in this way the original St. Vitus's dance was confounded with the disease. The aid of the saint is also invoked against sudden death, hydrophobia, and so on. See CHOREA.

VIVALDI, vē-väl'dē, ANTONIO (c.1675–1743). An Italian violinist, born at Venice. He studied music with his father, a violinist at San Marco, but entered the priesthood at an early age. He was in Darmstadt for a time, and in 1713 returned to Venice, where he was appointed director of the Conservatorio della Pietà. This position he occupied till his death. His most important works are his sonatas and concertos for violin. He produced 38 operas, mostly in Venice. Some of his concertos for the violin and his sonatas are still considered valuable.

VIVANTI, vē-vän'tē, ANNIE (MRS. CHARTRES) (1868–). An English author, especially known for her lyric verse. Born in London, the daughter of Anselmo Vivanti, an Italian patriot, she was married to John S Chartres, who in 1915 became a member of the British Ministry of Munitions. She was educated in Switzerland, England, Italy, and Germany, and

became able to write with ease in Italian, French, German, or English. Annie Vivanti's poems were translated into Danish by George Brandes, into German by Paul Heyse, and into Czech by Jaroslav Vrchlicky. She became a member of the Société des Gens de Lettres of France and of the Società degli Autori of Italy. Her writings include: *Lirica* (1890; 5th ed., enl, 1898); *Marion artista da caffè-concerto* (1891); *The Ruby Ring* (1900), a one-act comedy; *Winning Him Back* (1904); *The Devourers* (1910), a novel; *I Divoratori* (1911); *Circe: il romanzo di Maria Tarnowska* (1912); *Le Roman de Maria Tarnowska* (1912); *Marie Tarnowska, a Study in Slav Psychopathy* (1915); *L'Invasore* (1915), a drama.

VIVARINI, vē'va-rē'nē A family of Venetian painters of the late Gothic and early Renaissance, from Murano, near Venice. The earliest known members of this family, GIOVANNI DA MURANO (active 1443–46) and ANTONIO DA MURANO (active 1440–64), were the founders of the school The best-known example of joint activity, the "Madonna Enthroned" (1446, Venice), is still mediæval in conception. Two signed paintings by Antonio, an altarpiece in the cathedral of Parenzo and the "Adoration of the Magi" (Berlin), show freshness of invention and charming detail —Antonio's younger brother BARTOLOMMEO (active 1450–99) first assumed the name Vivarini. From c.1450 to 1459 he worked with Antonio. His work is distinctly individual and progressive, and he is rightly considered the leader of the school. "The Madonna Enthroned" (1465, Naples) belongs to his early style. A triptych, "The Madonna of Mercy" (1478, Santa Maria Formosa, Venice), and an altarpiece, "Madonna and Child with Four Saints" (1482, Frari, Venice), represent his mature period — His nephew and pupil, ALVISE VIVARINI, the most able of the Vivarini (active 1461–1503), showed still more the influence of the Renaissance, and owed much to Antonello da Messina. His drawing and color are fine and restrained, and his work exhibits dignity and sentiment. He had many pupils, and was Giovanni Bellini's chief rival, but was not his equal in technique nor breadth of composition. The "Virgin and Child" (1475, Monte Fiorentino) is his earliest known work. To his more mature style belongs "The Madonna Enthroned" (1480, Venice); "Madonna with Saints" (1485, Naples); "St. Anthony" (Frari, Venice); a series of saints, including the grandiose "Santa Clara" (Academy, Venice); and his masterpiece, "The Resurrection" (1498, San Giovanni in Bragora). After Alvise's death the Muranese school ceased to be distinct from the Venetian.

VIVERRIDÆ (Neo-Lat. nom. pl., from Lat. *viverra*, ferret). A family of small carnivorous mammals comprising the civets, ichneumons, and the like. The group is represented by fossil forms that range back to Eocene times. The early members are interesting in that they show points of resemblance to animals of other families, such as cats, weasels, bears, and hyenas, and thus present a very generalized type of early carnivore. The principal genera are *Amphictis, Ictitherium,* and *Palæoprionodon,* all from the Tertiary deposits of Europe. An allied and ancestral family, Viverravidæ, includes still more generalized types comprised in the genus *Viverravus* from the Eocene of North America. Consult· F. E. Beddard, "Mammalia," in *Cambridge Natural History,* vol. x (London, 1902); Wortman and Matthew, "The Ancestry of Certain Members of the Canidæ, Viverridæ, and Procyonidæ," *Bulletin of the American Museum of Natural History,* vols. xii and xiv (New York, 1899, 1901). See CIVET.

VIVES, vē'vās, JUAN LUÍS (1492–1540). A Spanish philosopher, born in Valencia He studied at Valencia, Paris, and Louvain, and taught at the latter university He was a friend of Erasmus. He was invited to England by Henry VIII, who made him tutor of the Princess Mary, in 1523; wrote for her *De Ratione Studii Puerilis Epistolæ Duæ;* was imprisoned for opposing the divorce of Queen Catharine of Aragon, 1528, and when released the following year went to Bruges, where he lived till his death, May 6, 1540. His principal works are *De Disciplinis* (comprising seven books, *De Causis Corruptorum Artium*) and *De Anima et Vita* (1539); in addition to these and several other metaphysical works, he wrote commentaries on Augustine's *City of God* (Eng trans, 1620). He was one of the most important logicians of his time. His works were collected and published by Coccius in two folio volumes, Basel, 1555, and by Majori in eight folio volumes, Valencia, 1782–90. Consult Namèche, *Mémoire sur la vie et les écrits de J. L. Vives* (Brussels, 1841); *Tudor School Life; the Dialogues of Juan Luis Vives translated into English, together with an Introduction* by Foster Watson (New York, 1908); *Vives and the Renascence Education of Women,* translated by Foster Watson (ib, 1912)

VIVIAN, VIVIANE, or **VIVIEN.** An enchantress in Arthurian romance, the nymph who brought up Lancelot in her fairy palace in the lake, whence she was called the Lady of the Lake, also the mistress of Merlin.

VIVIAN, HERBERT (1865–). A British traveler and writer, born at Pencalenick, Cornwall, and educated at Harrow and at Trinity College, Cambridge In 1891 and 1906 he contested seats for Parliament. He traveled extensively in Russia, Turkey, the Balkans, and Africa, and served as special correspondent of the *Morning Post* (1898–99) and of the *Daily Express* (1899–1900). In 1901 he revived Dr. Johnson's *Rambler.* Vivian received Servian and Montenegrin decorations His publications include: *Servia, the Poor Man's Paradise* (1897); *Tunisia and the Modern Barbary Pirates* (1899), *Abyssinia* (1901); *The Romance of Religion* (1902), with Mrs. Vivian; *The Servian Tragedy* (1904); and articles in the reviews.

VIVIAN GREY. An early novel by Benjamin Disraeli (1826–27).

VIVIANI, vē'vya'nē', RENÉ (1863–1925). A French statesman He was born in Sidi Bel Abbès, in French North Africa, Nov. 8, 1863. At an early age he associated himself with the Socialist party, soon becoming one of its most brilliant orators and prominent leaders. When the party was reorganized in 1904 into the Unified Socialist party, Viviani, like Briand (q.v.), stayed outside, and thenceforth called himself an Independent Socialist. His parliamentary career began in 1893, when he was elected deputy of the fifth ward in Paris. He retained this office until 1902, when he failed of reëlection, but four years later he was elected deputy of the Department of Creuse. In the same year he entered the cabinet of M. Clémenceau (q.v.) with the portfolio of the Department of Labor. Subsequently, in the ministry of M. Doumergue (q.v.), he was Minister of Public Instruction. In the spring of 1914

an exceptionally radical chamber was elected, and for a while it seemed that they would be unable to agree upon any one for Premier, but finally, on July 13, President Poincaré (q.v.) appointed Viviani, who received a vote of confidence of 370 to 137. The chief issues were the maintenance of the law requiring three years' service in the army and provision for a loan of 1,800,000,000 francs ($360,000,000) for military preparations. Viviani supported both of these measures. Shortly afterward the war with Germany commenced, and in August, 1914, Viviani reorganized his cabinet on a war basis. He retained the premiership for over a year, but resigned on Oct. 27, 1915, being succeeded by Briand. Viviani remained in the cabinet, however, as Minister of Justice.

VIV'IANITE (named in honor of J. H. Vivian, an English mineralogist). A mineral hydrated ferrous phosphate crystallized in the monoclinic system. It has a pearly lustre, and is blue to green in color. It occurs associated with copper, iron, and tin sulphides in veins, and also with iron ores, as limonite, and sometimes in cavities of fossil or buried bones, being derived from the phosphorus contained in them. It is sometimes called blue iron earth or native Prussian blue.

VIVIEN DE SAINT-MARTIN, vē'vyăN' de sĂN'maī'tăN', LOUIS (1802–97). A French geographer, born in Caen, Normandy. He went to Paris in 1814, and devoted his life to the writing of works on geography. Among his works are two volumes of a *Histoire universelle des découvertes géographiques* (1845–47); *Etudes de géographie ancienne et d'ethnographie asiatique* (1850–54); *Etude sur la géographie et les populations primitives du Nord-Ouest de l'Inde d'après les hymnes védiques* (1860); *Etude sur la géographie grecque et latine de l'Inde* (1858–60); *Le nord de l'Afrique dans l'antiquité grecque et romaine* (1863); *Histoire de la géographie et des découvertes géographiques* (1873); *L'atlas universel* (1877–85), finished by Franz Schrader. He also issued the first two volumes of the monumental work, *Nouveau dictionnaire de géographie universelle*, and the next two with the assistance of Louis Rousselet, who completed the work (7 vols., with two supplements, 1879–99).

VIVIP'ARY (from Lat. *viviparus*, bearing living young, from *vivus* alive + *parere*, to bear, produce). (1) The development of young separable shoots in those regions of the plant usually devoted to the formation of reproductive structures of other kinds; or (2) the development of young plants from unshed seeds. Viviparity of the first sort is exhibited often in the regions of the flower, where either the entire flower or only those parts of it which would produce sporangia (sporophylls) are replaced by a purely vegetative structure capable of growing at once into a new plant. The sporangia of ferns are sometimes replaced by young plants (apospory, q.v.), a form of viviparity. The term is sometimes applied also to the formation of plantlets in any unusual position, as on the winged leaves of *Bryonia*. (See MALFORMATION.) Viviparity from seeds is best illustrated by the mangrove (q.v.).

VIV'ISEC'TION (from Lat. *vivus*, alive + *sectio*, a cutting, from *secare*, to cut). A term originally employed to designate cutting operations upon living animals for experimentation, but now including experimentation of any kind upon living creatures, to demonstrate or discover physiological facts or theories. This comprises inoculation with disease, subjection to different temperatures, atmospheric pressure, food changes, or the action of various drugs and medicines, as well as to cutting operations involving ligature of arteries, exposure of nerves, or removal of vital organs. Physiological investigations on living animals were carried out by Galen and the Alexandrian school,' and all the important discoveries during later centuries were made in this way. The method was accepted as a necessary means to scientific knowledge until the nineteenth century, when the needlessly cruel experiments of Majendie and other investigators in France, Germany, and Italy caused public displeasure. Agitation in England resulted in the appointment, in 1876, of a royal commission to investigate vivisection in that country, and the passage of the Vivisection Act, which regulated, and somewhat restricted, the practice. Experiments performed for instruction were permitted only under stringent limitations. Invertebrate animals were not protected, but horses, dogs, mules, asses, and cats were safeguarded. An active propaganda for the total suppression of vivisection has been steadily maintained in Great Britain and in the United States. Antivivisection protests include objections to alleged experimentation upon human beings in pauper hospitals and insane asylums. The chief argument against vivisection (based mainly on the undoubtedly cruel experiments carried on before the days of anæsthetics) is that the practice is unnecessary and cruel. The whole weight of scientific opinion is in favor of vivisection conducted in a humane manner. Experiments as at present performed involve no avoidable suffering. Cutting operations are done under complete anæsthesia, with ether or chloroform, as in the human subject. Animals seriously mutilated are killed before regaining sensibility. There is nothing to gain and much to lose by infliction of pain, in most experiments, and the investigator for this reason is led to avoid it.

The benefits to mankind derived from animal experimentation are incalculable. Practically all our knowledge of physiology, of the effect of medicines, and of bacteriology is gathered from this source, and there is hardly a life-saving or pain-relieving appliance, measure, or operation that has not been directly derived through vivisection. Only a few benefits can be mentioned here. The whole subject of the circulation of the blood, of transfusion of blood and saline fluids, was worked out on animals. All the facts concerning respiration were discovered in the same way, and the practical application of the knowledge thus derived has led to the life-saving procedure of artificial respiration in cases of asphyxiation from gases, drowning, etc., to the use of oxygen for failing respiration, and to the science of ventilation. Our knowledge of digestion is based on observations on animals. The functions of the nerves, spinal cord, and brain and the location of the various nerve centres are among the most difficult and important problems solved by vivisection. The treatment of aneurysm by ligature, the repair and transplantation of bone, skin grafting, absorbable ligatures, the arrest of hæmorrhage by torsion of the arteries, the epoch-making discovery of general anæsthesia, the diagnostic and therapeutic uses of electricity, hypodermic medication, and the phenomena of inflammation are examples of the use-

fulness of animal experimentation The immense advances in our knowledge of contagious and infectious diseases, their bacteriology, and their prevention, were made through vivisection Diphtheria antitoxin, which has saved thousands of lives, and the various other antitoxic serums (see SERUM THERAPY) are products of the same method of investigation. These benefits are practical, and from a humanitarian as well as a scientific point of view outweigh many times the pain inflicted on animals and the destruction of animal life.

Bibliography. For a full discussion of the vivisection question, see *Reports* of the American Humane Association (Chicago, 1895–99); *Vivisection* 500 Prize Essays (Boston, 1898); various pamphlets published by the Defense of Medical Research Bureau of the American Medical Association (Chicago, 1909–13), by Cannon, Ewing, and others; *Reports* of the Royal Commission on Vivisection (London, 1907–12), W. W. Keen, *Animal Experimentation and Medical Progress* (Boston, 1914). The principal English antivivisection organs are the *Zoophilist* and *Abolitionist*. In the United States representative antivivisection publications are the *Journal of Zoophily* (Philadelphia), published under the auspices of the American Antivivisection Society; the *National Humane Review* (Albany), and the *Open Door* (New York).

VIZAGAPATAM, vē-zä'gŭ-pŭ-täm'. A seaport and capital of a district in Madras, British India, 178 miles northeast of Masulipatam, at the mouth of a small estuary, on an inlet of the Bay of Bengal (Map: India, E 6). The harbor is shallow and small. Panjam cloth, bags, and carved and other fancy wares are extensively manufactured. The population in 1911 was 43,564, including a large number of Europeans who reside in the suburb of Waltair Vizagapatam came under control of the English in 1768.

VIZCACHA. See VISCACHA.

VIZCAÍNO, vēth'kä-ē'nō, SEBASTIÁN (c.1550–1615). A Spanish explorer, born in Huelva. He became chief pilot of New Spain, and in 1596–97 attempted unsuccessfully to explore Lower California. In 1602–03 he explored and carefully surveyed the coast north of Cape Mendocino, discovered a bay, which he named Monterey in honor of the Viceroy, and dispatched northward from Cape Orford a vessel which sailed to 46° north latitude, and reached the mouth of a large river, probably the Columbia. The observations made by him on the California coast were used by Enrico Martínez in constructing 32 charts, which are still preserved in the archives of the Council of the Indies. His reports on his two voyages to California were published by Torquemada in *Monarquía Indiana* (3 vols., Madrid, 1615), and the greater part of them can be found in Burney's *Collection of Voyages to the South Sea* (London, 1811). Consult also Justin Winsor, *Narrative and Critical History of America*, vol. ii (8 vols, Boston, 1889), for an account and bibliography.

VIZ'ETEL/LY, EDWARD HENRY (1847–1903). An English journalist, born in Chiswick and educated in France, the son of H. R. Vizetelly (q.v.). During the Franco-Prussian War he was correspondent for the New York *Times* and the London *Daily News*. He founded the Cyprus *Times* in 1881 and the *Times of Egypt* at Alexandria in 1882, in which year he was present at the bombardment of Alexandria. In America he is remembered especially as the commander of the New York *Herald* relief expedition sent in 1889 to find Stanley. In 1897 appeared his *Reminiscences of a Bashi Bazouck;* in 1901, *From Cyprus to Zanzibar*

VIZETELLY, ERNEST ALFRED (1853–1922) An English journalist and author, son of Henry Richard Vizetelly (q.v.). He was educated in France, and was a newspaper correspondent and artist during the Franco-Prussian War and after, until 1886, when he returned to London to become editor and reader in his father's publishing house, for which he made or edited translations of most of Zola's novels. Later he again turned to journalism. His publications include. *The Heptameron* (English Bibliophilist's edition, 5 vols., 1894); *With Zola in England* (1899); *Emile Zola, Novelist and Reformer* (1904). *The Anarchists* (1911), three novels—*The Scorpion* (1894), *A Path of Thorns* (1901), and *The Lover's Progress* (1902); *Loves of the Poets* (1915). Under his pseudonym, "Le Petit Homme Rouge," were published several books on French court history; *Republican France 1870–1912* (1912); *My Days of Adventure* (1914); *My Adventures in the Commune, Paris, 1871* (1914).

VIZETELLY, FRANK (FRANCIS) HORACE (1864–). An American lexicographer, son of Henry Richard Vizetelly (q.v.). Born in London, and educated in France, and at Arnold College, Eastbourne, England, he was in business with his father in London from 1883 to 1891 In the latter year he settled in New York as a member of the editorial staff of the Funk and Wagnalls Company and as assistant editor of the *Standard Dictionary*, of which he became editor in 1913. Among other works with which he was editorially connected were the *Jewish Encyclopædia* (12 vols., 1901–06), and the *New Schaff-Herzog Encyclopædia of Religious Knowledge* (12 vols., 1905–12). His own books include: *A Desk-Book of Errors in English* (1906); *Essentials of English Speech* (1915); *Dictionary of Simplified Spelling* (1915); *The Development of the Dictionary of the English Language* (1915); *Desk-Book of 25,000 Words Frequently Mispronounced* (1916).

VIZETELLY, HENRY RICHARD (1820–94). An English engraver, publisher, and author, son of James Henry Vizetelly, a printer and publisher. He studied wood engraving under G. W. Bonnar and John Orrin Smith, and executed a series of landscape vignettes for Longfellow's *Evangeline* (c.1850) and much work for the *Illustrated London News*. He was a leader in the successful opposition to the newspaper stamp duty. Vizetelly founded the *Pictorial Times* and the *Illustrated Times*, which he sold in its fifth year for £4000. In 1865 he became Paris correspondent of the *Illustrated London News* at the then notable salary of £800. His experiences during the siege of Paris were later embodied in his vivid *Paris in Peril* (1882, with his son Ernest). In 1867 appeared his *Story of the Diamond Necklace*, and in 1870 *The Man with the Iron Mask*, a free rendering of Marius Topin's book. A result of a visit to Berlin in 1872 was his *Berlin under the New Empire* (1879). Subsequently, in London, he established a publishing business, making a specialty of translations of French and Russian authors. With the appearance of Zola's *La Terre* (*The Soil*), he was prosecuted and fined for publishing an obscene libel; in 1889 he was again fined, and this time imprisoned also for publishing a new edition, slightly expurgated, of Zola's works.

Among Vizetelly's writings, not mentioned above, are· *The Wines of the World* (1875), and other similar books, and *Glances Back Through Seventy Years* (1893), notable for its interesting sketches of the Bohemian side of London and Paris literary life.

His younger brother, FRANK VIZETELLY (1830–?1883), was principally known as a war correspondent and artist for the *Illustrated London News* during Garibaldi's expedition (1860), the American Civil War, and in Egypt Not heard of after the Kashgil massacre (1883) of Hicks Pasha (q.v.), he presumably lost his life or was made a slave.

VIZIANAGRAM, vē'zē-ŭ-nŭ-grăm' A town in the Vizagapatam district, Madras, British India, 30 miles north by east of the city of Vizagapatam (Map: India, E 5). It has a Maharaja college and a library. The city is the residence of a Maharaja or Zamindar, who controls one of the largest and most ancient estates in India. Pop , 1901, 37,270; 1911, 39,974.

VIZIER, vĭz'yĕr, or **VIZIR,** vĭ-zēr' (Arab. *wazīr,* carrier of burdens, counselor, from *wazara,* to bear burdens). A title of state functionaries in the Ottoman Empire and other Mohammedan states. It was first employed by Abu'l Abbas, the first Abbaside caliph, about 750; in the Ottoman realm it was introduced by the Sultan Orkhan (1326–59). Originally used as a designation of the Prime Minister, the title was conferred in 1386 by Amurath I on his victorious general, Timur-tâsh. From this period the number of viziers was gradually increased. The Grand Vizier is, after the Sultan, the most important personage of the Turkish Empire; he unites in his own person the whole powers of the State, and is charged with a corresponding responsibility.

VIZZOLA, vĕt-sō'lȧ. See GALLARATE

VLAARDINGEN, vlär'dĭnk-*en.* A quaint old town of the Province of South Holland, Netherlands, at the mouth of the Meuse, 5 miles west of Rotterdam (Map: Netherlands, C 3). There are a handsome church and town hall. It is a centre for the cod and herring fishery of the Netherlands, more than 170 boats and 2500 men being engaged in that occupation. Pop., 1899, 16,661; 1909, 23,037.

VLACICH, vlä'tsĕk, MATTHIAS. See FLACIUS.

VLADIKAVKAZ, vlȧ'dyĕ-kȧf-kȧz'. The capital of the Province of Terek, Russia, and a fortress of northern Caucasia, situated on both banks of the Terek (Map: Russia, F 6). The river is crossed by an iron bridge. Agriculture is the principal industry. Pop., 1911, 76,225, chiefly Russians, Armenians, and Jews.

VLADIMIR, vlȧ-dyē'mĕr. A government of central Russia, between Moscow and Nizhni-Novgorod. Area over 18,800 square miles (Map: Russia, F 3). It belongs to the central Russian plateau and is intersected by deep river valleys which give the surface a somewhat hilly appearance. It is watered principally by the Oka and its tributary the Kliazma. Iron, alabaster, and china clay are the principal minerals. The climate is colder than that of Moscow. A considerable part of the government is still under forest. The soil is largely stony and clayey, and the domestic output of grain is sufficient only to satisfy in part the demand. In manufacturing, however, Vladimir occupies a prominent position among the governments of Russia. Next to Moscow it is the largest centre of the textile industries in the country. The entire output of Vladimir approximates a value of $150,000,000, of which the textile industries make up about 80 per cent. The household industries produce cotton and silk goods, woodenware, metal articles, pottery, and icons. Local artisans migrate to other parts of Russia, and peddlers from Vladimir penetrate even as far as Austria and Siberia. Pop., 1912, 1,941,800, almost exclusively Russian.

VLADIMIR. The capital of the government of the same name, in central Russia, situated on the Kliazma, 114 miles east-northeast of Moscow (Map: Russia, F 3). It is an ancient town with only remnants of its former splendor, such as the Golden Gate, the Uspensky Cathedral (twelfth century), which is the burial place of the princes of Vladimir, the Dmitrievsky Cathedral, and a number of ancient monasteries Pop., 1911, 39,170. The prominence of Vladimir dates from the twelfth century, when Andrei Bogolyubsky made it the capital of the Grand Principality of Vladimir, known also as Suzdal. It attained great prominence and was the seat of a metropolitan. In the fourteenth century it began to decline, and with the absorption of the grand principality by Moscow entirely lost its importance.

VLADIMIR. The name of several Russian princes.—VLADIMIR I, the Great or the Saint, the first Christian sovereign of Russia, ruled from 980 to 1015. The facts of his life must be gleaned from the sagas, and are subject to doubt The account generally accepted is as follows: After the death of his brothers he became ruler of all Russia, and by conquest he increased his territory very greatly. Russia at this time was an ill-compacted Empire; the various Slavic tribes which dwelt within its boundaries acknowledged the sovereignty of the Russian princes solely by the payment of tribute, and that only when the princes were powerful enough to enforce it. Vladimir sought to increase the central authority. Many of his subjects were Greek Christians, his mother, Olga, had become one, and he wished to be allied with the Byzantine Imperial family, and for these and other reasons resolved to adopt Greek Christianity. He sent an embassy to Constantinople, promising peace and his conversion, in exchange for the hand of Anna, the sister of Constantine IX. His request was gladly complied with, and after his marriage and baptism at Kherson in 988 he returned to Kiev, destroyed all his idols, and commanded his subjects to be baptized. Churches were built, schools established, capital punishment was supplanted by fines, and excessive lenity shown to all criminals. He died July 15, 1015. The Russian church has decreed him the epithets of "saint" and "equal of the Apostles." The Order of Vladimir was founded in his honor by Catharine II (q.v.) in 1782, and the University of Kiev was also named for him.—VLADIMIR II (1053–1125), surnamed MONOMACHUS, the great-grandson of the preceding, was Grand Prince of Kiev from 1113 to 1125. In his youth he led a band of auxiliaries to join Boleslas II of Poland in the wars with Bohemia, gaining such renown that on his return he was ranked at the head of Russian warriors. Vladimir's father succeeded to the Grand Principality of Kiev (1078), and Vladimir wrested from their lawful possessors Smolensk, Tchernigov, and Novgorod; though some years afterward his cousin Oleg, the dispossessed Prince of Tchernigov, with the aid of the Polovtzes (a Turkic nation which was at that time the terror of the Russians), recovered his dominion. Vladimir,

having subsequently routed the Polovtzes in several engagements, became so popular that in 1113 he was chosen Grand Prince of Kiev, and for 12 years he displayed his eminent qualities as a ruler and a warrior. Most of Vladimir's fame, however, rests on his writings, which present an interesting picture of the internal life of Russia at the beginning of the twelfth century Vladimir's mother was a daughter of the Byzantine Emperor, Constantine Monomachus; and Alexis Comnenus, who wished to be on good terms with his powerful northern neighbor, is said to have sent him the crown, sceptre, and sword of his grandfather, which are still shown as such, and which are employed in the coronation of the Czar Consult Rambaud, *History of Russia*, vol. i (Boston, 1886), and V O. Kluchevsky, *History of Russia* (Eng. trans., New York, 1911).

VLADIMIR-VOLHYNSK, vō-lĭnsk′ (Polish, *Wlodzimierz*). An ancient town in the Government of Volhynia, Russia, situated on a tributary of the Bug, 210 miles west-northwest of Zhitomir. The church of Mstislav, originally erected in the twelfth century, has been rebuilt several times. The town is mentioned by Nestor (q v.) in 988, and, judging from the writings of contemporary chroniclers as well as from existing remains, it was a place of considerable prominence and splendor as the chief town of Volhynia. Pop., 1911, 18,795, more than half Jewish.

VLADISLAV, vlä′dĭs-läv. The name of several Polish kings. See LADISLAS.

VLADIVOSTOK, vla′dyĕ-vŏs-tŏk′. The capital of the Amur Government of Siberia, and the chief Russian commercial and naval port on the Pacific, situated at the south end of the Muraviev-Amursky Peninsula and on the Golden Horn (Map: Asia, P 4). The harbor is spacious, safe, and ice-free for nine months in the year. The mean annual temperature is somewhat over 40° F. The town is well built. The commerce is very important and is largely in the hands of the Chinese. The imports consist principally of manufactures, and the exports of raw materials. Pop., 1909, 91,464. There are a number of Chinese, Japanese, and Koreans. Vladivostok was founded as a military post in 1862 and was declared a free port in 1873. Its position as the eastern terminus of the Trans-Siberian Railway greatly adds to its importance. Since 1912 it has steamship communication with north Siberian ports. Its commercial position was at one time menaced by the rise of Dalny, which was specially favored by the Russian government. Some of the richest iron deposits of Siberia are found north of the city. It was of great importance to the Russian government during the European War of 1914 as a port of entry for much war material which could not be imported via the Baltic ports by reason of war conditions More than $100,000,000 worth of merchandise from the United States was sent to Vladivostok and thence transported by the Siberian Railway to Petrograd, Moscow, and other centres for distribution to the Russian armies.

VLISSINGEN, vlĭs′ĭng-en. See FLUSHING.

VLOZLAWEK, vlyŏts-lyä′vĕk, or **VLOTSLAVSK,** vlōts-läfsk′. A town in the Government of Warsaw, Poland, situated near the left bank of the Vistula, about 90 miles northwest of Warsaw. It has extensive manufactures. Pop., 1910, 38,000.

VLUGT, flŭkt, WILLEM VAN DER (1853–). A Dutch political writer. He was born at Haarlem, and was educated at Leyden University, where he became professor of philosophy in 1880. In 1902–06 he served as a member of the Second Chamber of the States-General His writings include· *De rechtstaat volgens de leer van Rudolf Gneist* (1879), *Transvaal versus Great Britain* (1899), *Finland, de rechtsvraag*, which was translated into French as *Les vrais coupables* (1900); papers on crime and criminals, and on Dutch politics in the monthly *Onze Eeuw* (1901–05); and articles in the periodical *De Gids*.

VOCAL RESONANCE. See PECTORILOQUY.

VOCATIONAL EDUCATION. That type of education that has for its primary purpose preparation for some wage-earning occupation. In its broadest sense the term should include preparation for the professions. The generally accepted definition, however, limits the scope of the term to preparation for the manual occupations or those occupations in which the intellectual preparation is elementary. For a discussion of the subject of vocational education in its different phases, see AGRICULTURAL EDUCATION; EDUCATION, COMMERCIAL; INDUSTRIAL EDUCATION; MANUAL TRAINING; SCHOOLS, TECHNICAL EDUCATION. For professional training, see LEGAL EDUCATION; MEDICAL EDUCATION; TECHNICAL EDUCATION; ETC.

VOCATIONAL GUIDANCE. An educational movement that has for its aim the collection and dissemination of information regarding conditions and prospects in occupations for boys and girls. The purpose of vocational guidance is dual—to furnish boys and girls about to start their life careers with advice on the proper choice of a vocation, and to determine their fitness for such vocations. The movement was philanthropic in origin and arose out of a desire to save boys and girls from blind-alley occupations and the consequent evils of unemployment. The more recent phase of the movement is to set the individual youth "to thinking, at the proper time, about the problem of choosing a life work, as a problem to be seriously faced and prepared for—to make him fully conscious of its existence as a problem to be seriously faced and prepared for, and aware of the sources of data having any bearing on its solution." (*Report, United States Commercial Education*, 1915, vol. i, p. 264.)

The movement received definite form in 1907 by the establishment of a bureau for giving vocational advice to young men. This was opened at the Civil Service House in Boston, and in 1909 was organized as a Vocational Bureau under a director Information was collected, and the coöperation of various organizations and interests was secured. Thus the Boston School Committee appointed a committee on vocational guidance; lectures were given to pupils about to leave school; and vocational advisers were placed in both elementary and high schools. To carry out further the purpose of the bureau a number of bulletins were issued on various careers, e.g., *The Machinist, Banking, The Baker, Department Stores*, etc. The bureau has conducted special courses for training vocational counsellors both in connection with Harvard University and Boston University. Similar work was done chiefly for girls by the Boston Home and School Association, the Girls' Trade Association, and the Women's Municipal League. In New York vocational guidance in the high schools was promoted by the High School Teachers' Association in 1908, and two years

later a small grant was obtained for the work from public funds. In the elementary schools the work of vocational guidance has depended largely on the interest of individual teachers. The movement has spread to other cities, and has been taken up by a number of colleges and universities The psychologists are also applying their attention to the subject with a view to determining mental and other fitness for certain occupations.

In Great Britain the movement began, as in the United States, as a philanthropic endeavor Since the enactment of the Labor Exchange Act (1909) and the Education (Choice of Employment) Act (1910) power has been granted to education authorities "to make arrangements, subject to the approval of the Board of Education, for giving boys and girls under 17 years of age assistance with respect to the choice of suitable employment, by means of the collection and communication of information and the furnishing of advice" The Board of Trade is closely associated in this work with the Board of Education and the local education authorities. Consult: Meyer Bloomfield, *The Vocational Guidance of Youth* (Boston, 1911); "Elementary Education in England," in United States Bureau of Education, *Bulletin No. 57* (Washington, 1913); Meyer Bloomfield, "The School and the Start in Life," and "Vocational Guidance," in United States Bureau of Education, *Bulletin No. 14* (ib., 1914); I. L. Kandel, in United States Bureau of Education, *Bulletin Nos. 4, 14* (ib, 1914).

VODENA, vō-dā'nȧ. A town in the Kingdom of Greece situated about 50 miles west-northwest of Saloniki (Map: Balkan Peninsula, C 4). It has many churches and mosques and produces tobacco, cotton, and woolen goods. It was wrested from the Turks in 1912, in the course of the Balkan War (q.v.). Pop., 1913, 8850.

VODKA, vŏd'kȧ. Russian brandy, a strong spirituous beverage. Originally vodka was made almost exclusively of rye, but later it was also obtained from barley and oats mixed with rye, as well as from potatoes and maize. In 1914, 60 per cent of the vodka was distilled from potatoes, 30 per cent from various grains and 10 per cent from molasses. Vodka, as manufactured at that time, contained about 90 per cent of alcohol, but was diluted in order to reduce the percentage of alcohol to 60 and 40. Alcohol distillation and vodka manufacture were largely in the hands of private persons, but rectifying and selling were made a government monopoly in four eastern districts in 1895 and then extended over the Empire. Government sales stations were opened in all the cities and villages of Russia, and vodka was sold in sealed containers for outside consumption only. The maximum and minimum prices for the unrectified spirits purchased by the government from the private distillers, as well as for the vodka sold by the government, were fixed by legislative enactment. The state received an ever-increasing revenue from the monopoly. In 1911 this revenue amounted to 595 million roubles; in 1912 to 626 million, and in 1913 to 680 million roubles; during the later year the revenue from its sale formed 26 per cent of the total receipts of the Imperial treasury. Vodka has been the national Russian drink for centuries, and excessive drink has been the scourge of the Russian village, carrying off more than 200,000 persons a year in premature death. There has always been a current of public opinion opposed to the sale of vodka as a means of raising revenue. The sale was suspended time and again in order to prevent drunkenness, particularly in times of military mobilizations, or during war, as in 1877 and 1904. But it was not until August, 1914, that the first attempt to enforce prohibition on a large scale was made. The first step was to suspend the sale of vodka until army mobilization could be carried out. The effects were beneficial, and the government was flooded with petitions from city and county councils and village communities, as well as from industrial, commercial, and labor organizations, to make the prohibition permanent. On Oct. 25, 1914, the government passed a law permitting cities and villages to pass ordinances in favor of and to enforce local prohibition, but limiting the enforcement of national prohibition to the period of the war only.

VOËTIUS, vō-ē'shĭ-us, GISBERT (1588–1676). A Dutch theologian. He was born in Heusden, became a minister at Blymen in 1611, and in 1634 was made professor of theology and Oriental languages in the University of Utrecht. He was engaged in numerous bitter religious controversies, at the synod of Dordrecht combated Arminianism with great violence; afterward attacked the works of Descartes and Cocceius; and exercised great influence upon the theology of his time. His works were published under the title of *Selectæ Disputationes Theologicæ* (1648–69), and again as *Politica Ecclesiastica* (1663–76).

VOGEL, fō'gel, EDUARD (1829–56). A German explorer, born at Crefeld. He was educated at Leipzig and at Berlin, where he studied with Encke; and was for two years at Bishop's Observatory in London In 1853 he was commissioned by the British government to assist Overweg and Barth in explorations of western Sudan. He reached Murzuk in August, 1853, Kuka in January of 1854, and in December met Barth near Bundi. Returning with the latter to Kuka and Lake Chad, he went southward alone to Yakuba, the first white man ever seen in that region. The remainder of 1855 he spent in the vicinity of Yakuba and the Benue River. In November he went back to Bornu and Kuka. Early in 1856 he started eastward for the Nile, reaching Wadai. In Wara he was apprehended by the Sultan and killed, probably about February 8. Several expeditions were undertaken in search of him. It was not until 1873 that his fate was finally ascertained by Nachtigal. His sister, Elise Polko, published his notes in her *Erinnerungen an einen Verschollenen* (1863). Consult Pahde, *Der Afrikaforscher Eduard Vogel* (Hamburg, 1889).

VOGEL, HERMANN KARL (1841–1907). A German astronomer, born in Leipzig. He studied at Dresden and at Leipzig, where he became assistant (1865) and later second observer in the observatory. In 1870 he became astronomer in the private observatory of Von Bülow at Bothkamp near Kiel, and here he devoted himself with great success to astrophysics. In 1874 he became observer in the new astrophysical observatory at Potsdam and in 1882 director of this institution. In 1892 he was elected member of the Berlin Academy. The first spectroscopic star catalogue ever published was that by Vogel in 1883. He also published: *Beobachtungen und Positionsbestimmungen von Nebelflecken und Sternhaufen* (1867–76); *Bothkamper Beobachtungen* (2 vols., 1872–73); *Untersuchun-*

gen über die Spektra der Planeten (1874); *Der Sternhaufen χ Persei* (1878); *Sternspektraltafel* (1888); *Ueber den neuen Stern im Fuhrmann* (1893).

VOGEL, HERMANN WILHELM (1834–98). A German photochemist. He was born at Dobrilugk (Lower Lusatia), and was educated at the Royal School of Technology in Berlin To that institution he was called in 1864 as instructor of photochemistry and later became full professor. He carried on researches in photography, devised a photometer (1864), and was first to discover the ultra violet rays of hydrogen (1878), and to enlarge the knowledge of spectral photography. His publications include: *Lehrbuch* (4th ed, as *Handbuch*) *der Photographie* (1867–70; 4th ed., 4 vols., 1890–99; part i, *Photochemie*, 5th ed, 1906); *Die chemischen Wirkungen des Lichts und die Photographie* (1874, trans. into English, French, Italian, Russian, and Japanese); *Praktische Spektralanalyse irdischer Stoffe* (1877), *Lichtbilder nach der Natur* (1879); *Das photographische Pigmentverfahren* (5th ed., 1905).

VOGEL, HUGO (1855–). A German historical, portrait, and genre painter, born at Magdeburg. He studied at the Dusseldorf Academy under Gebhardt and Wilhelm Sohn and in Paris under Lefebvre, and further perfected himself during travels in Italy, Spain, Holland, and Belgium. He then settled in Berlin, where he was professor at the academy from 1887 to 1892 Vogel first turned to historical subjects with his "Luther Preaching at the Wartburg" (1883, Kunsthalle, Hamburg). Later he painted landscapes, portraits, genre scenes, and flower pieces, but his reputation rests chiefly upon three important series of mural paintings representing appropriate subjects in the city halls of Berlin, Merseburg, and Hamburg (completed 1908). Pictorial in conception and well composed, they show the application of the principles of plein-air painting with an inclination towards naturalism, held in check by a strong feeling for beauty.

VO'GEL, SIR JULIUS (1835–99). A British colonial statesman, born in London. He was educated at the London University School and the Government School of Mines, emigrated to Melbourne in 1852, and after engaging in journalism in that city, went in 1861 to New Zealand, where he established the Otago *Daily Times*, the first daily paper in the colony. He became a member of the Otago provincial council in 1862, and was the head of the provincial government, 1866–69. He was a member of the House of Representatives in 1863; was Colonial Treasurer, Commissioner of Stamps, and Postmaster-General from 1869 till 1872; and was Premier in 1873–75, and again in 1876. Vogel was agent-general of New Zealand in London (1876–81). Returning to the colony, he was Colonial Treasurer, Postmaster-General, Telegraph Commissioner, and Commissioner of Customs (1884–87). His published works are *Great Britain and her Colonies* (1865) and *Anno Domini 2000; or Woman's Destiny*, a novel (1889; 3d ed., 1890).

VOGELSANG, fō'gel-zäng, HERMANN (1838–74). A German mineralogist He was born at Minden, and studied at Bonn. In 1865 he was appointed professor at the Polytechnic School of Delft. He is remembered for his pioneer work in the use of the microscope for geological purposes, for his demonstration of the presence of liquid carbonic acid in many minerals, for his researches in the formation of crystals, and for his beginning of a new classification of rocks He published: *Ueber die mikroskopische Struktur der Schlacken und Beziehungen zur Genesis der kristallinischen Gesteine* (1864); *Ueber die Systematik der Gesteinslehre* (1871); *Ueber die natürlichen Ultramarinverbindungen* (1873); *Die Kristalliten* (1875).

VOGEL VON FALCKENSTEIN, fō'gel fŏn fäl'ken-shtīn, EDUARD (1797–1885). A Prussian general, born at Breslau. In 1813 he entered the army and distinguished himself at Montmirail in 1814. He became a lieutenant general and commander of the Fifth Division in 1858, and was chief of staff in the Schleswig-Holstein War of 1864. At the breaking out of the Seven Weeks' War in 1866 he was put in charge of the army in western Germany that was to act against the allies of Austria. He defeated the Hanoverians in the battle of Langensalza on June 28th, and forced them to capitulate. On July 2d he set out for Frankfort by way of Fulda and Hanau, defeated the Bavarians at Kissingen on the 10th, then the troops of Hesse-Darmstadt on the 13th; on the 14th drove back a reinforcement of Austrian and Hessian troops, and on the 16th entered Frankfort A few days afterward he was appointed commander After the war he was made commander of the First Army Corps, and in 1867 he was elected to the North German Reichstag In 1870 he commanded the forces upon the Baltic, and in 1873 was retired. Consult Wengen, *General Vogel von Falckenstein und der hannoversche Feldzug, 1866* (Gotha, 1886).

VOGELWEIDE, WALTHER VON DER. See WALTHER VON DER VOGELWEIDE.

VOGHERA, vō-gā'ra. A town in the Province of Pavia, Italy, on the left bank of the Staffora, 39 miles by rail southwest of Milan (Map: Italy, B 2). The church of San Lorenzo (eleventh century) was remodeled in the barocco style in 1660. The fortifications which were erected in the Middle Ages by the Visconti have been replaced by shady promenades. It has a lively trade in raw silk, grain, and wine. Pop. (town), 1911, 14,651.

VOGL, fō'g'l, HEINRICH (1845–1900). A German tenor, born in Munich. He was a schoolmaster at Ebersberg from 1862 to 1865, during which period he devoted much time to the study of vocal music. Later, he studied under Franz Lachner and Hugo Jenk in Munich. His début occurred in *Der Freischütz* at the Munich Court Opera, in 1865, in which he achieved immediate success. Afterward he succeeded Schnorr von Carolsfeld as the model Tristan, and became famous as a Wagnerian singer. His compositions include songs, part-songs, and chamber music, as well as one opera, *Der Fremdling*, produced in Munich (1899). In 1868 he married Therese Thoma, a dramatic soprano, also famous in the portrayal of Wagnerian rôles, especially that of Isolde.

VOGL, JOHANN NEPOMUK (1802–66). An Austrian poet. He was born in Vienna and from 1818 until his death was in the service of the government in Lower Austria. He is known for his ballads, which are still popular. Among his works may be mentioned: *Oesterreichisches Wunderhorn* (1834); *Balladen und Romanzen* (1837); *Soldatenlieder* (1849; 3d ed., 1856); *Twardowsky der polnische Faust* (1853); *Jägerbrevier* (1862); and *Aus dem alten Wien*

(Vienna, 1865). Consult Schmidt, *J. N. Vogl* (Vienna, 1868).

VOGLER, fō'glĕr, GEORG JOSEPH, better known as ABBÉ or ABT VOGLER (1749–1814). A German organist, theorist, and composer, born at Wurzburg. He went to Rome and took holy orders. He founded the "Mannheimer Tonschule" at Mannheim and received the appointment of chaplain and second kapellmeister. From 1786 to 1799 he was court conductor at Stockholm, where he founded a music school. In 1807 he was appointed court kapellmeister at Darmstadt and founded a third "Tonschule" where both Weber and Meyerbeer received instruction. His contribution as a theorist was especially important. Among his works are the operas *Der Kaufmann von Smyrna* (1780), *Albert III von Bayern* (1781), *Castor und Pollux* (1784), *Gustavus Adolphus* (1791), *Samori* (1804), and *Der Admiral* (1810), besides much church music. Browning wrote a famous poem on Abt Vogler.

VOGRICH, fō'grĭk, MAX (WILHELM CARL) (1852–1916). An Austrian pianist and composer born in Szeben, Transylvania. At the age of 14 years he was a proficient pianist and went to Leipzig for special studies under Reinecke, Richter, Hauptmann, Wenzel, and Moscheles. He completed this in 1869, and was engaged in concert tours throughout Continental Europe, South America, and the United States (1870–78). From 1882 to 1886 he was engaged in tours and teaching in Australia, after which he went to New York, where he lived for some time. His works include the operas *Vanda* (1875), *Lanzelot* (1890), *King Arthur* (1893), and *Buddha* (1904); an oratorio, *The Captivity* (1891); the cantatas *The Young King and the Shepherdess* and *The Diver;* several masses, symphonies, violin and pianoforte concertos, and sonatas, besides duets, songs, and chamber music.

VOGT, vōkt, AUGUSTUS STEPHEN (1861–1926). A Canadian organist and choral director, born at Washington, Ontario. He studied piano and organ at the New England Conservatory (Boston), and especially theory and composition at the Royal Conservatory, Leipzig. He was organist of churches at Elmira, N. Y., St. Thomas, Ont., and Toronto. In 1894 he founded the Mendelssohn Choir, which he reorganized in 1900, and which gained an enviable reputation on a tour of the leading American and Canadian cities. Vogt was secretary of the College of Organists (1889–92) and president of the Canadian Society of Musicians (1893–95), and in 1913 was appointed director of the Toronto Conservatory of Music. He published *The Standard Anthem Book* (1894); *Modern Pianoforte Technique* (1900).

VOGT, fōkt, KARL (1817–95). A Swiss naturalist and materialistic philosopher, born at Giessen. He studied medicine there and at Bern, and in 1847 he became professor of zoology in Giessen, but being compelled to leave the country a year later, on account of his share in the political agitation of 1848, he accepted the professorship of natural history in Geneva in 1852, remaining there until his death. He became a member of the Swiss Federal Council in 1878. Vogt was one of the most eloquent exponents of Darwinism. He published authoritative works on geology, anthropology, and zoölogy, of which the following are important: *L'Histoire naturelle des poissons d'eau douce de l'Europe centrale* (1839), with L. Agassiz; *Lehrbuch der Geologie und Petrefaktenkunde* (2 vols., 1846; 4th ed., 1879); *Physiologische Briefe fur Gebildete aller Stande* (1845–46, 4th ed., 1874); *Lehrbuch der praktischen vergleichen Anatomie* (2 vols., 1885–94; Fr. trans.), with E. Yung. Consult his *Aus meinem Leben* (Stuttgart, 1895).

VOGÜÉ, vō'gu'ā', CHARLES JEAN MELCHIOR, MARQUIS DE (1829–1916). A French archæologist and historian. He was born in Paris and was privately educated. In 1853–54 and in 1861 and 1862 he traveled widely in the Orient. In 1868 he was elected a member of the Académie des Inscriptions et Belles-Lettres. In 1871 he was appointed by Thiers Ambassador to Turkey, and in 1875 was transferred to Austria, but after the retirement of MacMahon in 1879 he left the diplomatic service. In 1901 he was elected a member of the French Academy. He wrote: *Les églises de la Terre Sainte* (1860); *Mélanges d'archéologie orientale* (1869); *L'architecture civile et religieuse du Ier au VIème siècle dans la Syrie centrale* (1865–77), in history, *Le maréchal de Villars* (1888); *Les mémoires de Villars,* edited (1884–92); *Le duc de Bourgogne et le duc de Beauvilliers* (1900); *Le maître de la mer* (1904); *Catalogue de la collection de Clerq* (1911–12); *Une famille vivaroise* (2 vols., 1912).

VOGÜÉ, EUGÈNE MARIE MELCHIOR, VISCOUNT DE (1848–1910). A French critic and historian, born at Nice, cousin of the preceding. During the Franco-Prussian war he served as a volunteer and was wounded at Sedan. After 1871 he was attaché to the French embassies at Constantinople, Cairo, and St. Petersburg, respectively. At the latter court he passed seven years, but in 1882 gave up the diplomatic service to devote himself to literature. In 1888 he was made a member of the French Academy. It was through Vicomte de Vogüé that Russian novelists first became widely known in France and afterward throughout the English-speaking world. His more important publications include: *Syrie, Palestine, mont Athos* (1876); *Histoires orientales* (1879); *Le roman russe* (1886; 11th ed., 1912, Eng. trans., *The Russian Novel,* new ed., 1916), which had a great influence in arousing interest in Russian literature; *Regards historiques et littéraires* (1892); *Heures d'histoire* (1893); *Cœurs russes* (1894); *Le rappel des ombres* (1900); *Pages d'histoire* (1902); *Le maître de la mer* (1903); *Maxime Gorky* (1905); *Les routes* (1910); *Trois drames de l'histoire de Russie* (1911); *Pages choisies* (1912), with a preface by Bourget; *Les morts qui parlent* (1899). Consult Rod, "Le Vicomte E. M. de Vogüé," in *Les idées morales du temps présent* (Paris, 1891); E. W Gosse, *Portraits and Sketches* (New York, 1912).

VOGULS, vō'gulz. A Finno-Ugrian tribe living in the northern Urals, Russia. They are of short stature and robust, dolichocephalic, with blue or gray eyes, flat concave nose, long blonde or brown hair, and light skin inclined to yellow. They live by the chase, using as weapons the bow and arrow, the flintlock gun, and traps. Their domestic animals are the dog and cattle. Their tents and domestic utensils are made from birch bark; their birch canoes are made watertight with resin. They dress like the Russians and are nominal Christians, but worship idols and make sacrifices of animals. They practice totemic tattooing; polygamy is common. Consult: Müller, *Ugrischer Volksstamm* (Berlin,

1837); Ahlqvist, *Unter Wogulen und Ostjaken* (Helsingfors, 1885); Rabot, *A travers la Russie boréale* (Paris, 1894).

VOICE (OF. *vois, voiz, vuiz*, Fr. *voix*, from Lat. *vox*, voice). The audible sound produced in the larynx (q.v.) of any animal possessing that organ. The primary vocal elements originating in the larynx are modified in their passage outward through the pharynx and mouth so as to form articulate speech or musical sounds, i.e., speaking and singing. The whole respiratory apparatus is concerned in the production and modulation of the voice. The lungs force a column of air, under varying degrees of pressure, through the trachea or windpipe against the vibrating portions of the larynx, generating a sound which is modified by the tongue, teeth, lips, etc. The study of the varying conditions in the interior of the larynx is made possible by the use of the laryngoscope (q.v.). On attempting phonation, the arytenoids (movable cartilages to which are attached the posterior ends of the cords) are seen to raise themselves in the fold of mucous membrane which covers them, and rapidly approach each other. This movement approximates the edges of the vocal cords, and consequently narrows the opening of the glottis. During the emission of the most acute sounds the glottis contracts into a mere line. The arytenoid cartilages are raised and meet in the median line, the epiglottis is drawn outward, and a short, stiff tube is then formed above the glottis, all these parts being in a state of extreme tension. It is impossible to study with the laryngoscope the manner of formation of the gravest chest tones, because the arytenoid cartilages approach each other closely and bend under the border of the epiglottis, which is depressed, so that the cords are hidden. The larynx possesses within itself more delicate powers of adjustment than any musical instrument. In addition to the movements already mentioned, the vibrating portions of the cords can be shortened or lengthened, or limited to their edges; the free edges can be sharpened or blunted, and the whole cord can be flattened out like a ribbon. The entire mechanism is adapted to meet varying degrees of pressure of the column of air in the trachea, and the quality of the sound produced is further modified by the adjustable centres or ventricles of the larynx.

Tone has three attributes: strength or loudness, pitch, and quality or timbre. Strength depends upon the energy of the expirating blast, and upon the structure and adjustment of the vocal organ and the resonance apparatus. Pitch depends upon the rapidity of the vibrations, this being determined by the length and tension of the cords. Quality, as has been shown in the article ACOUSTICS (q.v.), depends upon the character and number of the partial tones (overtones) accompanying any fundamental note sounded; and this is determined mainly by the form and thickness of the cords.

The principal difference between male and female voices lies in their pitch; they are also distinguished by their quality, the female voice being softer. There are two kinds of male voice, bass and tenor, and two kinds of female voice, contralto and soprano, all differing from each other in quality. The boy's larynx is like that of the female, and his voice is similar in range and pitch, but is somewhat louder and different in timbre. At puberty the boy's larynx undergoes a rapid change, into the bass or tenor, and is said to crack or break, the peculiarity then noticed being due to imperfect control of the muscular mechanism, and also, in some degree, to the congested and swollen state of the mucous membrane of the cords, incident to active growth. See SINGING.

In each larynx different parts or regions of the scale are produced by different laryngeal mechanisms. Laryngoscopic observations show that for each region or system there is a particular setting of the larynx, which is maintained throughout each register, the chief change being an increasing tension of the cords as the notes rise in pitch, at the break or change of register there is a sudden shifting of the setting. In most voices the ear recognizes three registers, the lower, middle, and upper, also termed the thick, thin, and small registers. In the first the cords vibrate as thick masses, in the second only their thin edges vibrate, and in the last the vibrating chink of the glottis is much reduced in length. Ease and smoothness of transition from one register to another is one of the principal objects in training the singing voice. Besides the musical tones formed in the larynx a large number of other sounds can be produced by the vocal apparatus. Speech consists in the modification of the laryngeal tones by other organs superior and anterior to the larynx (as the tongue, the cavity of the fauces, the lips, teeth, and palate, with its velum and the uvula acting as a valve between the throat and nostrils), so as to produce those articulate sounds of which language is formed.

Ventriloquism appears to consist merely in the varied modification of the sounds produced in the larynx in imitation of the modifications which distance imposes upon the voice. The essential mechanism of ventriloquism consists in taking a full breath, then keeping the muscles of the chest and neck fixed, and speaking with the mouth almost closed and the lips and lower jaw as motionless as possible, while air is very slowly expired through a narrow glottis. Care is also taken that none of the expired air is allowed to escape through the nose. Much of the ventriloquist's skill, however, in imitating sounds coming from particular directions depends on deceiving other senses than hearing. The direction from which sounds reach the ear is never very clearly distinguished, and when the attention is directed to a particular point, the imagination is apt to refer to that point whatever sounds we may hear. See PALATE; ACOUSTICS. Consult: Helmholtz, *Die Lehre von den Tonempfindungen* (Brunswick, 1877); H. Jennings, *The Voice and its Natural Development* (London, 1911); R. B. Faulkner, *The Tonsils and the Voice* (Pittsburgh, 1913); J. Bell-Ranske, *Voice and Nerve Control* (New York, 1915); W. H. Howell, *A Text Book of Physiology* (6th ed., Philadelphia, 1915).

VOICE. See DEPONENT; GRAMMAR.

VOICES, LEADING OF. See LEADING OF VOICES.

VOICES OF THE NIGHT. A collection of poems by Longfellow (1839), including the well-known "Psalm of Life." Most of the poems appeared originally in the *Knickerbocker Magazine.*

VOICING. A term applied to regulating the quality of tone in organ pipes. Tuning has to do only with correctness of pitch; but in voicing a certain quality is aimed at. The first requirement is, that all the pipes must be made

uniform This is done by carefully regulating the amount of wind admitted and the angle at which it strikes the upper lip, and also by slightly changing the edge of the lip Flue pipes and reed pipes require different treatment, so that voicers to-day generally make a specialty of either of these pipes. Voicing requires a very fine ear.

VOID (OF. *voide, vuide*, Fr. *vide*, empty, probably from Lat. *viduus*, bereft, deprived, widowed; connected with OPruss *widdewu*, OChurch Slav. *vĭdova*, Skt. *vidhavā*, Goth. *widuwō*, OHG, *wituwa*, Ger. *Wittwe*, AS. *widewe*, Eng. *widow*). In law, an act or agreement which has no legal force or effect is said to be void. A clear and substantial distinction is made between void and voidable. That which is void is a nullity in law from its inception, but a voidable act or agreement has full legal force and effect until set aside. For example, an illegal contract is void, whereas one induced by fraud is only voidable at the option of the defrauded party. See CONTRACT; VOIDABLE.

VOID'ABLE. In law, an act or agreement which may be set aside or rendered of no effect by a party thereto, at his option, is voidable. However, it continues to have full legal effect until such action is taken. Thus the contracts of infants are said to be voidable See CONTRACT, and consult the authorities there referred to.

VOIGT, fōgt, GEORG (1827–91) A German historian, born at Konigsberg, son of Johannes Voigt. He was educated in Königsberg In 1858 he became professor at Munich, in 1860 he went to Rostock as professor of history, and in 1866 to Leipzig, where he remained till his death. In 1854 appeared his *Wiederbelebung des klassischen Altertums oder das erste Jahrhundert des Humanismus* (3d ed., 1893); and from 1856 to 1863 his chief work, *Enea Silvio de' Piccolomini als Papst Pius II, und sein Zeitalter.*

VOIGT, JOHANNES (1786–1863). A German historian. He was born at Bettenhausen, Thuringia. In 1817 he was called to Königsberg as professor of history, which position he held during the remainder of his life. His best-known works are *Hildebrand als Papst Gregor VII und sein Zeitalter* (1815), the first unprejudiced treatment of Gregory by a Protestant; *Geschichte Marienburgs* (1824); the excellent *Geschichte Preussens* (9 vols., 1827–39;) *Codex Diplomaticus Prussicus* (6 vols., 1836–61); and *Geschichte des Deutschen Ritterordens* (1857–59).

VOIR DIRE, vwär dēr (OFr., to say the truth). A Norman French term employed to denote the preliminary examination of a witness or juror in order to determine his legal competency. By the common law, a person having a financial interest in the result of a cause could not be a witness therein, and a person called as a witness might be examined to determine his competency in this respect. This rule no longer prevails in the United States. It is customary to examine jurors on voir dire in order to ascertain whether they have any bias or prejudice for or against either party, and whether they possess the necessary qualifications to act as jurors in the cause So in the case of a witness, e.g., an infant or an alleged insane person, or an alleged expert, it is customary to conduct a preliminary examination to ascertain the fitness of such a person to testify. See JURY; WITNESS.

VOIRON, vwä'rôn'. A town of the Department of Isère, France, on the left bank of the Morge, 14 miles northwest of Grenoble (Map: France, S., K 3). The modern church of St. Bruno is attractive. A conspicuous copper statue of Notre Dame de Vouise stands on a tower 50 feet high. Silk, cloth, paper, straw hats, and chemical products are manufactured. Pop., 1901, 12,625, 1911, 12,503.

VOIT, foit, KARL VON (1831–1908). A German physiologist. He was born at Amberg, Bavaria, and was educated in Munich, Wurzburg, and Gottingen. He entered the Physiological Institute of the University of Munich in 1856 as Bischoff's assistant, and was professor of physiology there from 1863 till his death. In 1865 he founded, with Buhl and Pettenkofer, the *Zeitschrift fur Biologie*, in which most of his important writings on the subject of nutrition and metabolism appeared. These include: *Physiologisch-chemische Untersuchungen* (1857); *Ueber die Theorien der Ernahrung der tierischen Organismen* (1868), *Ueber die Kost in offentlichen Anstalten* (1876); *Untersuchung der Kost in einigen offentlichen Anstalten* (1877); *Physiologie des allgemeinen Stoffwechsels und der Ernahrung* (in vol. vi of Hermann's *Handbuch der Physiologie*, 1881).

VOITURE, vwä'tur', VINCENT (1597–1648). A French poet and courtier He was born at Amiens, and educated at the College of Calvé et Boncour and at the University of Orléans, where he pursued the study of law. He was introduced to the fashionable life of Paris and soon became a favorite at the Hôtel de Rambouillet among such men as Corneille, Balzac, and Chapelain. His wit was redoubtable. On the formation of the French Academy in 1635 he was one of the first members admitted, but took no active part in its proceedings. Voiture's brilliant verse delighted the salons during his lifetime, but remained unpublished till 1650, when his *Œuvres* appeared. They have gone through many editions, as successive generations have been pleased by the lightness of his touch (e.g., ed. Roux, 1856). The *Lettres* were published by Uzanne (1880). Consult: Sainte-Beuve, *Causeries du lundi*, xii (Paris, 1851–62); Rahstede, *Wanderungen durch die franzosische Litteratur, Vincent Voiture* (Oppeln, 1891); E. Magne, *Voiture* (Paris, 1911).

VOKES, vōks, ROSINA (1858–94). An English actress, the youngest of the famous Vokes family, which included her brother Frederick (1846–88) and her sisters Jessie (1851–84) and Victoria (1853–94). She participated in many of the early successes of the family, including the popular *Humpty Dumpty* and other pantomimes during the sixties In 1870 she was married to Cecil Clay and retired from the stage. Fifteen years afterward she appeared in America, where for several successive seasons her vivacious talents were warmly appreciated in light comedies like *A Pantomime Rehearsal* (written by her husband), *The Schoolmistress, The Circus Rider, Wig and Gown*, and others. She left the stage late in 1893 because of ill health, and died at Torquay, England.

VO'LANT. In heraldry (q.v.), a term meaning flying and used of a bird or insect.

VOLAPÜK, vō'la-pük. An artificial language invented in 1879 by Johann Martin Schleyer (born 1837), a German priest, and intended to be used as an international language (q.v.). The sounds admitted into Volapük are those represented by the following 27 letters: *a ä e i o ö u ü b c d f g h j k l m n p r s t v x y z.*

These letters, with a few exceptions, are used in their Latin, Italian, or German values. The vowels are nominally long The "umlaut" vowels, *a o u*, are admitted to fill out the inflexive scheme, which depends much on vowel distinctions The consonants, *q*, *w*, *ng*, *th* (*thin*), *dh* (*this*), *zh*, etc., are excluded; *c* and *j* are perversely used. The Latin, English, German, or other national word for a given concept is chosen, and is reduced to its simplest form, with the omission or alteration of sounds or sequences of sounds not allowed in the scheme. Thus for "house" the Latin *domus* is taken, reduced to *dom* (pronounced dôm); for "time" the English *time*, reduced to *tim* (pronounced tēm); for "teaching" the English *teach* (tētsh), reduced to *tit* and altered to *tid* (pronounced tēd) The words are often disguised beyond recognition, as *kod* (English *cause*), *dan* (German *Dank*), *nam* (Latin *manus*). All stems except particles must end in a consonant. To these are added many inflexive and formative endings, and some prefixes. In nouns the ending *a* indicates the genitive, *e* the dative, and *i* the accusative (*dom, doma, dome, domi*).

The verb formations are rather numerous. The six vowels *a a e i o u* indicate the six tenses. Passive forms begin *pa-*, *pa-*, etc. Prepositions are used to supplement inflexions (*a, bei, de, ko*, etc). Throughout, synthesis, as in Latin and Greek, is the rule, and cumulation is the result. Polysyllables abound.

International congresses of Volapuk were held (1884, 1887, 1889), a governing council was formed (1887), and statutes were adopted. The second stage soon arrived. Proposals for the improvement or extension of the system were at first decided by the council, with a right of veto conceded to the inventor. But the apparatus became unwieldy, and dissensions increased. Individual reforms of the language were published, and independent inventors put forth new schemes of their own. As a result the whole movement almost collapsed. But at length a number of the leaders, with a reorganized council, under the directorship of Woldemar Rosenberger (1893–98) and Rev. M. A. F. Holmes (1898–1903), formed practically a new system, called *Lingu international*, or specifically *Idiom neutral*, "the neutral language." Consult: Schleyer, *Entwurf einer Weltsprache* (Sigmaringen, 1879); *Wörterbuch* (Constance, 1880; 4th ed., 1888); Kirchhoffs, *Le Volapük* (Paris, 1886 et seq.); Hain, *Grammar of Volapuk* (London, 1888). See ESPERANTO; INTERNATIONAL LANGUAGE.

VOLATILE LIVER OF SULPHUR. See BOYLE'S FUMING LIQUOR.

VOLBACH, fōl'bäĸ, FRITZ (1861–). A German composer, organist, and writer, born at Wipperfürth (Palatinate). He studied philosophy at Heidelberg and Bonn, and in 1886 entered the Royal Institute for Church Music at Berlin, where he was a pupil of Grell (q.v). In 1892 he accepted the conductorship of the Liedertafel at Mainz, and in 1907 was appointed music director at the University of Tübingen. His compositions include a comic opera, *Die Kunst zu lieben* (1910), a symphony in B minor, three symphonic poems, a piano quintet in D minor, several choral works with orchestra. His more important books are biographies of Handel (1898) and Beethoven (1905); *Die deutsche Musik im 19. Jahrhundert* (1900); *Das moderne Orchester in seiner Entwickelung* (1910); *Die Instrumente des Orchesters* (1913).

VOLCANIC BRECCIA, brĕch'a. See TUFF.

VOLCANO. As generally understood, a mountain which in a period of activity throws out molten or other material from the earth's interior, this material, taken collectively for all volcanoes, being lava (or its disrupted parts, scoriæ, or cinders and ashes), steam, and gases —sulphurous, sulphureted hydrogen, hydrochloric, methane, etc. There is no limitation as to the size (in height or diameter) of the "mountain", therefore volcanoes vary from small hillocks to giant excrescences of the earth's surface, many of its loftiest summits (as Orizaba and Popocatepetl, in Mexico, Cotopaxi and Aconcagua, in the Andes; Kilimanjaro, in East Central Africa; Demavend and Ararat, in the Caspian region of Asia—between 17,000 and 23,000 feet in altitude) being of a volcanic nature It would seem that a great part of the mass of most volcanoes is formed by the materials which they throw out. Therefore these mountains develop in size as the eruptions continue in time and magnitude. The size of a volcano is, however, in no way a measure of the force of its activity, unless, perhaps, one may assume the reverse proposition of what is very generally believed. Many violent or paroxysmic and destructive eruptions have taken place from comparatively low volcanoes, like Vesuvius, Skaptar Jökull, in Iceland, the Soufrière of St. Vincent, Coseguina in Nicaragua, Krakatoa in the Sunda Sea, Bandai-San in Japan, and Pelée on the island of Martinique, mountains measuring only a few thousand feet high.

Parts of a Volcano. The fundamental parts of a volcano are the basal portion or mountain proper; a more steeply rising and conical portion or "cone"; and the pit or basin-shaped depression on the summit of most active volcanoes known as the crater—the seat of eruptivity There is no exact line delimiting these parts or making them necessary parts of a volcano, for in many there is no separation between the cone and the base proper—or the whole mountain might be said to be the cone—and in some volcanoes eruption takes place without any opened crater (Giorgios in Santorin, 1866, Pelée, and some of the ancient puys of central France). When present, as it is generally, the crater is on the actual summit of the mountain, but its true relation is frequently masked by the breaking away of a portion of the crater wall, when the caldron appears subcentral or lateral, with its base some distance down the slope of the volcano. True lateral craters or craterlets are formed when the main mountain has broken out over its surface supplemental or parasitic cones, which are sometimes very numerous, as in the case of Ætna. The persistently active Kilauea, situated at the 4000-foot level on the slope of Mauna Loa, is a supplemental crater of that volcano, but its activity is mostly, if not entirely, independent of the mountain on which it is parasitically placed. The size of the crater bears no relation to the height of the mountain carrying it. Orizaba, three and a half miles high, has a crater less than 1000 feet in diameter; the crater of Popocatepetl is hardly more than double that size. On the other hand, Haleakala, a Hawaiian volcano on the island of Maui, 10,000 feet in height, has a crater (seemingly the largest in the world) 20 miles in circumference; and the ancient crater surrounding Aso-San, 5630 feet, in Japan, is perhaps still larger. The size of the crater in no

way measures the intensity of an eruption. Krakatoa, Vesuvius, and Pelée, at the times of their greatest paroxysms, had craters of only moderate dimensions, that of Pelée being about 2500 feet in diameter.

Building Up of a Volcano. It has been said that probably much the greater number of volcanoes have made their own masses through the accumulation in time of their ejected products—the heaping up about the points of activity of lava, cinders, or ashes, usually of all three. As these are thrown out with a certain amount of alternation or regularity, the mountain itself acquires a regular internal structure, which, in section, would appear in alternating layers (strata) of deposition. Some volcanoes, whose eruptive energies are of a greater kind, and are not expressed in steam eruptions, are built up almost entirely of lava, and their outer dress, depending upon the viscosity or liquidity of the outflows, is either steep (like the mamelons of the island of Bourbon, and some of the puys of the Auvergne region of France) or very gentle, descending in a gradient of from 15° to 5° or less, as in some of the Hawaiian volcanoes. Other volcanoes are constructed almost wholly of cinders or scoriæ, but the composite cone is the most general.

It was once thought that volcanoes, instead of being accumulations of ejected material, were massive upheavals of the earth's surface, caused by pent-up force within acting upon the depressing surface. The more accurate study of volcanic phenomena has not given proof of the existence of "craters" or "cones of elevation," as these assumed structures have been called. But it is not improbable that in the initial formation of some (even many) volcanoes a preparatory step has been the upheaving of the deeper strata through magmatic intrusions, a condition fairly well indicated by the uplifts which are recognized in or associated with the structures known as laccolites—intruded lava-masses which have forcibly domed up the strata lying over the areas of upward passage of escaping lava. The Henry Mountains of southeastern Utah, the Euganean Hills (or portions of them) in Northern Italy, are familiar examples of this type. The prodigious force of this uprising lava is measured by the thousands of feet of thickness of sedimentary strata which it has bodily uplifted.

Material Ejected. The quantity of material ejected in the course of eruption is ordinarily dependent upon the force or violence of the eruption, and the period of its continuance. Skaptar Jökull, in its great eruption of 1783, threw out a mass of lava the cubical contents of which are thought to have equaled the bulk of the Mont Blanc massif. In the historic eruption of Vesuvius of the year 79 there was no lava flow, but the discharge of fragmental products (cinders and ashes) was very large, burying, as is well known, a considerable portion of Campania with débris several feet thick. The cataclysm of Krakatoa in 1883 was responsible for the extrusion of material which, it has been thought, could not have measured less than 4.3 cubic miles; and this again, we are informed by some geologists, could hardly have been more than the one-hundredth part of the material that was thrown out by Temboro, on the island of Sumbawa, in 1815. It seems not unlikely that on certain days of its eruptions in May and August, 1902, the ejecta of Pelée, chiefly ashes, more than equaled in bulk the quantity of sediment discharged by the Mississippi River in the course of a full year. The projectile force of eruption is such that light materials are thrown many miles into the air, where they may be suspended for months or even years, as in the Krakatoa outburst, moving about with the upper atmospheric currents, and giving rise, through the sifting out and reflection of the sun's rays, to those remarkable phenomena which are known as the "red glows" or "volcanic afterglows." These usually follow the true sunset by the period of about a half-hour (20–40 minutes), and rise to a position in the sky possibly exceeding 45° above the horizon. The afterglows of the Krakatoa eruption, the first to be carefully observed, were thought to have been deflected from dust particles sailing at a height above the earth's surface of from 30 to 50 or even 70 miles, and were continued for a period of considerably over a year. The gaseous emanations are an important feature of all volcanic activity; and often form the only outward evidence of an eruption, while they precede, accompany, and follow the main outburst when lava and ashes are ejected. They issue normally in a vertical column which soon condenses and spreads out as a cloud or canopy overhanging the crater. The cloud is white, changing to gray or black when accompanied by ash. Steam is the most abundant vapor emitted, although A. Brun claimed that it plays a subordinate rôle and is not an original constituent of the deep-seated emanations. Day and Shepherd, however, found water vapor in the gases given off by the Hawaiian volcanoes. The other common gases are carbon dioxide, hydrogen sulphide, sulphur dioxide, methane, hydrochloric acid, nitrogen and oxygen; they vary in nature and proportions with each eruption.

Electric, Magnetic, and Acoustic Disturbances. The ordinary electric disturbances which are associated with volcanic eruptions have long been recognized These are the lightning flashes and peals of thunder which appear or are generated (perhaps as the result of friction) in the furious steam-cloud which is shot out from and overhangs the vent of the active volcano In addition to the commoner or true flash-lightning, other forms of electric or pyro-electric discharge have been observed in association with volcanic discharges—balls or "stars" of electric luminosity appearing in the volcanic cloud, as has several times been noted in the case of the Vesuvian eruptions, and again noticed at the time of the eruption of Tarawera, in New Zealand, in June, 1886. But the most wonderful displays were those which were associated with the outbreaks of Pelée, notably those of the evenings of May 26th and August 30th. On the latter date the "electric" figures appeared as clustered or rocket stars, moving in straight and serpent lines (sometimes in parallel series), normal circles, and circles with zigzag streamers. These were observed simultaneously with the ordinary zigzag lightning, and lacked but little of the latter's blinding brilliancy. It has been impossible to determine the exact or absolute nature of these vivid lights traversing the volcanic cloud, but there can be no question as to their electric character.

Perhaps the most remarkable feature of the great Pelée eruption of May 8, 1902, was the violent disturbance in the magnetic field which it occasioned. While minor disturbances of the

magnetic needle had already been noted in earlier eruptions, these had generally been in close proximity to the scene of action, and in some instances had been referred to as an effect of the ejection of rock material containing magnetic iron. But at the time of the Pelée eruption the disturbance seems to have been of world-wide penetration, as it was noted by careful observers at most widely removed stations of meteorological and magnetic research At most of the stations, the disturbance was noted almost exactly two minutes after the time of the destruction of St. Pierre, and in some places its continuance was extended over several hours No satisfactory interpretation has up to this time been given regarding the nature of these magnetic phenomena.

The Krakatoa eruption of 1883 seems to have made itself felt as a distinct nonseismic shock or tremor through the entire diameter of the earth, and perhaps the same is true of the May eruption of Pelée At any rate, a barograph record made at Zi-ka-wei (China) indicates a distinct concussional wave arriving at the station four hours after the magnetic disturbance was initiated There is hardly room to doubt that the more rapid of the shock-pulsations were transmitted directly through the earth, and were followed later by the surface waves, which, traveling in opposite directions over the globe, gave interference areas as well as areas of most pronounced concentration. The sound waves following volcanic eruptions travel, doubtless, both through the earth's interior and over its surface. Eruptions are frequently heard at great distances, and yet, anomalous though it may appear, need not be audible near by. Humboldt called attention to this in connection with the eruption of the Soufrière in 1812, the noise of which was well noted in the valley of the Orinoco and beyond, at a distance in direct line of perhaps 750 or 800 miles. The May eruption of Pelée was likewise transmitted by sound to the most distant parts of the Orinoco valley, and to the northern coast of Venezuela (Maracaibo, 800 miles distant), and yet all evidence points to the conclusion that it was not heard at Fort-de-France, the capital of Martinique, at a distance of 14 miles from the scene of the great disaster. Similarly, no true shock of the eruption of August 30, 1902, was detected on the slope of the volcano itself at a distance of four miles in a direct line from the crater, although it was remarked at Port-of-Spain, on Trindad, and at Carupano, on the Venezuelan coast, with the distinctness and intensity of the discharge of siege guns. These anomalies in sound carriage are not unlikely to be due to forms of acoustic opacity—alternating layers, with different degrees of tension, density, and temperature of the atmosphere.

Atmospheric Disturbances. These appear mainly in winds of great violence which pass in advance of the clouds of eruption (in this sense comparable with the wind that is forced ahead of a snow avalanche), and others whose course is directed towards the volcano, and which are seemingly indraughts into vacual areas made by sudden explosion of steam. These so-called contrary currents have been noted in the eruptions of Tarawera, in 1886, of Bandai-San, Japan, in 1888, and of Pelée. They are at times very destructive, almost as much so as the direct winds scattered about by the outgoing blasts. It is not unlikely that most of the destruction that followed the explosion of Bandai-San, in 1888, and which resulted in the annihilation of the greater part of seven villages, was the work of this form of wind Many attempts have been made to associate volcanic outbursts with particular phases of the moon and sun (sun-spot periods) and with special meteorological conditions of our atmosphere, and on these assumed relations special prophecies as to future volcanic happenings have been built. But no relation of this kind has so far been found, nor is there well-founded reason for believing that it in any way exists. Many of the most violent eruptions have taken place during storm periods; others of equal violence at times of almost absolute atmospheric stability. For at least six days preceding the May eruption of Pelée the barometric variation at noon was only one millimeter, the barometer marking steadily at this time 762 millimeters. This condition also existed at and before the time of Pelée's eruption of Aug 30, 1902, and it was noted in the great eruption of Vesuvius in 1794.

Geographical Distribution of Volcanoes. With hardly an exception all volcanoes are situated in what can reasonably be assumed to be areas of weakness in the earth's crust, such areas being the ocean basins themselves, the border lands of these basins, or the mountain ranges which flank or construct the continental outlines It follows then that volcanoes are either insular (oceanic) or suboceanic—i.e., placed on the continents close to the oceanic border. No distantly inland (active) volcano is known unless it can be shown to be in a region of crustal instability (Southern Mexico) or one in which a comparatively recent disruption has taken place (the volcanoes of the Great Rift valley, of East Central Africa—Mfumbrio Group). Mount Wrangel, in Alaska, is a possible exception to this rule. The main line of areas of volcanic distribution are: (1) The Pacific-Caribbean belt following the Andes of South America, with many dormant, extinct, or active summits (Aconcagua, Mistí, Cotopaxi, Sajama, Chimborazo, Tolima); the Lesser Antilles (Soufrière, Pelée, and many peaks on St. Lucia, Dominica, Guadeloupe, etc.); Central America and Mexico (Irasú, Coseguina, Izalco, Santa María, Agua, Fuego, Popocatepetl, Orizaba, Colima, Jorullo); the west coast of North America (Shasta, Hood, Rainier, Baker, Wrangel, Illiamna, Sheshalden, Makushin); Kamchatka, the Japanese Islands (Fujiyama, Aso-San, Bandai-San, Asamayama); the Philippines (Mayon) and Sunda Sea Islands (Gelunggung, Papadayang, Tengger, Temboro, Krakatoa); New Zealand (Egmont); and Victoria Land (Antarctica; Erebus and Terror). All of these seem to define a nearly continuous line or belt of weakness or disruption in the earth's crust. (2) A Mediterranean-Caspian region is defined by the positions of the Lipari Islands (with Stromboli), Etna, Vesuvius, the Ægean Islands (with Santorin), Demavend, and Ararat. (3) An Atlantic region, defined by the mainly quiescent volcanoes of Iceland (Hecla, Skaptar Jökull), the Azores (Pico), Madeira, Canaries (Teneriffe), Cape de Verde Islands, Tristan da Cunha, etc. (4) A Pacific region, with the numerous volcanoes on the small islands of the Polynesian group and the Mauna Loa volcanoes of Hawaii, Mokuaweoweo, the summit, and Kilauea the lateral crater.

Cause of Volcanic Eruptions. There is still much obscurity regarding the causes that condition volcanic eruptions—that permit of the generation of steam within the earth's interior, of its explosive escape through the "crust," and of the formation or existence of the molten magmatic mass that reaches the surface as lava or in its disrupted form, as scoriæ and ash. The accessible facts seem to point to the conclusion that the steam or vapor of water is derived from the hydrated rocks of the earth's superficial mass, and its sudden evolution is due to release from pressure of the rock or magma with which it is inbound, or to steady and increasing superheating. These conditions, as well as that of the uplifting and outthrow of lava, might be supplied as the result of deep rock displacements, which, by squeezing, would bring the more highly heated deeper crust nearer to the surface or to the critical point of dismemberment. And these displacements can readily be ascribed to vast subsidence, notably of the sea bottom.

See ANDES; ÆTNA; GEOLOGY; PELÉE, MONT; VESUVIUS; ETC.

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VOLCANO. See VULCANO.

VOLE, vōl. An English name, little used in America until recently, for the smaller members of the rat family (Muridæ) of the genera *Arvicola, Erotomys, Calomys, Microtus*, and their near allies. The species are numerous and widely distributed, being found in Europe, Asia, Africa, and North and South America. Some of them are completely terrestrial in their habits, others are aquatic. (See MOUSE; MEADOW MOUSE.) Consult G. S. Miller, "Genera and Subgenera of Voles and Lemmings," in *North American Fauna*, No. 12 (Washington, 1896).

VOLGA. The largest river of Russia and of Europe. It rises among a cluster of lakes and marshes in the Valdai Hills in the Government of Tver, 205 miles southeast of St. Petersburg, and flows in a generally southeasterly course, though it describes a large zigzag with sharp bends at Samara and Tsaritsyn, between which its course runs to the southwest. It empties through a large delta into the Caspian Sea, after a course of about 2300 miles (Map: Russia, G 5). Its total fall from its source to its mouth is less than 900 feet, and its current is throughout tranquil and regular, wholly without falls or rapids, so that the river is navigable almost to its source. The extreme upper portion flows between wooded hills, but after leaving the Valdai plateau its course lies within the great plains. The right bank is generally higher than the left, and for a considerable distance along the middle course it is lined by a limestone escarpment with steep, wooded cliffs, a spur of which deflects the river at Samara in a long, narrow loop 50 miles to the eastward. The left bank is low, and in some places along the middle course it is lined with great marshes and trembling forests, in which the trees are supported by soil floating on soft mud. In the lower course both banks are low, but dry, owing to the rapid evaporation. Here the river receives practically no tributaries, and flows through saline steppes lying below sea level Below Tsaritsyn the river begins to divide into a number of parallel arms, but the true alluvial delta begins only a short distance above Astrakhan. The delta is about 70 miles wide, and consists of eight large and numerous smaller arms which are all merged together under a single sheet of water during the floods. The main channel near its mouth is several miles wide, below the confluence of the Kama the width of the river is 1500 yards, and at Tver it is about 200 yards.

In some places the channel is nearly 100 feet deep, but the navigable depth is reduced by shoals to four or five feet in the lower and two or three feet in the upper reaches The quantity of sediment deposited seems to increase from year to year, shoals and sand bars are continually formed, and a number of dredging machines have to be kept constantly at work. The chief tributaries of the Volga are the Kama from the east, a large river in itself, and the Oka from the west. The whole system waters 22 of the Russian governments, and has a total navigable length of over 7000 miles. Steamers ascend the main stream 1650 miles to Tver. Though the river is icebound more than one-third of the year, the traffic is large, amounting to over 14,000,000 tons of goods annually, or more than one-fourth of the total traffic on all the Russian railroads. The principal articles carried are timber, grain, salt, and naphtha. The chief ports on the river are, in the order of their shipping, Astrakhan, Nizhni-Novgorod, Tsaritsyn, and Saratov Connected with the Volga is a vast canal system, through which communication is established between the river and the Black, Baltic, and White seas. The fisheries in the Volga are very important.

VOLHYNIA, vōl-ĭn'ĭ-ȧ. A government of southwest Russia, bordering on Austria and Poland. Area, over 27,700 square miles (Map: Russia, C 4) The northeastern part belongs to the region of Poliessie (q.v.) and is mostly marshy. The southern part is hilly and intersected by deep river valleys. The chief river is the Western Bug. There are numerous lakes. The climate is moderate but unhealthful in the north Forests cover a considerable part of the area and are exploited on a large scale, timber being extensively exported. In the south, where the soil is fertile, agriculture has attained a considerable degree of development, especially among German colonists. Rye, wheat, oats, sugar beets, tobacco, and hops are produced. Stock raising is also important. The chief manufactures are beet sugar, spirits, and leather. Pop., 1912, 3,995,700—Russians, Jews, and Poles. Capital, Zhitomir (q.v.). The region of Volhynia was inhabited by Slavs and belonged to Russia at the very beginning of Russian history. In the fourteenth century it passed to Lithuania and was united with Poland in 1569. With the annexation of Poland (1793–95) it passed to Russia.

VOLITION, vō-lĭsh'ŭn. See WILL.

VOLK, DOUGLAS (1856–). An American

figure painter and teacher, son of Leonard Volk. He was born in Pittsfield, Mass., and studied in Paris under Gérôme (1873–78). After his return to America he organized and became director of the Minneapolis School of Fine Arts (1893) and afterward taught at the Cooper Union art school, the Art Students' League, and the National Academy of Design, New York. His paintings, which usually combine figure and landscape, are good in drawing, carefully composed, and pleasing in color. Good examples of his work, which is found in most American public collections, include: "The Young Pioneer," a portrait of Dr. Felix Adler, and "Little Mildred" (all in the Metropolitan Museum, New York), "Boy with Arrow" (National Gallery, Washington); "Accused of Witchcraft" (Corcoran Gallery, Washington); "Puritan Mother and Child" (Carnegie Institute, Pittsburgh). Among his mural decorations are those in the Minnesota capitol at St. Paul and the Des Moines (Iowa) courthouse. He was elected a member of the National Academy in 1899, and of the Architectural League in 1912 and received many prizes, including gold medals at Charleston (1907), the National Academy of Design (1910), National Arts Club, New York (1915), and the Panama-Pacific Exposition, San Francisco (1915).

VOLK, Leonard W. (1828–95). An American sculptor. He was born at Wellstown, N. Y., and after working as a marble cutter and modeling by himself in St. Louis studied for two years in Rome. On his return in 1857 he settled in Chicago, where he did much to further art education and assisted in founding the Academy of Design, of which he was president eight years. He modeled the monument to Stephen A. Douglas in Chicago and various soldiers' monuments, but is at his best in his faithful and dignified portrayals of prominent Americans. These include the statues of Lincoln and Douglas (Illinois State House), General Shields (Capitol, Washington), and the bust of Lincoln. For his son, see Volk, Douglas

VOLKELT, fŏl'kĕlt, Johannes Immanuel (1848–). A German philosopher, born at Lipnik, Galicia, and educated at Vienna, Jena, and Leipzig. He became professor of philosophy at Basel in 1883 and at Würzburg in 1889 and in 1894 was made professor of philosophy and pedagogy in Leipzig. In philosophy he opposed positivism on the ground that thought by its demands enables us to transcend the subjectivity of experience. Volkelt wrote on æsthetics as well as on philosophy proper. His more important works are: *Pantheismus und Individualismus im System Spinozas* (1872); *Die Traumphantasie* (1875); *Kants Erkenntnistheorie* (1879), a searching piece of criticism; *Aesthetische Zeitfragen* (1895); *Arthur Schopenhauer, seine Persönlichkeit, seine Lehre, sein Glaube* (1900; 3d ed, 1907); *Die Kunst des Individualisierens in den Dichtungen Jean Pauls* (1902); *System der Aesthetik* (3 vols., 1905–14); *Zwischen Dichtung und Philosophie* (1908), *Was ist Religion?* (1913).

VOLKMANN, fŏlk'män, Richard von (1830–89). A German surgeon, born in Leipzig, son of the physiologist Alfred Wilhelm Volkmann (1801–77). He studied medicine at Halle, Giessen, and Berlin and in 1867 became professor of surgery and director of the clinic at Halle. He was a prominent surgeon in his day and a pioneer in the introduction of antiseptic methods in Germany. In 1885 he was ennobled. He edited (1870–89) *Sammlung Klinischer Vortrage* and contributed to the Pitha-Billroth *Handbuch der Chirurgie*, a section on diseases of the locomotory organs (1865–72); he also wrote *Beitrage zur Chirurgie* (1875). Under the pseudonym Richard Leander he wrote a juvenile *Traumereien an franzosischen Kaminen* (1871), which passed through many editions; *Aus der Burschenzeit* (1876); *Gedichte* (3d ed, 1885); *Kleine Geschichten* (1888); *Alte und neue Troubadourlieder* (2d ed., 1890). His collected stories appeared in 1899.

VOLKMANN, Robert (1815–83). A German instrumental composer, born at Lommatzsch. He studied both organ and piano with his father, violin and cello with Friebel, and composition with Anacker at Freiberg and K. F. Becker at Leipzig, where he received great encouragement from Schumann From 1839 to 1842 he taught music at Prague and finally settled at Pesth, where he remained, except for four years at Vienna (1854–58). He was professor of harmony and counterpoint at the National Academy of Music for several years. Among his works are: two symphonies (D minor and B flat); three *Serenades* for string orchestra; two concert overtures, a cello concerto, a *Concertstuck* for piano and orchestra; six string quartets; two trios; numerous works for piano (two and four hands) Among his vocal works are two masses, offertories, sacred songs, and a Christmas carol of the twelfth century. Consult C. Preiss, *Robert Volkmann* (Graz, 1912).

VOLKMANN, Wilhelm Fridolin, Ritter von Volkmar (1821–77). An Austrian psychologist, born in Prague. In 1846 he became a lecturer in æsthetics, afterward in philosophy, at the University of Prague, and in 1856 was appointed to a professorship in philosophy there. His chief studies were in the exact psychology of the school of Herbart. His most important publication is the *Grundriss* (later *Lehrbuch*) *der Psychologie vom Standpunkte des philosophischen Realismus* (1856; 4th ed., by Cornelius, 1894–95).

VOLKOV, vŏl'kŏf, Feodor Grigorievitch (1729–63). A Russian composer and theatrical director, born at Kostroma, Central Russia. He was summoned to the court of Empress Elizabeth in 1752 and a few years later was made first court actor at a Russian theatre then founded at Moscow by Imperial command. The libretto of the opera *La Clemenza di Tito*, to music composed by Araja in 1751, is important because it is the first opera written on a Russian text. His authorship of the opera *Taniushka, or The Fortunate Meeting*, the first Russian comic opera, with which Volkov's biographer credits him, has not been fully established.

VOLLMAR, fŏl'mär, Georg Heinrich von (1850–). A German Socialist leader, born at Munich. He entered the Bavarian army at an early age and served as lieutenant in the war with Prussia in 1866. He then enlisted in the papal army and later entered the Bavarian railway service, which he left to take part in the Franco-German War, in which he served as an officer until badly wounded at Blois. Having become interested in social studies, he embraced Socialism and (in 1878–86) was imprisoned several times for activity in propagating Socialistic ideas, organizing secret societies, etc. Vollmar became prominent in the German Reichstag, to which he was repeatedly elected after

1881, except during the period 1887–90; in the Legislature of Saxony (1883–89); and in the Legislature of Bavaria, of which he became a member in 1893. He became a leader of the conservative wing of the Social Democrats He showed himself ready to make concessions to the principle of private ownership in the case of the small landowners or peasants. His publications include: *Der isolierte socialistische Staat* (1880); *Ueber die nachsten Aufgaben der Socialdemokratie* (1891); *Ueber Staatssocialismus* (1892).

VOLLMÖLLER, fôl'mēl'ĕr, KARL (1848–). A German Romance philologist, born in Ilsfeld, Wurttemberg, and educated in Tübingen, Bonn, Munich, Berlin, and Paris. He traveled in Spain in 1874–75 and became a lecturer in Strassburg in 1875. He was professor at Erlangen (1877–81) and then at Göttingen until 1891, when he retired, settled in Dresden, and devoted himself to Romance philology. He was editor of the *Sammlung franzosischer Neudrucke* (9 vols., 1881–89), *Romanische Forschungen* (1883 et seq.), and of the valuable yearly summary, *Kritischer Jahresbericht uber die Fortschritte der romanischen Philologie* (1890 et seq.), and published: *Kurenberg und die Nibelungen* (1874); *Der Munchener Brut* (1877), a twelfth-century French version of Geoffrey of Monmouth's work (with Konrad Hoffmann); *Octavian* (1877), an old French romance; *Poema del Cid* (1879); *Beitrage zur Litteratur der Cancioneros und Romanceros* (1897); *Rezensionsexemplar und bezahlte Rezension* (1902); *Briefe K. Hofmanns an Ed. von Kausler* (1907); *Einer alte Familiensitz* (1911).

VOLLON, vô'lôN', ANTOINE (1833–1900). A French still-life, landscape, and figure painter, born in Lyons. He studied at the Lyons School of Fine Arts and under Ribot. Vollon is one of the greatest of modern still-life painters. His coloring is rich and harmonious, and in the rendering of metals, the color and bloom of flowers, and in the painting of fish he has few equals. He also painted figure subjects. His works include "Sea Fish," "Curiosities," "The Port of Antwerp," and the portrait of the artist, all in the Luxembourg; "The Kettle" (1872, Lyons Museum).

VOLNEY, vôl'nā', CONSTANTIN FRANÇOIS CHASSEBŒUF, COUNT DE (1757–1820). A French philosophic writer and politician. He was born in Craon. He studied medicine and Eastern languages, spent some years in Egypt and Syria, wrote *Voyage en Egypte et en Syrie* (2 vols., 1787; trans., 1787), was elected to the States-General (1789), joined the Republican movement and contributed to its anti-Christian "philosophy" the famous *Les ruines, ou méditations sur les révolutions des empires* (1791; trans., New York, 1796; London, 1827), and to its pedagogy *La loi naturelle, ou le catéchisme du citoyen français* (1793), in spite of which he fell under suspicion of Royalist leanings and was saved from execution only by the fall of Robespierre. Soon afterward (1794) he was made professor in the Ecole Normale, traveled in the United States (1795–1808), was made Senator (1799), Academician, and Commander of the Legion of Honor. He was created Count by Napoleon (1808) and a peer by Louis XVIII (1814). His later works are: *Tableau du climat et du sol des Etats-Unis* (2 vols., 1803; trans., 1804), and *Recherches nouvelles sur l'histoire ancienne* (3 vols., 1814–15; trans., 1819). Consult Eugène Bergers, *Volney: Etude sur sa vie et sur ses œuvres* (Paris, 1852), and J. R. Barni, *Les moralistes français au 18me siècle* (ib., 1873).

VOLNEY POWDER. See EXPLOSIVES.

VOLO, vō'lō, or **VOLOS.** The capital of the Nomarchy of Magnesia, Greece, 37 miles southeast of Larissa, on the Gulf of Volo (Map: Greece, D 4). It is situated near the sites of the three ancient cities of Demetrias, Pagasæ and Iolcus and has interesting remains of the early Greek and Roman periods. The citadel, the church of Hagios Nikolaos, and the monument modeled after the Parthenos of Phidias are noteworthy. Volo has a good harbor. It is an important exporting centre of the products of Thessaly. Pop., 1896, 16,232; 1907, 23,563.

VOLOGDA, vō'lôg-da. A government of northeast Russia. Area, 155,500 square miles (Map: Russia, F–J 2). It is a flat region, marshy and wooded in the north, and with some offshoots of the Ural Mountains in the east, reaching an altitude of nearly 5000 feet. This mountainous region is barren and almost uninhabited. The western part contains the bulk of the population Vologda is amply watered by the Dvina, with its headstreams and tributaries, the Mezen and the Petchora. The climate is continental and exceedingly severe. The agricultural area is very restricted, and the larger part of the inhabitants find a source of livelihood in fishing, hunting, and lumbering. In the southern part the crops are abundant, and some products, especially flax, are even exported. The forests cover over three-fourths of the entire surface and belong largely to the crown. Stock raising is favored by the abundance of pasture land, and dairying is assuming an industrial character in the southwest. Pop., 1912, 1,678,600, chiefly Russians, but containing also many Zyrians, a people of Finnish stock, who have retained many of their national traits.

VOLOGDA. The capital of the Russian government of the same name, situated on both banks of the river Vologda, 289 miles north-northeast of Moscow (Map: Russia, F 3). It trades extensively with Archangel and St. Petersburg in agricultural and forest products, spirits, and leather. Lace making is an important industry. Pop., 1911, 38,700. The town was founded in the twelfth century (1147) and attained considerable commercial importance in the sixteenth century, when Archangel carried on an extensive trade with England and Holland. The foundation of St. Petersburg removed the centre of the foreign trade of Russia to the west, and Vologda lost its former importance.

VOLPE, vôl'pĕ, ARNOLD (1869–). A Russian-American orchestral conductor, born in Kovno. He studied the violin with Isidor Lotto at the Warsaw Institute of Music in 1884–87 and then for four years with Leopold Auer at the Imperial Conservatory in St. Petersburg. Two years later, in 1893, he returned to the conservatory, taking a four years' course in composition under Nicholas Soloviev. In 1898 he went to the United States, settling in New York where he became conductor of several orchestral societies. In 1902 he established the Young Men's Symphony Orchestra for the purpose of training orchestral players. The more advanced players he formed in 1904 into the Volpe Symphony Orchestra, constantly recruited from the older organization. In 1910–14 he was con

ductor of the municipal concerts in New York City.

VOLPO'NE, or THE FOX. A comedy by Ben Jonson, produced in 1605, printed in 1607.

VOLSCI, vŏl'sī A people of ancient Italy, closely related to the Umbrians (See ITALIC LANGUAGES, *Volscian;* UMBRIA.) To the south of them lay the sea, to the east the Samnites (q.v.), to the north the Æqui and the Hernici, to the west the Latini The Volsci were brave and hardy mountaineers and fine warriors; they were incessantly at war, in conjunction with the Æqui (q.v.), with the Romans, but about 383 B.C. they were finally subdued by Rome. Consult J. Jung, *Grundriss der Geographie von Italien und dem Orbis Romanus* (2d ed., Munich, 1897), "Volsci," in Friedrich Lübker, *Reallexikon des klassischen Altertums*, vol. ii (8th ed., Leipzig, 1914).

VOLSINII, vŏl-sĭn'ĭ-ī. See BOLSENA.

VOLSK, vōl'y'sk. A town in the Government of Saratov, Russia, situated on the right bank of the Volga, 91 miles northeast of Saratov (Map: Russia, G 4). It has extensive ironworks, tanneries, etc. Pop., 1911, 36,134.

VOLSUNGA SAGA, vōl'zụng-a sä'gà. A thirteenth-century mythical history of the renowned old Germanic family of the Volsungs, descendants of Odin. Sigurd or Siegfried, son of Sigmund, is the most noted hero of the race. Consult: Morris and Magnusson, *The Volsungasaga* (London, 1870), Sophus Bugge, *Die Heimat der altnordischen Laeder von den Welsungen und Nibelungen* (Halle, 1909), H. Bartels, *W. Morris' Story of Sigurd the Volsung and Fall of the Niblungs* (Münster, 1906).

VOLT, vōlt (from It. *Volta*, name of the discoverer of the voltaic cell). A unit of electromotive force. It is defined to be the electromotive force which, steadily applied to a conductor whose resistance is 1 ohm, will produce a current of 1 ampere. It is therefore practically equivalent to 10^8 C. G. S. electromagnetic units. (See ELECTRICAL UNITS.) The electromotive force of two cells, the Clark and the Cadmium (or Weston), are known fairly accurately; and so for practical purposes the electromotive force of a Clark or a Cadmium cell is used as the standard, and its value substituted in the result. Consult the paper by Gouy in the *Reports* of the International Congress of Physics (Paris, 1901). See VOLTAIC CELL OR BATTERY

VOL'TA. A river of west Africa formed in the northern part of the British Gold Coast Colony by the confluence of the Black and the White Volta. It flows in a southerly course, partly on the boundary of German Togoland, and empties into the Gulf of Guinea, 400 miles west of the mouths of the Niger. Its total length, including the Black Volta, is about 900 miles. The headstreams rise in the savanna regions of French Sudan, but the main river flows within the forest belt. It is broken in several places by rapids, which, together with the bar at the mouth, are impassable at low water; but during the floods large vessels can ascend it about 50 miles, and smaller vessels 250 miles.

VOLTA, ALESSANDRO, COUNT (1745–1827). An Italian physicist, inventor of the voltaic battery. He was born at Como and was educated at the public schools of his native town, showing a marked taste for literary effort and for physics. His first important essay, with the Leyden jar, was followed in 1771 by a discussion of the phenomena of frictional electricity. In 1774 he became professor of physics in the Royal School at Como and in the following year devised the electrophorus. In 1776–77 he applied himself to chemistry, one of his important discoveries in this science being the organic nature of marsh gas. Volta's work now became known abroad. He studied atmospheric electricity and devised many experiments, such as igniting gases by the electric spark in closed vessels. In 1779 he became professor of physics at the University of Pavia, a chair he occupied for 25 years. In 1872 he traveled in Europe, meeting in Paris Franklin, Buffon, and Lavoisier and in London other famous scientists. Galvani's discovery of what he termed "animal electricity" led Volta to experiments with two different metals in contact, and in 1794, with his condensing electroscope, he virtually proved his theory that the action of the current was due to the two metals. By 1800 he had developed his electric pile of dissimilar metals in contact and separated from a corresponding pair by a piece of moistened cloth or paper. Then came the crown of cups, or first voltaic battery, in which strips of metal were placed in cups containing brine or weak acid. The diverse theories of Galvani and Volta led to a scientific controversy, but Volta's ideas triumphed and persisted until modern times. In 1801 Volta was called to Paris, where he repeated his more important experiments before the Institute of France and was received by Napoleon, who made him Count and Senator and gave him a gold medal. A centennial exposition commemorative of the discovery of the voltaic cell was held at Como in 1899, but unfortunately a number of valuable Volta relics and manuscripts were destroyed by fire. Many of Volta's investigations were communicated to the Royal Society of Great Britain and were printed in the *Philosophical Transactions*, while his complete works were published at Florence in 1816 Consult D. F. T. Arago, "Eulogy," English translation in Smithsonian Institution, *Annual Report*, 1875 (Washington, 1876). See VOLTAIC CELL OR BATTERY.

VOLTAIC CELL or **BATTERY.** Johann Sulzer observed in 1752 that "if you join two pieces of lead and silver and then lay them on the tongue you will notice a certain taste resembling that of green vitriol, while each piece apart produces no such sensation." The significance of this observation was not appreciated until Volta had described his crown of cups in 1800. Any two metals, copper and zinc, e.g., and the saline saliva compose, as is now known, a voltaic couple or cell.

While pursuing his experiments to explain Galvani's discovery (see GALVANIC BATTERY), Volta, of the University of Pavia, was led to the invention of the voltaic pile, where two dissimilar plates, as zinc and copper, were placed the one on the other. Then followed a piece of cloth moistened with a weak solution of common salt. The cloth was surmounted by another pair of metal plates in the same order as the first, and so on, each pair being separated from adjacent ones by moist cloth.

Volta's *couronne de tasses*, or crown of cups, was in principle essentially the same as a single couple of the pile. A series of cups contained brine or dilute acid; into the liquid dipped

metallic strips, half zinc and half copper. The zinc end of a strip dipped into one cup, and the copper end into the next one. An electric current was taken from the terminal wires of the series. Such was the first voltaic cell on record. Volta announced his discovery in a letter dated March 20, 1800, and addressed to Sir Joseph Banks, president of the Royal Society. In the words of Sir Humphry Davy, "the voltaic battery was an alarm bell to experimenters in every part of Europe." On April 30, 1800, Nicholson and Carlisle discovered that water could be decomposed by the electric current, and this important discovery was followed by Davy's production of the electric arc light between two pencils of carbon, the source of the current being a large voltaic battery; and in 1807 he accomplished the electrolysis of the fixed alkalis, potash and soda, and discovered the corresponding metallic elements, potassium and sodium.

Volta's battery will be best understood by considering a single simple cell. If a plate of zinc be placed in sulphuric acid, diluted with about 20 times its volume of water, bubbles of hydrogen will at first collect on the zinc, but visible chemical action will soon cease. If now a plate of copper be placed in the same solution, no change will be observed so long as the two metals are kept out of contact; but as soon as they are made to touch or are joined by wires (Fig. 1), vigorous chemical action sets in, the zinc wastes away, and hydrogen gas is freely liberated from the surface of the copper plate instead of the zinc. This chemical action goes on only so long as the two plates are electrically connected. Such a combination of two conductors, immersed in a compound liquid, called an electrolyte, which is capable of reacting chemically with one of them, is a voltaic cell or element. Several such cells joined together compose a battery. If the zinc and copper plates are connected with a wire, an electric current flows around in a circuit, from the copper to the zinc through the wire, and from the zinc to the copper through the liquid. The copper plate, or its equivalent, is accordingly now called the positive electrode, or cathode, and the zinc plate the negative electrode, or anode.

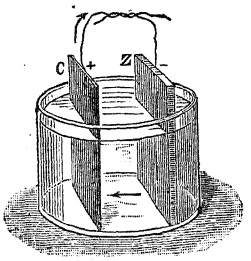


FIG. 1. SIMPLE VOLTAIC CELL.

The modern theory of dissociation furnishes an explanation of the manner in which an electric current is conducted through a liquid. It is briefly as follows: When an alkali, a salt, or an acid, such as hydrochloric acid (HCl), is dissolved in water, some of the molecules, at least of a binary compound, split into two parts (H and Cl, e.g.), one part having a positive electric charge and the other a negative one. The two parts of the dissociated substance with their electric charges are called ions. An electrolyte is a compound capable of such dissociation into two or more ions. It conducts electricity only by means of the migration of the ions resulting from the splitting in two of the molecules. The separated ions convey their charges with a slow but measurable velocity through the liquid. Electropositive ions, such as zinc and hydrogen, carry positive charges in one direction; electronegative ions, such as chlorine and sulphion (SO_4), carry negative charges in the opposite direction; and the sum of the two kinds of charges carried through the liquid in a second is the measure of the current. The appearance of the hydrogen at the cathode only is thus explained. See ELECTROCHEMISTRY.

Local Action. When acid is used in a cell as the electrolyte, with commercial zinc, there is always evidence of chemical action which contributes nothing to the current, for it goes on when the circuit is open. This is known as local action. It is probably due to particles of carbon, iron, etc., in the zinc; these form with the zinc itself miniature voltaic couples, the currents flowing in local short circuits between the foreign particles and the zinc. For this reason the zinc is eaten away locally with the formation of pits in its surface. The remedy for this local action was found by Sturgeon in 1830 to be amalgamation of the zinc, i.e., the formation on its surface of a mercury-zinc amalgam. The amalgam brings pure zinc to the surface, covers the foreign particles, and, above all, forms a smooth surface to which a film of hydrogen adheres and protects it from chemical action, save when the circuit is closed. If this protecting film of hydrogen be removed by exhausting the air above the liquid, the acid will attack the amalgamated plate as if it were impure zinc. Hydrogen is found to afford a similar protection from chemical action in other cases.

Polarization. If a simple voltaic cell is put in circuit with a galvanometer, it may be observed that the current gradually diminishes. If now the adhering film of hydrogen be brushed off the copper plate with a glass rod, the current will increase to nearly its original value. This decrease of the current is due to several causes which are included under the term polarization. The hydrogen at the positive electrode is the chief agent in decreasing the electromotive force of the cell, by means of the negative or counterelectromotive force which it produces.

To prevent polarization means are adopted to replace the hydrogen ions with others, such as copper or mercury, which do not produce polarization; or else the positive electrode is surrounded with a chemical which furnishes oxygen or chlorine to unite with the hydrogen before it reaches the electrode.

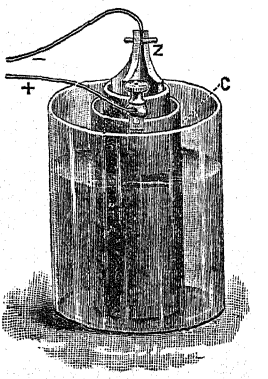


FIG. 2. DANIELL CELL.

The Daniell Cell, invented by Professor Daniell, of London, in 1836, was the first successful attempt to prevent polarization by chemical methods. It consists of a glass jar containing a saturated solution of copper sulphate ($CuSO_4$) and in it a cylinder of sheet copper (*C*, Fig. 2), which is usually cleft down one side. Within the copper cylinder is a porous pot of unglazed earthenware containing dilute sulphuric acid, or preferably a dilute solution of zinc sulphate

($ZnSO_4$). The porous pot contains also the zinc prism, *Z*. The object in using the unglazed pottery to separate the two solutions is to prevent their rapid admixture, while the ions readily pass through the pores.

With sulphuric acid in the porous pot, the hydrogen ions are intercepted at the porous partition by the copper sulphate. The positive copper ions then migrate towards the copper electrode and are there deposited as metallic copper. The SO_4 ions go to the zinc electrode with their negative charges, as in the case of the simple voltaic cell.

When the zinc is immersed in dilute zinc sulphate, both sulphates in the Daniell cell undergo partial dissociation, and no hydrogen ions are then present. Only zinc and copper ions travel towards the copper electrode. The zinc ions are not deposited on the copper plate, because zinc in copper sulphate invariably replaces the copper, forming $ZnSO_4$ in place of the $CuSO_4$. Zinc sulphate is formed at the negative, and metallic copper is deposited on the copper electrode. At the same time there is a loss of copper sulphate corresponding exactly to the increase of zinc sulphate. The Daniell cell is one of the most constant elements yet devised, for in it polarization by hydrogen is entirely avoided.

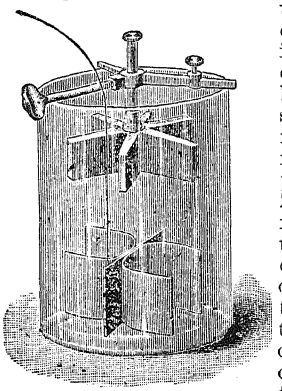


FIG. 3. GRAVITY CELL.

The Gravity Cell is a modified Daniell (Fig. 3). The porous pot is omitted, the partial separation of the liquids being secured by difference in density. The copper electrode is placed at the bottom in saturated copper sulphate, while the zinc is suspended near the top in a weak solution of zinc sulphate. The zinc should never be placed in the copper sulphate solution. The saturated copper sulphate is more dense than the dilute zinc salt; it therefore remains at the bottom, except as it slowly diffuses upward.

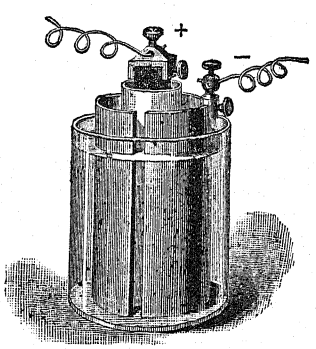


FIG. 4. BUNSEN CELL.

The Bunsen Cell, devised by Bunsen in 1841, consists of a glass jar containing dilute sulphuric acid, and a hollow cylinder of amalgamated zinc immersed in it (Fig. 4). Within the zinc cylinder is a porous pot containing strong nitric acid (HNO_3) and a prism of dense carbon. The hydrogen ions from the sulphuric acid are intercepted on their way to the positive electrode by oxygen from the nitric acid and are oxidized with the production of water. The nitric acid molecule is broken up and yields a brownish-red gas which is very corrosive and irritating.

The Chromic Acid Cell usually consists of a plate of zinc between two of carbon dipping into a vessel containing dilute sulphuric acid, to which is added either chromic acid or the bichromate of potassium or sodium. The sodium salt is much to be preferred to the potassium salt. When the bichromates are used an additional quantity of sulphuric acid is needed to liberate chromic acid, which is the real depolarizer. Fig. 5 illustrates one form of this cell, which is very convenient, but is open to the objection that since the carbon plates are usually left standing in the solution, the liquid soon works upward and attacks the connections at the top. The zinc is attached to a sliding brass rod, *A*, so that it may be lifted out of the liquid when the cell is not in use. The hydrogen coming from the ionized acid is oxidized to water by the chromic acid, and polarization is prevented.

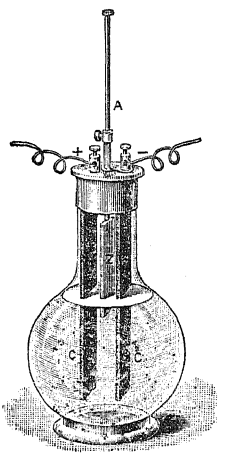


FIG. 5. GRENET CELL.

Fig. 6 illustrates a form of chromic acid battery, where the several cells composing it have their carbons and zincs suspended from a frame. It is known as a plunge battery and is convenient for experimental work.

The Edison-Lalande Cell is an example of the use of a solid depolarizer, viz., black oxide of copper. It was originally due to Lalande. The electrolyte is a solution of caustic soda, one part of the alkali to three of water by weight.

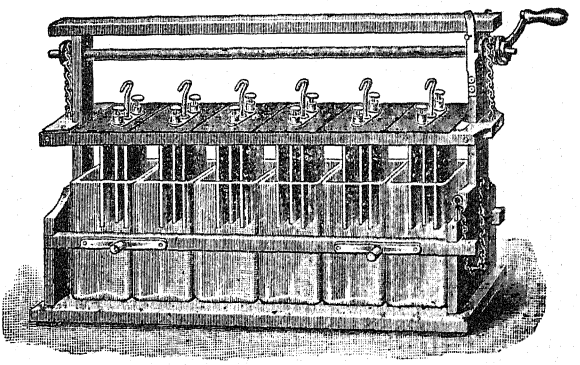


FIG. 6. PLUNGE BATTERY.

When the cell is working, the zinc forms with the alkali sodium zincate, which is soluble, while hydrogen is released at the cathode. Copper oxide readily gives up its oxygen to a reducing agent like hydrogen. In this cell the copper oxide is employed as a compressed plate, supported in a light copper framework, which is

attached to the cover of the jar and forms the positive electrode. In the larger sizes two zinc plates are used, one on each side of the copper oxide slab. The solution is covered with a layer of heavy paraffin oil to prevent access of the carbon dioxide of the air, which would convert some of the caustic soda into a carbonate and shorten the useful life of the cell. The serious disadvantages of this cell are high first cost and low electromotive force. When freshly set up the cell may have as high an electromotive force as one volt, but the working value is only about three-quarters of a volt.

All of the preceding cells, except the simple one of Volta, are adapted to work on a closed circuit. They do not polarize very seriously and are able to furnish a fairly constant current for a long period.

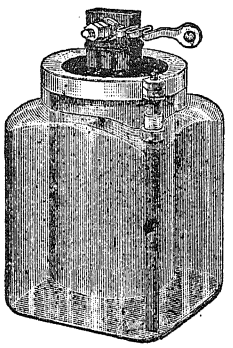


FIG. 7. LECLANCHÉ CELL.

The Leclanché Cell stands in quite a different class. It is usually free from local action, but it polarizes easily and is therefore employed for domestic purposes requiring intermittent currents for short periods only. For such service it is good for months and even years, without replenishment of anything except water. The Leclanché cell consists of a glass jar containing a saturated solution of ammonic chloride (sal ammoniac) in which is immersed a rolled zinc rod (Fig. 7). The porous pot contains a bar of carbon tightly packed in a mixture of manganese dioxide and granulated carbon. When the circuit is closed, the sal ammoniac acts on the zinc, forming zinc chloride and liberating ammonia and hydrogen. The hydrogen is slowly oxidized by the manganese dioxide. On a closed circuit the hydrogen is liberated faster than it is oxidized, and the cell polarizes. If it is allowed to rest it recovers from polarization. The form shown in the illustration has a porous pot provided with a flange which fits the top of the glass jar. The zinc rod enters the jar through a small hole, which is closed by a piece of rubber tubing surrounding the rod at this point. The jar is thus practically closed for the purpose of preventing evaporation.

Investigation has shown that the manganese dioxide furnishes only about half the oxygen to effect complete depolarization in a cell worked intermittently. It can hardly be doubted that an additional source of oxygen is the gas absorbed by the carbon and dissolved in the electrolyte. With ready access of air and frequent intervals of rest, it is quite possible that nearly enough oxygen may be supplied from the air without any other depolarizer. It is for this reason that the carbon cell, which is the Leclanché with the porous pot and the manganese dioxide omitted, is quite effective for easy and intermittent service.

Dry Cells have come into extensive use in recent years for the purpose of securing portability, which is obviously lacking in a cell with a liquid electrolyte. The name is a misnomer, since a so-called dry cell is practically a Leclanché cell in which the electrolyte is in the form of a moist mixture. The chief difficulty in devising a dry cell is to find an absorbing medium for the mixture sufficiently hygroscopic to keep it wet. Dry cells deteriorate by local action and by loss of water.

Fig. 8 shows in section a dry cell of modern design. The zinc can forms the negative electrode. Inside this can, at the bottom and sides,

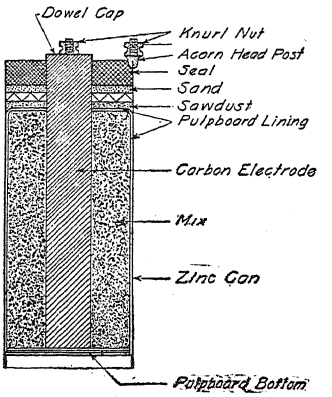


FIG. 8. DRY CELL.

is a pulpboard lining, which serves two purposes: as an insulator between the zinc and the mixture, and as a medium for carrying a part of the electrolyte. The positive electrode consists of the carbon rod, which is surrounded by the portion designated "mix" in the figure. This mixture consists of crushed carbon, graphite, manganese dioxide, zinc chloride, and ammonium chloride. It is packed tightly around the carbon electrode. The whole is held in place and made air-tight with a wax or pitch seal. A cell constructed in this manner will have a voltage of from 1.5 to 1.6 and will show a short-circuit current of from 25 to 30 amperes. The standard dimensions of these cells are 2½ inches by 6 inches.

Small dry cells, for use in pocket flashlights, millions of which are sold annually, differ from the standard size in the use of a muslin bag instead of the pulpboard to separate the zinc from the mixture. Two or three of these cells are connected in series according to the voltage of the lamp used.

Figures 9 and 10 exhibit graphically tests of a Leclanché and an Obach dry cell respectively. Each cell was on a closed circuit through an external resistance of five ohms for one hour; the recovery from polarization was traced for the following hour, the data for the latter being plotted backward towards the starting point. The polarization of the dry cell was somewhat less than that of the Leclanché; but after the first five minutes the current through the Leclanché was more constant in value than that through the dry cell.

Standard Cells. A standard cell is employed as a standard of electromotive force. It is not intended to furnish any current, but only electric pressure. The first standard cell was invented by the late Latimer Clark in 1873. In 1894 it was made a legal standard in Great Britain and the United States; and, in accordance with the best determinations up to that time, its electromotive force was assumed to be 1.434 volts at 15° C. Its value now is 1.4324 volts.

It consists of zinc in a saturated solution of zinc sulphate, and mercury in contact with a

paste of mercurous sulphate mixed with zinc sulphate. All the materials must be neutral and specially prepared in accordance with standard

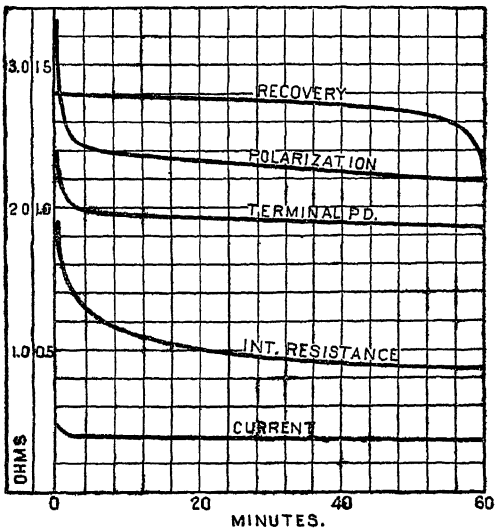


FIG. 9. DIAGRAM SHOWING TEST OF A LECLANCHÉ CELL.

specifications. The Carhart-Clark cell, a modified form of the above, was also used.

The H form devised by Lord Rayleigh is now universally used. In one limb of the H is the negative electrode, consisting of a mercury-zinc amalgam containing 10 per cent of zinc. This is covered to the depth of one centimeter with zinc sulphate crystals. The positive electrode in the other limb is pure mercury, and

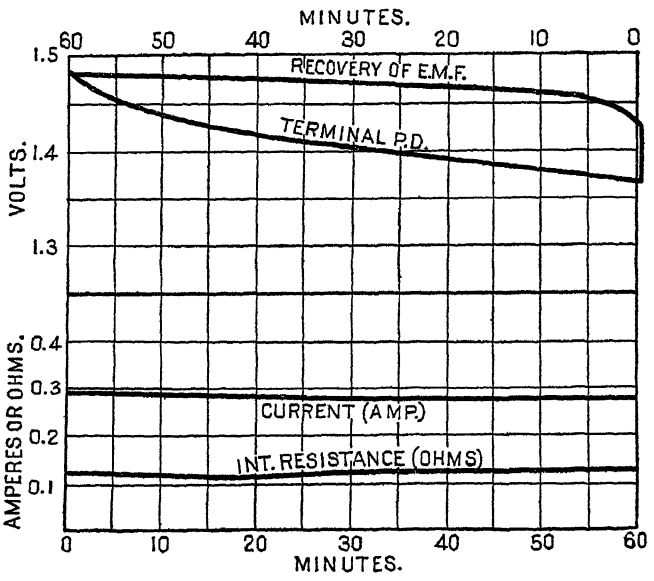


FIG. 10. DIAGRAM SHOWING TEST OF AN OBACH CELL.

on this is placed the mercurous sulphate paste; the paste in turn is covered with crystals of the zinc salt. The cell is finally filled with a saturated solution of zinc sulphate, and the vessel is securely closed. Platinum wires sealed into the two limbs of the cell make connection with the zinc amalgam and the mercury respectively.

The change of electromotive force with temperature is large in the Clark cell. The formula expressing the electromotive force of the cell at any temperature is

$$E_t = E_{15} - 0.00119\,(t-15) - 0.000007\,(t-15)^2.$$

Thus near 15° C. a change of temperature of 1° C. changes the electromotive force about 0.0012 volt. This formula is good between 10° and 25° or 30° C.

Weston Normal Cell. The International Conference on Electrical Units and Standards, held in London in 1908, decided unanimously to adopt the Weston normal cell as the international standard of electromotive force Since that time the Weston normal cell has everywhere displaced the Clark cell as the international standard. In the Weston cell cadmium amalgam is used instead of zinc amalgam, and saturated cadmium sulphate instead of zinc sulphate In other respects the Weston cell is like the Clark It is made in the H-form (Fig 11). Both limbs are completely closed by sealing them before the blowpipe.

A signal advantage of the Weston normal cell over the Clark is its small change of electromotive force with temperature. The international value of its electromotive force at 20° C. is 1 0183 volts, and the formula expressing the electromotive force at any temperature is

$$E_t = E_{20} - 0.0000406\,(t-20) - 0.00000095\,(t-20)^2.$$

The Weston normal cell should be distinguished from the Weston standard cell of commerce, which is set up with a nearly saturated solution of cadmium sulphate but without any crystals of the cadmium salt The electromotive force of the latter is somewhat higher than that of the normal cell, and the effect of a change of cadmium sulphate are present; but this cell is not reproducible to the degree required in a standard. The average of small groups of Weston normal cells made in different countries agrees in electromotive force to within about two parts in a hundred thousand.

Energy Relations. From the point of view of energy a voltaic cell is a device for the direct conversion of potential chemical energy into the energy of an electric current. Long ago the question arose whether all the chemical energy transformed in a voltaic cell is thus converted in its entirety into electrical energy. The chemical processes going on in the cell involve a loss in the intrinsic energy of the materials. Does this loss equal the energy which takes the form represented by the electric current? Lord Kelvin and Helmholtz at first answered the question in the affirmative. According to this view it is a simple matter to calculate the electromotive force of any given voltaic combination from the heats of formation of the compounds undergoing chemical change. The quantity of electricity transported through a cell, when a gram equivalent of zinc enters into solution, and a gram equivalent of other substances undergoes a concurrent change, may be obtained by dividing the atomic weight of zinc

by its electrochemical equivalent. The result is 96,540 coulombs. This quantity multiplied by the electromotive force of the cell must equal the electrical energy given out while one gram equivalent of zinc goes into solution. If this product is placed equal to the algebraic sum of the heats of formation of all the chemical changes involved in the cell, the value of the electromotive force is readily obtained from the equation. Thus the heat of formation of a gram equivalent (32.5 grams) of zinc as $ZnSO_4$ is 121,000 calories; of copper (31.7 grams), as $CuSO_4$, is 95,700 calories. The difference is 25,300 calories. In other words, the reaction in the Daniell cell may be written

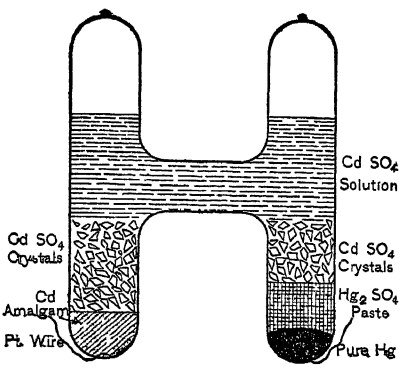


FIG. 11. WESTON NORMAL CELL

$$CuSO_4 + Zn = ZnSO_4 + Cu + 25{,}300 \text{ calories.}$$

Then $EF = 25{,}300 \times 4.186$ watts, where F is the quantity of electricity (96,540 coulombs) corresponding to one gram equivalent. From this equation E is 1.098, the electromotive force of the Daniell cell. This value agrees very closely with the observed value. It was soon found, however, that other cells did not show equally good agreement with the theory. In some the electromotive force is smaller than the value calculated from the heats of formation, and in a few it is larger. Finally, Willard Gibbs in America and Helmholtz in Germany independently expressed the true relationship between the chemical energy transformed and the electrical energy developed. The Helmholtz equation may be written as follows:

$$E = \frac{H}{nF} + T\frac{dE}{dT},$$

in which H is the algebraic sum of all the heats of formation expressed in mechanical measure, n is the valence of the cation, F is the quantity of electricity transported through the cell by one gram equivalent of any substance, T is the absolute temperature (on a scale whose zero is —273° C.), and dE/dT is the temperature coefficient of the electromotive force of the cell. From this equation it is obvious that the actual electromotive force is smaller than the value calculated from thermal data alone whenever the temperature coefficient of the cell is negative, and it is larger when the temperature coefficient is positive. In the former case, only a portion of the transformed chemical energy appears as the energy of the current; the remainder heats the cell. In the latter case the electrical energy given out by the cell is in excess of the chemical energy transformed, and the cell converts some of its heat into electrical energy and so cools in action. The Gibbs-Helmholtz equation represents our most assured knowledge of the relations between the chemical, electrical, and thermal quantities involved in a voltaic cell, and it has been fully established by experiment. Consult Walker, *Introduction to Physical Chemistry* (London, 1891), and Carhart, "Thermodynamics of a Voltaic Cell," in *Physical Review* for July, 1900.

It has been demonstrated also by experiment that the change in the electromotive force of a cell per degree of temperature is equal to the sum of all the thermal electromotive forces per degree, taken with their proper sign, at all contacts of dissimilar substances in the cell.

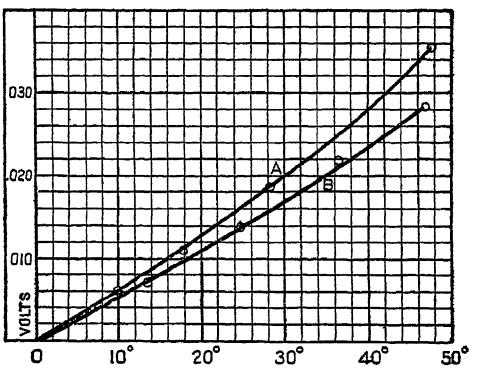


FIG. 12.

The thermoelectromotive force between zinc and a solution of zinc sulphate is directed from the solution to the metal. The same is true of copper and copper sulphate, while the thermoelectromotive force between equidense solutions of the sulphates of zinc and copper is practically zero. If a Daniell cell be so constructed that one side or electrode may be heated independently of the other, it will have a positive coefficient if the positive electrode and the solution about it be heated, and a negative coefficient if the

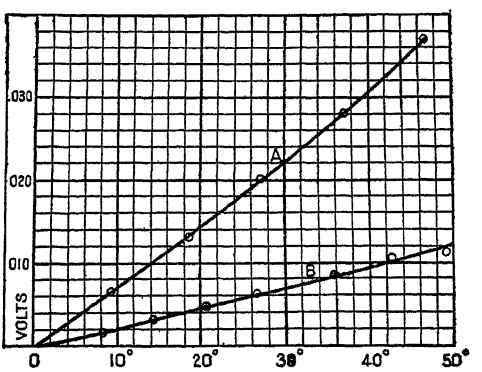


FIG. 13.

negative side be heated. Since both zinc and copper, each in a solution of its sulphate, tend to become positive when heated, or to play the rôle of copper in a simple voltaic element, it follows that the thermoelectromotive force at the copper electrode of a Daniell cell is in the same direction as that of the cell itself, while that at the zinc electrode is in the opposite direction. These two thermoelectromotive forces per degree C. are very nearly equal to each other, and

the temperature coefficient of the Daniell cell is accordingly very small. The curves of Fig 12 represent the changes in the electromotive force of a Daniell cell produced by heating the two sides separately. Curve *A* is for the zinc side, and curve *B* for the copper side. The two changes have opposite signs, but both are plotted as positive ordinates in the figure, since their difference expresses the change of electromotive force when the whole cell is heated

In Fig. 13 curve *A* is again the curve for zinc —zinc sulphate—and curve *B* is the curve for mercury—mercurous sulphate—in the same solution of zinc sulphate. In other words, the cell was set up as a Clark standard cell without any crystals of the zinc salt. The difference in the values of these thermoelectromotive forces for say 10° and 40°, divided by the temperature difference, 30°, gives the change in electromotive force of this type of Clark cell for 1° C. It is 0.00055 volt. The actual change determined by heating the whole cell was 0 00056 volt; and if a much smaller term, depending on the square of the temperature difference, be taken into account, the result will be identical with that obtained from the curves of Fig. 13.

The same method of synthesis applied to a cell composed of zinc in a solution of zinc chloride and mercury in contact with mercurous chloride (calomel), which has a small positive temperature coefficient, again gives a result agreeing perfectly with the coefficient obtained by direct measurement.

It thus appears that the heat generated or absorbed by a voltaic cell, corresponding with the sign of the temperature coefficient, may be localized in the cell. In the Daniell cell the passage of a current generates heat at the zinc electrode, where the current flows against the thermoelectromotive force at that point; at the same time heat is absorbed at the copper electrode, because the thermoelectromotive force there is in the same direction as the current, and energy is given to the circuit. This energy is supplied by the heat of the cell itself. On account of these two opposite heat effects a difference of temperature is established between the two sides of the cell proportional to the quantity of electricity that has passed through it. If a current is passed through the cell from some outside source, in the opposite direction, the heat effects at both electrodes will be reversed. These results have been established by experiment. If heat is generated on one side and absorbed at the other in equal quantities, then the temperature of the cell as a whole will remain unchanged, the temperature coefficient is zero, and the chemical energy transformed equals the electrical energy given out.

Nernst's Theory. The modern theory of dissociation has given rise to another view of voltaic cells in the hands of Nernst and his school. Van't Hoff accounts for the phenomena of osmotic pressure by the theory that the molecules and ions in a solution exert a pressure which conforms in all respects to the laws of Boyle and Gay-Lussac for gases. According to this view, the ions are forced out of the solution against the electrodes in a voltaic cell and give up their charges to them.

Further, it is assumed that metals exhibit a tendency to go into the ionic state when immersed in an electrolyte. This tendency is known as electrolytic solution pressure. It is analogous to vapor pressure, and measures the tendency of a metal to pass into the state of free ions in an electrolyte. Let P denote the solution pressure, and p the osmotic pressure due to the metallic ions present in the electrolyte. If now P is greater than p, some of the metal will go into the solution as positively charged ions, leaving the metallic mass negatively charged. If P equals p, no more ions are formed and the metal does not become charged. If P is less than p, the osmotic pressure drives the positive ions out against the smaller solution pressure, and the metal to which they give up their charges becomes positively charged. The charging of the metal is equivalent to the production of a difference of potential between the metal and the solution.

Starting from the well-known gas equation, $pv = RT$, and assuming that when the ions pass from the pressure P to the pressure p, work is done to the same extent as if the ions were in the gaseous state, Nernst found that the electromotive force between a metal and an electrolyte may be expressed by the following formula:

$$E = 0.0002 \frac{T}{n} \log \frac{P}{p}.$$

In this equation n is the valence of the metal. Taking into consideration the potential difference at both electrodes, we have as the equation for the electromotive force of a voltaic cell, neglecting the small potential difference at the contact of the two electrolytes,

$$E = 0.0002\, T \left(\frac{1}{n} \log \frac{P}{p} - \frac{1}{n'} \log \frac{P'}{p'} \right).$$

The Gibbs-Helmholtz and the Nernst formulas denote two methods of viewing the action taking place in a voltaic cell. They are not antagonistic, but complementary. Nernst's formula gives perhaps a more detailed insight into the mechanism of a cell; Helmholtz's, especially when the heat effects are localized, considers a voltaic cell entirely from the point of view of the chemical and thermal energy involved. The Nernst formula gives no definite account of the temperature coefficient of a cell, nor of the relation of this coefficient to the electrical energy evolved. The thermodynamic method of Gibbs and Helmholtz furnishes the most secure foundation for the investigation of the transformations of energy in a voltaic cell, without exposing to view, however, the exact mechanism beyond the application of thermoelectromotive forces to the problem.

Concentration Cells. In the extreme case in which there is no chemical energy to be converted into work, the cell becomes a device for the conversion of heat alone into the energy of the current. It is then known as a concentration cell. Thus, when two electrodes of the same metal are immersed in a solution of a salt of this metal, the concentration of the solution at one electrode being greater than at the other, the cell has a small electromotive force which will produce a current. When the solutions are so dilute that there is no further heat of dilution, this electromotive force is the residual obtained from the Gibbs-Helmholtz equation, or $T \times dE/dT$. It is proportional to the absolute temperature of the cell. Fig. 14 represents a Zn-$ZnSO_4$ concentra-

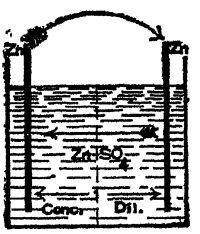


FIG. 14. CONCENTRATION CELL.

tion cell. The direction of the electromotive force within the cell is shown by the long arrow in the solutions. The short arrows show the direction of the thermoelectromotive forces at the two electrodes. This thermoelectromotive force increases in value with an increase in the concentration of the electrolyte, and the relation between the two is a perfectly definite one. Hence the origin of the electromotive force in a concentration cell, with solutions of extreme dilution, may be regarded as thermal entirely and equal to the difference of the two thermoelectromotive forces on the two sides of the cell. There is also probably a small electromotive force at the contact of the two solutions. Such a cell converts the heat of its surroundings into the energy of a current, but it does not contradict the second law of thermodynamics, because the process involved does not constitute a cycle of operations. Such a system as this cannot by repeated cooling convert into work the heat of neighboring bodies, because the concentrations are equalized by the flow of current, and then there is no further electromotive force.

On the Nernst theory the formula for the electromotive force of a concentration cell becomes

$$E = 0.0002\frac{i}{n}\cdot\frac{2v}{u+v}\cdot T\log\frac{c_1}{c_2}.$$

In this formula i expresses the degree of dissociation of the dissolved salt, u and v are the migration velocities of the positive and negative ions respectively, and c_1 and c_2 are the two concentrations.

Nernst has applied his theory to a concentration cell consisting of silver electrodes in solutions of silver nitrate, the concentrations being as 1 to 10. The measured electromotive force was 0.055 volt at 18° C., and the calculated value, 0.0574. The two are in very satisfactory agreement.

Similar concentration cells may be made by employing a single solution and amalgams in contact with it, the two amalgams containing the metal ion in different degrees of concentration. For example, zinc-mercury amalgams in contact with a solution of zinc sulphate give an electromotive force from the concentrated to the dilute amalgam through the cell. When a current flows the zinc goes into solution from the more concentrated amalgam, and zinc ions are set free at the surface of the weaker amalgam. In this case the larger thermoelectromotive force is at the junction of the less concentrated amalgam and the solution; and more heat is absorbed at the cathode than is generated at the anode. As in the other case, therefore, this cell converts heat into electric energy

When the heats of dilution of the solutions in the two sides of the cell differ, the difference is available as energy to produce electromotive force, represented by the first term of the Gibbs-Helmholtz equation. The Nernst equation does not take this energy into account, it is therefore applicable to solutions of extreme dilution only. (*Physical Review*, vol xxvi, March, 1908, pp. 210–219.) To illustrate The difference between the known heats of dilution of the solutions $ZnSO_4\cdot 50H_2O$ and $ZnSO_4\cdot 200H_2O$ is 67 calories per gram molecule If a concentration cell is set up with these two solutions, the electromotive force derived from this heat of dilution is

$$\frac{67\times 4\,186}{2\times 96.540} = 0.00145 \text{ volt.}$$

The coefficient dE/dT of this cell with zinc amalgam electrodes was found to be 0 0000344. Hence at 25° C. (or 25° + 273° = 298° absolute) the term TdE/dT is

$$298 \times 0.0000344 = 0\,01025 \text{ volt. Then}$$
$$E = 0.00145 + 0.0125 = 0.0117 \text{ volt.}$$

The measured voltage was 0.0116 volt. Other concentration cells gave computed values agreeing equally well with the observed ones, as shown in the following table:

SOLUTIONS	$\frac{dE}{dT}$	$T\frac{dE}{dT}$	E_h	Comp E.M.F.	Obs E.M.F.
$ZnSO_4$. 50 H_2O					
$ZnSO_4$ 400 H_2O	0.0000528	0.01573–25°	0.00178	0.0175	0 0171
$ZnSO_4$. 100 H_2O					
$ZnSO_4$ 400 H_2O	0.000032	0 00954–25°	0.00072	0.0103	0.0101
$ZnSO_4$ 50 H_2O					
$ZnSO_4$. 100 H_2O	0 0000174	0 00518–25°	0.00106	0.0062	0.0062
$ZnSO_4$. 50 H_2O					
$ZnSO_4$. 200 H_2O	0.0000344	0 01025–25°	0 00145	0 0117	0.0116
$CdSO_4$. 50 H_2O					
$CdSO_4$. 400 H_2O	0 0000188	0 00557–23°	0 01080	0 0164	0.0164
$CdSO_4$. 50 H_2O					
$CdSO_4$. 200 H_2O	0.000009	0 00246–0°	0 00847	0.0109	0.0108
$CdSO_4$. 100 H_2O					
$CdSO_4$. 400 H_2O	0.0000155	0.00423–0°	0.00604	0.0103	0 0099
$CuSO_4$ 60 H_2O					
$CuSO_4$. 200 H_2O	0 0000248	0.00739–25°	0 00251	0.0099	0 0098
$ZnCl_2$ .21 9 H_2O					
$ZnCl_2$. 386 H_2O	—0.000104	—0 02839–0°	0.10100	0.0726	0 0751

Bibliography. H. S Carhart, *Primary Batteries* (Boston, 1891); R. A. Lehfeldt, *A Textbook of Physical Chemistry* (London, 1899); J. Walker, *Introduction to Physical Chemistry* (ib., 1899); Walther Nernst, *Theoretische Chemie* (Stuttgart, 1900); W. R. Cooper, *Primary Batteries: Their Theory, Construction, and Use* (London, 1901); S. A. Arrhenius, *Textbook of Electrochemistry*, English translation by John McCrae (ib., 1902); W. Jaeger, *Die Normalelemente und ihre Anwendung in der elektrischen Messtechnik* (Halle, 1902).

VOLTAIRE, vôl'târ'. The assumed name of JEAN FRANÇOIS MARIE AROUET (1694–1778). A French philosopher and a versatile author, born in Paris in February, 1694. His father was first a notary and afterward a treasurer attached to one of the high courts of the kingdom. Jean François was educated first at the Collège Louis le Grand, then by the Jesuits, becoming a brilliant scholar. His education was directed partly by his father, partly by a worldly

ecclesiastic, the Abbé de Châteauneuf, who introduced him to the best society of the last years of Louis XIV. His school days were followed by a few years of rather dissipated life, which ended when he was taken to The Hague as secretary by the French Ambassador to Holland, the Marquis de Châteauneuf, a kinsman of the Abbé. Having fallen into a love intrigue with a young lady of a refugee Huguenot family, Olympe Dunoyer, he was sent back to Paris, and his father determined to send him to the colonies, but relented on the young man's promise to reform and to study in an attorney's office. In the freer life of the Regency he soon became known as a brilliant and sarcastic wit His caustic repartees more than once brought him into trouble. He had twice to leave Paris by order of the Regent, and finally, on account of something he had written, and of other things wrongly ascribed to him, he was imprisoned in the Bastille, remaining 11 months (1717–18). His release was soon followed by the performance at the Théâtre Français of his first tragedy, *Œdipe*, based on the *Œdipus Tyrannus* of Sophocles. The play was received with great applause, and the author was at once hailed as the legitimate heir of the great masters of French tragedy. About this time Arouet assumed the name of Voltaire, the origin of which has never been satisfactorily explained

The production of *Œdipe* (1718) may be considered the beginning of his extraordinary literary career. For a long time he was considered mainly a dramatic poet; yet even then he had conceived the idea of an epic poem devoted to the glory of Henry IV, and intended as a eulogy of the principle of religious toleration, and he had planned a great historical work relating the events of the reign of Louis XIV. From 1719 to 1726 he was occupied mainly with the production of plays, none of which repeated the success of *Œdipe*, and with the composition of his epic poem, which, under the strict laws then governing the printing of literary works, he was unable to publish. This poem, known first as the *Poème de la Ligue*, was printed in Geneva (1723) and issued secretly, but met with considerable success. In his first philosophical poem, *Le pour et le contre*, both his anti-Christian views and his deistic philosophy found clear and eloquent expression. This period of Voltaire's life is also marked by the beginning of his enmity towards a man who was then considered the greatest lyric poet of France, Jean Baptiste Rousseau. A quarrel with a member of a very high family, the Chevalier de Rohan, led in 1726 to a second imprisonment in the Bastille, which was ended in a few days by his promise to leave the kingdom and to move to England. He remained there 26 months, acquainting himself with the social and intellectual life of the country. His visit had been preceded by his acquaintance with Bolingbroke, who introduced him to the greatest literary men of the time, Pope, Congreve, Young, and Chesterfield. He soon mastered the language, and, in order to prepare the British public for the appearance of an enlarged edition of his epic poem, wrote in English two remarkable essays, one on epic poetry, the other on the history of civil wars in France. The poem itself, under its permanent title of *La Henriade*, soon followed. Although the French government took great precautions to prevent the introduction of the book into France, its success all over the continent of Europe was unprecedented. Voltaire, already considered the most brilliant dramatic poet of the age, was proclaimed a not unworthy rival of Homer and Vergil. This judgment is far from having been indorsed by posterity The success of *La Henriade* was due to temporary circumstances and conditions, and especially to its eloquent presentation of the idea of religious toleration.

Permission to return to France was granted to Voltaire in 1728. Until 1732 he resided in Paris, and it is not too much to say that all that he did during this period bears witness to the deep influence exerted upon him by his stay in England. His chief works during these active years were dramatic. The tragedies of *Brutus* (1730), *Zaire* (1732), and *Sémiramis* (1748) show the influence of Shakespeare, *Zaire* being, to a certain extent, an adaptation of the theme of *Othello* to the French stage. Voltaire wrote also a series of letters, very likely based upon actual letters sent by him to his friend Tiariot during his stay in England, and tending to make the intellectual life of England known to the French public, and he composed a *Histoire de Charles XII, roi de Suède*, the elements of which were received by Voltaire from the Swedish Ambassador to England. The publication of the letters just mentioned forms one of the most curious incidents in Voltaire's career. After having had them printed, he feared the effect of their publication He therefore decided to defer the publication of the work, at least in French, and it appeared first in England, in an English translation entitled *Letters Concerning the English Nation* (1734). A spurious edition of the French version, however, due to the purloining of some of the volumes printed by order of Voltaire, soon found its way to the public, and brought about a wrangle between the author and his intended publisher, Jore. There was even some danger of Voltaire's being sent for the third time to the Bastille. This was averted only by his clearly demonstrating that he had had nothing to do with the publication of the work. It is now known as *Lettres philosophiques*, and is considered not far from the first of what may be called Voltaire's revolutionary works. They touch upon various subjects as to which he thought the French sorely needed enlightenment: the system of religious toleration followed in England; the guarantees for individual freedom enjoyed by British subjects; liberty of speech and of the press; the political life manifested in the existence of a free Parliament; the esteem in which literary men were held; a literature unknown to France and one which gloried in the names of Shakespeare and Milton; the scientific and philosophic labors of Newton and Locke, destined soon to supplant in the minds of Frenchmen the theories of Descartes; the practice of inoculation against smallpox, etc. Few works ever published contain so much matter as these letters, which led every Frenchman who read them to think about the conditions under which he was compelled to live and to question whether the French political and social system was as perfect as it had been held to be by the preceding generations.

A new period now began in Voltaire's life, owing to his peculiar association with a woman of high aristocratic rank, Madame du Châtelet, with whom, by the strange moral code then accepted in high French society, he was permitted to live in the closest intimacy until her death in

1749, without even causing a break between her and her husband These years were spent mostly at Madame du Châtelet's château at Cirey on the boundaries between Champagne and Lorraine Voltaire was then wealthy, having been enriched by speculations, some of them of a dubious character, during preceding years, and this improvement in his fortune was manifested by his style of life His years in Cirey in companionship with a woman of high intellectual gifts and scientific attainments, to whom the French were indebted for the first translation in their language of Newton's *Principia*, were years of prodigious intellectual activity. Play upon play was sent by him from the Château de Cirey to be performed in Paris. He worked on his history of Louis XIV and on a still more ambitious historical work, the composition of which was undertaken at Madame du Châtelet's request, a universal history from the death of Charlemagne to the accession of Louis XIV He published the *Eléments de la philosophie de Newton*, intended to acquaint the French public more thoroughly with the system, only a glimpse of which had been given them in the *Lettres philosophiques*. His lighter productions, tales, novels, satires, light poetry, are almost numberless; one, the poem *Le mondain* (1736), a defense of refined and luxurious life, brought him into serious trouble, as he was accused of having cast ridicule upon religion by the way in which he had spoken of Adam and Eve To the same period belongs in part the composition of another and longer poem which Voltaire's admirers wish he had never written, the celebrated *La pucelle* (1739; first published, 1755), the mock heroine of which is no other than the purest incarnation of French patriotism, Joan of Arc. In truth Voltaire never intended in this poem to cast ridicule upon the historical figure of the Maid of Orleans, as is shown by the pages devoted to her in his historical writings. His satire is directed only against the absurdly mystical idea of her career presented in Chapelain's *Pucelle* (1730 or 1731). Voltaire's stay in Cirey was not continuous. He often went from there to Paris, and to Versailles, where through the influence of Louis XV's famous mistress, Madame de Pompadour, he even became a court character. His first step in this direction was his appointment as historiographer of France and then as one of the gentlemen of the King's bedchamber, soon followed by his election to the French Academy (1746). His *Poème de Fontenoy* (1745), describing a battle won by the French over the English during the War of the Austrian Succession, and his *Précis du siècle de Louis XV*, as well as his two dramatic court entertainments, *La princesse de Navarre* and *Le triomphe de Trajan*, were the outcome of the connection of Voltaire with the court of Louis XV. The performance of the *Triomphe de Trajan* marked the end of his favor at court. While still holding his court offices Voltaire returned to Cirey, meaning to remain there for life There should also be mentioned the comedy *L'Enfant prodigue* (1736) and the tragedies *Mahomet* (1742) and *Mérope* (1743). His plans were upset in 1749 by the death of Madame du Châtelet, who had formed a new and secret connection with the poet Saint-Lambert; and he returned to Paris, where he tried to make himself a home, kept by one of his nieces, a young widow, Madame Denis. He found the French public somewhat estranged; rivals had arisen during his absence, and he determined to fight them upon their own ground and to put on the stage dramas written on themes already treated by them.

This is one of the most unsatisfactory periods of Voltaire's life. He was dissatisfied with himself as well as with the rest of the world, and therefore determined to accept the offers made to him by Frederick II, King of Prussia. His intercourse with this great man had begun in 1736, when Frederick had asked him to become one of his regular correspondents Both as Prince Royal and after 1740 as King of Prussia, Frederick overwhelmed the great writer with all sorts of flatteries. After his accession he used every effort to induce Voltaire to live permanently at the court of Prussia, but at first failed. There were meetings between the two men, visits of Voltaire to Berlin and Potsdam, during one of which he performed an important diplomatic mission in behalf of the French government. The death of Madame du Châtelet removed the obstacle that kept Voltaire from accepting Frederick's offers. He managed to get the permission of the King of France for this step, and in 1750 went to Berlin He was received with demonstrations of the deepest affection, but the opposition of their characters soon manifested itself in quarrels due largely to Frederick's autocratic temper and to the freedom with which Voltaire ridiculed, not without good reasons, the president of the Royal Academy of Berlin, the French scientist Maupertuis Within two years Voltaire left Berlin, never to return His stay in Prussia, however, had not been barren of literary results. While there he completed and had published in Leipzig (1751) his *Siècle de Louis XIV*, the success of which was greater than that of any other history previously published. An epilogue of Voltaire's stay with Frederick happened in Frankfort, where, by order of Frederick, he was arrested and made to suffer harsh treatment, under the pretext of his having carried away a volume of Frederick's poems. This added to his rage, and made Frederick exceedingly unpopular for a time among men of letters

Voltaire returned to France and for a while he was without abode. Louis XV had been offended by his request to leave France for Berlin while holding the title of Gentleman of the King's Bedchamber, and would not permit him to return to Paris. Seeing him unwelcome at the court, those in power elsewhere declined to welcome him, and finally he determined again to move out of France, and in 1754 settled in the Republic of Geneva, where he bought a house. He also bought a small estate in the Vaud country, then under the government of the Republic of Bern. But he soon discovered that he was not likely to enjoy much more freedom under republican and Protestant governments than under the King of France, and conceived the idea of being, as it were, his own sovereign. He bought, for his lifetime, two estates in France near the boundaries of the Republic of Geneva, the estates of Tournay and of Ferney. This gave him the possession of feudal rights, transferred to him and secured through the good offices of the Duke of Choiseul, who had recently become the Prime Minister of Louis XV and by whom he was greatly admired. He settled in Ferney in 1758, there to spend the last 20 years of his eventful life. In the interval between his return from Berlin and his

settlement at Ferney, he had published his most ambitious historic work, *Essai sur l'histoire générale et sur les mœurs et l'esprit des nations*, the title given to the universal history already mentioned above.

When Voltaire settled in Ferney, all his extensive works, with the exception of his *Dictionnaire philosophique*, had been published; but his work was not yet half done. In Ferney he felt secure; persecution could hardly reach him. He therefore assumed a very aggressive attitude towards all the abuses which he desired to destroy. Instead of undertaking large compositions, he sent forth hundreds of short writings issued under all sorts of names, seldom under his own, printed in many different places and finding their way to the public in spite of the severe restrictions placed upon the production of literary works His main theme was the fight against religious intolerance and religious fanaticism, against belief in miracles, and in favor of the sovereignty of reason. Every man who suffered on account of his belief found in him an eloquent and, as the event demonstrated, a powerful defender. The clearest demonstration of this fact was given by him in his labors in favor of the Calas family. (See CALAS, JEAN.) A touching episode of this period of Voltaire's life is his conduct towards a grandniece of the great tragic poet, Pierre Corneille, of whose poverty he had heard and whom he invited to Ferney, acting to her as a father and educator, and preparing, in order to secure a dowry for her, a complete edition of Pierre Corneille's works. Every person of note in Europe, from the King of France down, showed eagerness to subscribe. The romance *Candide* appeared in 1759 and the tragedy *Tancrède* in 1760.

In the year 1778 his friends besought him to pay a visit to Paris Louis XV was dead and Louis XVI had not energy enough to forbid what he disliked. In spite of the opinion of his physician, the celebrated Tronchin, who told him that an oak cannot be transplanted when more than 80 years old, Voltaire yielded to the temptation. The Parisians received him with demonstrations of the greatest enthusiasm. His bust was crowned in his own presence at the Théâtre Français on the occasion of the first performance of his tragedy of *Irène;* the French Academy held a special meeting in which he heard eulogies of his own deeds and writings. He was visited by every person of note. Benjamin Franklin, then in Paris as the agent of the newly founded Republic of the United States, took to him his own grandson, on whom he asked Voltaire to pronounce a blessing. Voltaire placed his hand upon the young man's head, uttering at the same time in English, "God and Liberty." Voltaire has been represented as an atheist, but without warrant as far as his written or spoken utterances are concerned.

To the success of his fight for liberty a comparison between the condition of things at the time of his death and at the time when he began to write bears sufficient witness. His exertions while in Paris had the effect which Tronchin had foreseen, and he died there on May 30, 1778. His body, which was first carried away from Paris by his nephew, Abbé Mignot, was afterward taken to the Panthéon, where, in spite of various statements that it had been disinterred, it is believed still to be resting.

As a writer, Voltaire is not, perhaps, the author of a single great masterpiece; but every one of his productions, at least in prose, presents to us an unsurpassed example of clearness, perspicuity, and wit. He wrote in order to convince, and so far succeeded that many of his writings have to a certain extent lost their interest because of the very destruction of the abuses against which they were directed One who wishes to appreciate his greatness must look upon him more as a man of action who used literature as a weapon than as a mere writer.

Bibliography. The best editions of his works are those published at Kehl (70 vols., 1785–89); the Beuckot edition (70 vols., Paris, 1839 et seq.); the Moland edition (50 vols., ib., 1875 et seq.) The best collection of selected works is the one edited by Georges Bengesco (10 vols., Paris, 1887–92). Consult also: Gustave Desnoiresterres, *Voltaire et la société française au XVIIIème siècle* (2d ed., Paris, 1871–76); James Parton, *Life of Voltaire* (2 vols., Boston, 1881); Georges Bengesco, *Voltaire; Bibliographie de ses œuvres* (4 vols., Paris, 1882–90); Francis Espinasse, *Life of Voltaire* (London, 1892); Emile Faguet, *Voltaire* (8th ed., Paris, 1895); T. R. Lounsbury, *Shakespeare and Voltaire* (New York, 1902); John Morley, *Voltaire* (London, 1906); S. G. Tallentyre, *Life of Voltaire* (2 vols., New York, 1905); id., *Friends of Voltaire* (ib., 1907); J. Churton Collins, *Voltaire, Montesquieu, and Rousseau in England* (London, 1908); Gustave Lanson, *Voltaire* (2d ed., Paris, 1910); W. R. Price, *Symbolism of Voltaire's Novels* (New York, 1911).

VOLTAM'ETER (from *voltaic*, from It. *Volta*, name of the discoverer of the voltaic cell + Gk. *μέτρον, metron*, measure). An instrument designed to compare the intensities of electric currents by means of their effects when passed through electrolytes. (See ELECTRICITY.) It has been shown by Faraday and others that when an electric current is passed through an electrolyte the quantity of matter liberated at either of the electrodes—anode or cathode—varies directly as the quantity of current carried, i.e, as the product of the intensity of the current and the time. Therefore, if different currents are passed through any one electrolyte, their intensities may be compared by noting the quantities (number of grams) of matter liberated in given intervals of time. It has been observed, however, that this law of Faraday is true only if the same specifications are followed in the use of the apparatus for containing the electrolyte and obtaining the liberation of the matter. Such an apparatus is called a voltameter. There are various forms of voltameters in use; one is so arranged as to collect any gases that may be liberated at the electrodes, which in this case are made of platinum, and the electrolyte is generally dilute sulphuric acid; another consists of a solution of copper sulphate in water, having two copper plates as electrodes; in another the electrolyte is a solution of silver nitrate in water contained in a platinum bowl which serves as the cathode, the anode being a disk of silver. There are excellent discussions of the subject in *Bulletins of the National Bureau of Standards*, especially volumes ix and x (Washington, 1913–14), and various scientific and other papers from this institution. See AMPERE.

VOLTERRA, vôl-tĕr'rà. A town of the Province of Pisa, Italy, on a hill, 39 miles by rail southeast of Pisa (Map: Italy, C 3). Volterra is very irregular in outline, the main portion

being grouped on the southern side of the hill. It is surrounded by a high, massive, and remarkable wall, 4½ miles in circumference. Outside this wall is the ancient Etruscan necropolis. The notable cathedral, consecrated in 1120, was enlarged and embellished by Niccola Pisano. The superb Palazzo Municipio, dating from 1208, contains a few good pictures In the Palazzo Tagassi is the fine National Museum, founded in 1731 and including a library of more than 17,500 volumes, and the municipal archives. It contains, in addition, a wonderful collection of Etruscan cinerary urns, also sculptures, bronzes, gold ornaments, coins, etc. The imposing citadel is now used as a prison.

The leading industries are alabaster working —for which the town is famous—and the manufacture of salt from the brine springs at Leopoldo, 5 miles south of the town. The salt industry supplies all Tuscany. The chemical products are of importance. There are also ironworks. Pop. (commune), 1901, 14,433; 1911, 16,784.

Volterra, the Etruscan Velathri (Roman Volaterræ), was one of the 12 league cities of Etruria. During this period it was a large and important town. It was destroyed during the tenth century. It was for a time a free town. It came under the rule of Florence in 1361

VOLTERRA, DANIELE RICCIARELLI DA (1509–66). An Italian painter of the Late Renaissance, born at Volterra, in Tuscany He was a pupil first of Sodoma, and later became a follower of Michelangelo, occupying himself with painting after his designs. A more ungrateful task was the clothing of the nude figures in Michelangelo's "Last Judgment," from which he derived his nickname, *Il Braccatone* (breeches maker). His best picture, "Descent from the Cross," after Michelangelo, in Trinità de' Monti, at Rome, is a great composition, full of emotional power; and in the same church are his frescoes of the "Life of the Virgin." Other well-known paintings are: "Baptism of Christ," in San Pietro in Montorio (Rome), "David Killing Goliath" (Louvre); "Massacre of the Innocents" (Uffizi, Florence), containing more than 70 figures. Volterra also frescoed many façades of Roman palaces, now destroyed.

VOLTERRANO GIUNIORE. See FRANCESCHINI, BALDASARRE.

VOLTIGEURS, vōl'tē'zhĕr'. In the French army, infantry composed of short but athletic men, organized by Napoleon in 1804, and intended to operate as scouts and skirmishers. In case of need, they could even mount behind cavalry and then be rapidly transported to threatened points. Each battalion had a voltigeur company. Later (1814) the Imperial Guard contained no fewer than 19 regiments of voltigeurs. Suppressed at the abdication, restored upon the return from Elba, suppressed again at the second restoration, these troops reappeared during the second Empire, when four regiments were created in the Imperial Guard, only to disappear definitely from the *cadres* of the army in 1871.

VOLT'ME'TER. A direct-reading instrument used to measure the difference of potential or voltage. The voltmeter for direct current is usually a galvanometer of portable form so arranged with pointer and scale that volts may be read directly, and any form of ammeter (q.v.) can be used as a voltmeter if given sufficient resistance. For direct-current measurements the most accurate voltmeters are based on the principle of the Darsonval galvanometer (see GALVANOMETER) and have the movable coil formed by a number of coils of fine wire, mounted on jeweled bearings and kept in position by a fine spiral spring Using a galvanometer with a high resistance in circuit the current is proportional to the difference of potential. This idea is the basis of voltmeters of this type and the resistances are so adjusted that the pointer deflects over an evenly divided scale and by varying the resistances the same scale can be used in indicating several ranges of differences of potential. There are different types of voltmeter some of which may depend on the movement of a small piece of soft iron with respect to a coil through which a current passes, or of one coil with respect to another. There are also voltmeters of the moving magnet type where a permanent magnet or polarized vane carrying a pointer is deflected under the influence of a current in an adjacent coil. In the hot wire voltmeter originally devised by Cardew the difference of potential is indicated by the expansion of a long fine platinum wire which is heated on the passage of a current. Most voltmeters for alternating currents are either a form of electrodynamometer or based on the principle of the quadrant electrometer. (See ELECTROMETER) Where the dynamometer principle is employed the current passes through two coils connected in series, but with one arranged so that it may rotate within the other. The attraction of one coil for the other produced by the current enables the difference of potential to be measured. See ELECTRICITY.

VOLTUM'NA. A goddess of the Etruscans. The deputies from the 12 divisions of the Etruscans met at her temple in the territory of Volsinii (see BOLSENA). She can scarcely be separated from the Roman god Vortumnus, or Vertumnus (see POMONA), whose temple on the Aventine seems to have been built in 264 B.C., at the time of a war with Volsinii. The god is expressly called the chief god of that city, and his temple seems to have been vowed to induce him to desert to the Romans.

VOLTURNO, vōl-tur'nō A river of south Italy, flowing southeastward, then westward past Capua, and emptying, after a course of 115 miles, into the Tyrrhenian Sea (Map: Italy, D 4). On its banks Garibaldi defeated the Neapolitan army in 1860.

VOLUME. See MENSURATION.

VOLUME, CRITICAL. See CRITICAL POINT.

VOLUM'NIA. The mother of Coriolanus in Shakespeare's drama of the latter name.

VOL'UNTARISM. A metaphysical theory which holds that reality is at bottom will; it is thus a form of idealism, differing from intellectualistic idealism in making will more fundamental than sensation and idea In modern times Schopenhauer (q.v.) is the best-known voluntarist; but perhaps the philosophy of Wilhelm Wundt (q.v.) is the most thoroughly developed voluntarism of recent times. Münsterberg and Royce are also voluntaristic. See METAPHYSICS.

VOL'UNTARYISM. The principle or system which advocates the complete separation of church and state, and the support of the church by voluntary contributions. The term "voluntaryism" first came into use in the early part of the nineteenth century in connection with discussions between churchmen and dissenters in Scotland, although there had been advocates of the principle long before this, nota-

bly the Baptists, Congregationalists, and Friends (qq.v.) The principle is held to be based on the express law of Christ respecting the church, as well as on conscience, the nature of civil government, and considerations of general equity and policy. It is the principle embodied in the relation of the United States government to churches. See the articles on CIVIL CHURCH LAW, AMERICAN, ESTABLISHMENTS, ECCLESIASTICAL; NONCONFORMISTS.

VOLUNTARY ASSOCIATION. An organization of individuals for moral, benevolent, social, or political purposes, or for any object other than pecuniary profit. Such associations are not legal entities as are corporations, nor have they the legal status and incidents of partnerships. In order to bind any member of a voluntary association for debts and liabilities incurred by another member or by a committee thereof it must be shown that a relation of principal and agent existed between them, and this relation will not be presumed from the mere fact of the association, except where the liability contracted was for something absolutely necessary for the preservation of the association. Therefore, a member of such an association acting without authority becomes personally responsible for debts contracted for its benefit. An association organized to carry on some business scheme for profit is for legal purposes subject to the law governing partnerships and cannot correctly be termed a voluntary association in the above sense. Consult N L. Lindley, *Treatise on the Law of Partnership* (8th ed., London, 1912). See CORPORATION; PARTNERSHIP, and authorities there referred to.

VOLUNTARY CONVEYANCE (Lat. *voluntarus*, willing, from *voluntas*, will, from *velle*, to will, wish). In law, a conveyance made without valuable consideration therefor. No consideration is necessary to make a valid transfer of lands or chattels, and a person may legally make a gratuitous transfer of all his property provided his act does not prejudice his creditors. Fraudulent intent is implied from the fact that the creditors suffer loss as a result of the transfer. At common law a conveyance without consideration was held to vest the property in the grantee subject to a resulting trust (q.v.) in favor of the grantor. This rule does not now generally apply.

VOLUNTEER, MILITARY. A member of a military organization, serving of his own free will He may belong to a trained reserve for national defense, as in England or the United States, or to an auxiliary force of the regular or standing army.

Volunteer System of England. The modern volunteer movement had its origin in England, the oldest organization of which there is any reliable knowledge being the Honorable Artillery Company of London. The volunteer movement proper may be said to have had its inception in the call for 40,000 Protestants of Ireland to repel the threatened invasion of that country by the French and Spaniards in 1779. The fear of an invasion of England by Napoleon brought about the volunteer legislation of 1805, resulting in the creation of a volunteer establishment closely approaching 450,000, of whom fully one-fifth were Irish. The militia were organized locally and in each county were under the command of a lord lieutenant (q.v.). With the advent of peace began the neglect of the system, an error which was heartily repented of during the periods of the Crimean War, the Indian Mutiny, the French hostility of 1857, and the difficulty with the United States over the San Juan boundary. The comparatively small regular army was used exclusively for the reenforcement of foreign and colonial garrisons, so that a volunteer force was an imperative necessity. The volunteer regiments of this period were made up of tradesmen, clerks, and farmers, officered by locally prominent professional men or employers of labor, each officer and man paying the entire expense of his service—uniform, equipment, drill hall, instruction, etc. Wealth was almost a necessity on the part of the officer, owing to the custom of enlisting employees to complete the strength of the command, the employer paying all the expenses. Prohibitive almost as such regulations were, the preference of a free people for a volunteer army rather than a huge regular army led to the assembling under arms of 100,000 men. The moment the war stimulus ceased, however, the organization again showed signs of decay, so much so that the government, in order to keep alive the system, finally placed it on a firm national basis by establishing it as a recognized form of national defense, defraying its expenses, and bringing it in actively close touch with the regular army. In 1872 was commenced the system of joint manœuvres, volunteer regiments taking an equal share of the work and training with the regulars. Under the Volunteer Act of 1900 new regulations were formulated as follows: (1) A member of a volunteer corps may contract to come out for actual military service at specified places in Great Britain whenever summoned by order of the Secretary of State for War, and to serve for a period not exceeding one month in the absence of a royal proclamation calling out the volunteers generally. (2) A member of a volunteer corps or regiment may contract to proceed upon active service to any part of the world in a unit or company formed of volunteers, on special conditions as defined by the terms of this contract. The Boer War of 1899–1902, in which large bodies of volunteers and yeomanry did valuable service, demonstrated the value of volunteers to the British Empire. In 1907 the volunteer and militia organizations of the United Kingdom were abolished and absorbed in the territorial army, which corresponds to the organized militia in the United States. The bulk of the territorial army was organized as 14 mounted brigades and 14 complete divisions. Service was purely voluntary and for home defense only. Many officers and men, however, volunteered for service abroad during the great war. See UNITED KINGDOM, *Army*.

The Volunteer System of the United States originally was formed along the same lines as in England. The Ancient and Honorable Artillery Company of Boston, like its British prototype, enjoys the distinction of seniority as a voluntary organization. In general terms the word "volunteer" applies to a man who voluntarily engages in the military service of the United States or of some particular State or Territory, and differentiates him from a man who is drafted compulsorily into the military service (a power which Congress has the right to exercise and did exercise during the Civil War). The term "volunteers," as applied technically to one of the three classes into which the United States land forces are divided, is used in a special or restricted sense and in-

cludes only the troops which have been raised and maintained for limited periods under authority of Congress as adjuncts to the regular army in times of actual or threatened war, or other emergency. So far as the constitutional authority for their creation is concerned, the regular and the so-called volunteer forces are upon an identical footing, but are differentiated by the fact that the former are permanent and the latter temporary.

As applied to military organizations, the term "volunteers" appears for the first time in the Act of May 28, 1798, which empowered the President to accept any company or companies of volunteers who might associate and offer themselves for the service. This act authorized the President to appoint the commissioned officers of such company or companies, and the Act of June 22, 1798, empowered him to organize the companies into legions, regiments, or battalions, and to appoint field officers for the same It will be noted that as the States or Territories are not mentioned in the Act of May, 1798, the companies of volunteers to be raised under its provisions were not in any sense State organizations, but could be taken from the country at large

In 1803, when difficulities arose with Spain, the President was authorized by the Act of March 3 of that year to require the executives of such of the States as he might deem expedient to organize, arm, equip, and hold in readiness to march at a moment's warning, detachments of militia, not exceeding in all 80,000 men; and the second section of this statute gave the President power to authorize the State executives to accept as part of such detachments any corps of volunteers, the officers of whom were to be appointed by the State authorities. The Acts of Feb. 24, 1807, and March 30, 1808, when trouble was anticipated with England, were practically repetitions of the Statute of 1803, except that the number of men to be called out was not to exceed 30,000 and 100,000, respectively, including corps of volunteers. The Act of Feb. 6, 1812, was largely a reenactment of the Statute of 1807, except that the number of volunteers was not to exceed 50,000 men; but the Act of July 6 of the same year repealed this statute so far as the appointment of officers was concerned, and empowered the President to appoint and commission them, by and with the advice and consent of the Senate. The Act of Feb. 24, 1814, reënacted the legislation of 1812, except that the President was authorized to receive such proportion of volunteers "as in his judgment the public service may require," who were to serve for five years, or during the war; and about a month later the Act of March 30, 1814, empowered the President, by and with the advice and consent of the Senate, to make all necessary appointments of officers and to fill all vacancies. In the War of 1812 the enrollment of volunteers was small compared with regulars and militia, the figures being: regulars, 38,186; militia, 458,463; rangers, 3049; volunteers, 10,110.

Passing now to the Florida War, the Act of May 23, 1836, authorized the President to accept the services of not exceeding 10,000 volunteers, the officers to be appointed in the manner prescribed by law in the several States and Territories to which such volunteers belonged; and practically the same legislation was reënacted on March 3, 1839, when 50,000 volunteers were authorized at the time of the dispute with Great Britain in regard to the Maine boundary line, and again on May 13, 1846, at the beginning of the Mexican War, 50,000 volunteers were likewise authorized. It is to be observed, however, that the Act of March 3, 1847, empowered the President to organize the volunteers who might reenlist into companies, battalions, and regiments, and to commission the officers of the same The enrollment for the Mexican War was: regulars, 26,922; volunteers, 73,532: militia, none.

During the Civil War the first legislation in regard to volunteers, enacted on the 22d of July, 1861, made a radical departure from either of the previous methods of appointing volunteer officers, inasmuch as it provided that the company officers were to be elected by the men, and the field officers by the company officers, but the Act of the 6th of August following rescinded this and prescribed that the vacancies among the commissioned officers of volunteer regiments were to be filled by the State governors. Under the Act of July 17, 1862, colored troops were first organized in South Carolina and Louisiana, and later in many other places, to the number of nearly 100,000 men While the officers in most instances were not named directly by the President, they were appointed, after passing careful examinations, by the Adjutant General and other officials under his authority.

On April 28, 1863, an invalid corps was organized for garrison duty, made up of officers and enlisted men who had been wounded or otherwise disabled for active field service, the officers, after passing satisfactory examinations, being appointed by the President, by and with the advice and consent of the Senate. About the same time six regiments and one company of United States volunteers were organized, the officers being all appointed by the Secretary of War, after passing examinations; and on the 20th of May, 1864, a regiment of veteran volunteer engineers was raised in the Army of the Cumberland, the officers being appointed by the President upon the recommendation of the commander of the Army of the Cumberland. The last act relating to volunteers during the Civil War was that of Nov. 28, 1864, which created a new volunteer army corps, consisting of not less than 20,000 men, and known as the United States Veteran Volunteers, the officers being appointed by the Secretary of War, after rigid examination. The enrollment in the North for the Civil War was: regulars, 46,679; volunteers and militia, 2,637,759. The Confederate States enrolled about 900,000 volunteers. A large majority of the Northern volunteers were American born; in the South practically all were Americans.

The first legislation in regard to volunteers passed during the Spanish War was that of April 22, 1898, which gave the appointment of all regimental and company officers to the governors of the States in which their respective organizations were raised, except that the President was authorized to organize not exceeding 3000 men possessing special qualifications, and to appoint the officers of the same. The Act of May 11 of that year provided for a volunteer brigade of engineers and a force of 10,000 immunes, all of the officers to be appointed by the President with the consent of the Senate. The enrollment in the war with Spain in 1898 shows regulars, 45,669; volunteers, 232,235. The Act of March 2, 1899, authorized the raising from

the country at large of a force not exceeding 35,000 men for service in the Philippine insurrection, and provided that the officers should be appointed by the President by and with the advice and consent of the Senate. It is admitted by all that the troops mustered into the service under the provisions of this act became the best-disciplined and best-instructed, and were, therefore, the most efficient and most economical body of volunteers that have ever formed a part of the national land forces.

The legislation of April 25, 1914, authorized the raising of volunteer forces in time of actual or threatened hostilities. The same act formally recognizes that the land forces of the United States consist of three classes: (1) the regular army; (2) the organized militia, when called into the service of the United States; (3) such volunteers as Congress might organize in time of war.

The War College Division, General Staff, in a *Statement of a Proper Military Policy for the United States*, published Sept 11, 1915, commented as follows on the existing volunteer law: "In addition to any forces that may be maintained and trained in time of peace, provision must be made for vastly increasing such forces in time of war These must come from the untrained body of citizens, and provisions for raising them are contained in the Act of Congress, approved April 25, 1914. This act meets the military needs for raising volunteer troops as far as concerns the enlisted personnel, except in two particulars, which are: (1) that under the existing laws certain organizations of the militia, with numbers far below the full strength, can enter the volunteer force in advance of other similar volunteer organizations from the same State; (2) no volunteers of any arm or branch can be raised until all the militia of that particular arm or branch have been called into the service of the United States." "It is evident that it cannot be known prior to the existence of the imminence of war what organizations, if any, of the organized militia will enter the volunteer service, and that no definite plans can be prepared providing for the use of such organizations, either as militia or as volunteers, until war is actually upon us. No legislation affecting the organized militia is recommended beyond the repeal of all provisions of laws now in effect whereby militia or militia organizations may or must be received into the Federal service in advance of any other forces."

It will be seen from the foregoing that there has been no uniform rule in the method of appointing officers of the volunteer forces, and that the legislation has often conferred this power wholly or in part upon the President, while at other times it has been vested in the governors of the States and Territories.

In all but two States of the Union militia officers below the rank of major are elected by the men and the field officers by the company officers. When the appointment of volunteer officers has been left to the State and Territorial executives, the usual practice has been—and particularly during the Spanish War—to make nearly all such appointments, and promotions as well, on analogous lines, the practical result being that the volunteer officers are elected by those whom they are to command. It is needless to point out that the appointment and promotion of officers on these lines is not only wholly wrong in principle but most pernicious in results, radically affecting, as it does, the discipline and efficiency of the troops and enormously increasing the expense to the government by making it necessary to employ at least twice as large a number in order to secure the same result. In defense of this bad system it is claimed that the men would come forward more readily and in greater numbers, but when we consider the vast population from which the volunteers can be drawn, it is believed that this argument has but little weight. Within three months after the declaration of war with Spain no fewer than 56,258 men had enlisted in the regular army. If in 1898 such a large number of men were willing to enlist in the regular army with its reputation for strict discipline, and where the men have no voice whatever in the selection of their officers, should another war occur it would seem reasonable to suppose (taking into consideration the large increase of the population) that the necessary men would be forthcoming for the volunteer regiments, even if the appointment of the officers were vested in the President. As a matter of fact, in 1899, although the climate was very hot and unhealthy and the seat of war was at the other end of the world, there was no difficulty whatever experienced in raising from the country at large 35,000 volunteers for service in the Philippines, the officers all being appointed by the President.

Even if the contention above referred to were true, it is the judgment of all military experts that volunteer troops in which the officers are elected by those under them would not be as efficient as a much lesser number organized under the system in which the President appoints the officers subject to existing legal restrictions and limitations, and this, too, with an immense diminution in the expense of the war. Consult *Organization of the Land Forces of the United States* (Washington, Government Printing Office, 1912).

In Germany, previous to the great European War, young men were allowed to serve as one-year volunteers provided they passed a scientific examination, or produced a certificate of maturity issued by one of the specially authorized educational institutions. Certificates of maturity certify the holder's qualification for one of the upper classes of a high school or college. After enlistment he has the option of serving in any corps open to such volunteers, or, if he so desires, with the pharmacists of the sanitary corps. If the volunteer is a medical student desiring to enter the sanitary corps, he is required to serve six months under arms, and after graduation six additional months as a noncommissioned officer or under-sergeant. Such volunteers are then elected military surgeons and pass into the reserve. Other volunteers, irrespective of their civil calling or profession, and so far as they are qualified by general education and military efficiency, are trained and destined for commissioned officers of the reserve or Landwehr. At the expiration of their term of service they undergo examinations in subjects both theoretical and practical, and are posted to the reserve, as reserve officers aspirants, and render active service in two exercises of eight weeks each. To secure such an appointment aspirants must have a civilian occupation or profession in no way derogatory to the rank of a commissioned officer. They must also be elected by their comrades. Although allowance is made for a few volunteers to be supported

at public expense, the great majority serve at their own charge, which is estimated as approximately 1500 marks in the infantry and 2000 in the mounted branches. See ARMIES; CONSCRIPTION; MILITIA; section on *Army* under UNITED STATES and UNITED KINGDOM. Consult especially Huidekoper, *The Military Unpreparedness of the United States* (New York, 1915).

VOLUNTEER FIRE DEPARTMENTS. See FIRE PROTECTION, MUNICIPAL.

VOLUNTEERS OF AMERICA. An organization formed for religious and philanthropic work in New York City in 1896. In that year the movement was incorporated under the laws of the State of New York and Gen. Ballington Booth, the founder, was elected president. The objects declared in the charter are as follows: "The Volunteers of America is to be a religious organization, military in its method, and having as its object the reaching and uplifting of the people of America who have not hitherto been reached or affected by the ministrations of any existing religious corporation." There are 11 directors, and the officers of the corporation are elected annually. The commander in chief is elected by members every five years In 1915 the organization included six regiments or divisions, each under the direction of a regimental or sectional officer. These superintending officers had under their leadership 168 societies or stations and institutions, in which the following work was accomplished: The meetings of the Volunteer societies were attended by 783,279 persons, and 1,895,686 persons were addressed in open-air services. The number of families visited was 28,362. In the relief stations, homes, and institutions throughout the year the Volunteers furnished free beds to 241,297 persons, and lodged for pay and for work 247,855 persons. They furnished 875,119 free meals, and in addition there were paid for in work and nominal fees 303,201. The total number of families and individuals otherwise assisted was 105,915. In connection with the Volunteer prison work leagues have been formed in 40 States and Federal prisons embracing over 90,000 prisoners, 74 per cent of whom are leading reformed lives. The families of the prisoners are visited and if found needy are assisted by the Volunteer Prison League workers.

VOL'VOX. A genus of fresh-water algæ belonging to the group Chlorophyceæ. It forms spherical colonies, which are often composed of many thousands of cells, often have a diameter of 0.5 mm. or more, and are visible to the naked eye. They have a rotatory movement, produced by numerous cilia on the periphery. There is a marked protoplasmic continuity between all the cells of the colony. Propagation is both sexual and asexual. See ALGÆ; CHLOROPHYCEÆ; CŒNOBIA.

VOL'VULUS (Lat., from *volvere*, to roll). A form of intestinal obstruction due to twisting of the gut upon itself. This usually occurs in the vicinity of the cæcum and especially in cases where the bowel has a long mesenteric attachment. These knots and twists occur, as a rule, in individuals over the age of 30 and give rise to the same symptoms that characterize intestinal obstruction of whatever variety, viz., pain, vomiting, complete constipation, abdominal distention, and syncope. Vomiting occurs early and consists at first of the contents of the stomach, and later of the intestine. The only safe treatment is prompt operation.

VOLZ, fôlts, PAUL (1871–). A German evangelical theologian, born at Lichtenstein, Wurttemberg. Educated at the universities of Tübingen and Berlin, he held a pastorate at Leonberg in 1902–07, and thenceforth was connected with the University of Tubingen, where he was professor of Old Testament from 1914 Between 1905 and 1912 he also traveled and studied in Palestine His publications include: *Die vorexilische Jahwoeprophetie und der Messias* (1897); *Judische Eschatologie von Daniel bis Akiba* (1903); *Mose* (1907); *Geist Gottes und verwandte Erscheinungen im Alttestament und Judentum* (1910), *Neujahrsfest Jahves* (1912); *Die biblische Altertumer* (1914)

VO'MER (Lat., plowshare). In human anatomy, a bone which forms part of the middle partition of the nose, and the lower edge of which fits into grooves between the apposed surfaces of the palatine processes of the upper jaw and palate bones. Anteriorly it articulates with the triangular cartilage of the septum, above with the perpendicular plate of the ethmoid bone (q.v.); posteriorly with the sphenoid bone. The vomer develops in two laminæ, inclosing a plate of cartilage which is prolonged to form the rest of the septum of the nose; these laminæ unite into one bone, union being complete about the age of puberty. See SKELETON.

VOM'ITING (from *vomit*, from Lat. *vomitus*, p.p. of *vomere*, to vomit; connected with Gk. *ἐμεῖν, emein*, Skt. *vam*, to vomit). The emptying of the stomach by way of the mouth through its own spasmodic contractions. In a conscious person vomiting is preceded by nausea, increased flow of saliva in the mouth, and the breaking out of cool perspiration; the face is pale, weakness or prostration follows, the pulse becomes slower and feeble. The individual may faint. At first the stomach contents are vomited, consisting of food, mucus, and thin serous fluid. If persistent and violent, the vomiting causes the ejection of bile which has regurgitated from the duodenum into the stomach under the pressure of the diaphragm, and rarely of fæces from the intestine This is a constant symptom of intestinal obstruction. In cirrhosis of the liver blood is vomited, as also in phosphorus poisoning, ulcer, and cancer of the stomach. The black vomit in yellow fever (q.v.) owes its color to blood which escapes into the stomach. In mild attacks of vomiting from an overloaded stomach the normal state soon returns. In young infants the act may be simply a regurgitation from an overfull stomach, and resembles an overflow, without systemic disturbance. In severe attacks deep inspiratory efforts are made, during which the diaphragm is thrust down low against the stomach, while the lower ribs are drawn in. A sudden, violent expiration and contraction of the abdominal wall succeed, adding to the pressure upon the stomach. Besides this, the longitudinal fibres of the œsophagus are shortened and the cardiac orifice of the stomach is somewhat dilated, and the contents are ejected. The vomiting centre in the medulla may be excited by reflex irritation due to peripheral causes, such as tickling the throat, or obstruction of the intestine; or to the presence of renal or biliary calculi. It may be excited by poisons, or by impulses from parts of the cerebrum, due to smells, tastes, and emotions, or by brain tumor, abscess, or other intracranial disease. Some emetics act directly on the vomiting centre, for they are efficient if the stomach be cut out

and replaced by a bladder filled with water, as in Claude Bernard's celebrated experiment. Others act reflexly by irritating the mucous lining of the stomach. Still others develop a nauseating taste, thus affecting a higher centre in the cerebrum.

Treatment must be conditioned upon the cause and the accompanying disease. In different conditions mustard applied to the epigastrium, darkness (when due to acute eye irritation), and the supine posture, or the administration of hot water, aromatic spirit of ammonia, nux vomica, small doses of ipecacuanha, arsenic, soda, ice, whisky, creosote, chloroform, or coffee will relieve. Calomel frequently is efficacious Sudden and violent vomiting in a healthy person is cause for suspicion of a poisonous agency at work, either fermentation of improper food, or a drug.

VONDEL, vŏn'del, JOOST VAN DEN (1587–1679). A Dutch dramatist, born in Cologne. With his parents he early removed to Amsterdam, where he received a little schooling. He early turned to verse. In his twenty-fifth year he began the study of foreign languages. For a time he was in business, then he became a bookkeeper in the Public Loan Office In 1640 he became a Catholic. His literary work begins with a drama, *The Pasha* (1612), and some lyrics, aided by study of the classical drama and the *Poetics* of Aristotle. Thereafter Vondel's dramas were classic in form, they observed the unities, employed the chorus, and tended generally to lyricism, though often didactic and sometimes controversial. Some of the lyrics from his dramas are among the finest in the Dutch language. His classical imitations or adaptations (*Hecuba*, 1625, *Hippolytus*, 1628; *Electra*, 1638; *King Œdipus*, 1660; *Hercules in Trachis*, 1663, *Iphigenia in Taurus*, 1666; *The Phœnician Iphigenia*, 1668, and others) were accompanied by a parallel series of original tragedies (*Jerusalem Laid Waste*, 1620; *Palamedes*, 1625; *Gijsbrecht van Amstel*, 1637; *Maria Stuart*, 1646; *Lucifer*, 1654; *Jephtha*, 1659; *Adam in Banishment*, 1664; *Zungchin*, 1666, *Noah in the Deluge*, 1667, and others) Of these *Lucifer* is famous as presenting parallels with *Paradise Lost*, supposed by some critics to be the result of imitation, but hardly more striking than the resemblance between Milton's work and the poem attributed to the Anglo-Saxon Cædmon. He also translated the *Metamorphoses* of Ovid Vondel's *Works* were edited by Lennep (12 vols., Amsterdam, 1850–69; reprinted, 1888). There are *Lives* by Baumgartner (Freiburg, 1882), Haek (Hamburg, 1890), and Kalff (2d ed., Haarlem, 1902), and studies by Looten, *Etude littéraire sur Vondel* (Brussels, 1889), and Müller, *Ueber Miltons Abhangigkeit von Vondel* (Leipzig, 1891). See also the excellent *Bibliography* by Unger (Amsterdam, 1888).

VON EMMICH, fŏn ĕm'ĭk, OTTO (1848–1915). A German soldier, born at Minden in Westphalia. He entered the army in 1866, became a lieutenant in 1868, and as a battalion adjutant participated in the campaign of 1870–71. He was promoted through the various grades to colonel in 1897, and became commander of the 31st infantry brigade in 1901, and of the 10th division at Posen in 1905. Raised to the rank of general of infantry in 1909, he was placed in command of the 10th Army Corps at Hanover. During the early days of the European War in 1914, as commander of the German army of the Meuse, he laid siege to Liége, which he entered August 7. Before the forts fell, a week later, he is said to have lost 20,000 men, and for some time it was believed he had committed suicide because of chagrin at this record Afterward he distinguished himself in the Galician campaign and in the winter battle in East Prussia. In June, 1915, he was decorated with the Order Pour le Mérite In 1913 he had been elevated to the nobility. He died of arteriosclerosis. See WAR IN EUROPE.

VON HOLST, fŏn hōlst, HERMANN EDUARD See HOLST, HERMANN EDUARD VON.

VONNOH, BESSIE POTTER (1872–). An American sculptor, born in St Louis. She studied at the Art Institute of Chicago under Lorado Taft (q v), whom she assisted in his work on the Agricultural Building at the World's Fair of 1893. Afterward she studied in Paris and in Italy. In 1899 she was married to Robert Vonnoh (q.v). Her subjects are portrait and ideal statuette groups of children and young women They are in modern dress, modeled with a sympathetic and sensitive appreciation, in a naturalistic style with little detail. Among her works, which have a wide popular appeal, are: "Mother and Child" (1905); "A Modern Madonna" (1905); "Beatrice" (1906); "The Young Mother" (Metropolitan Museum, New York), and several pieces in the Art Institute, Chicago, and the Brooklyn Museum. Mrs Vonnoh was elected an associate of the National Academy of Design in 1906 and received medals at St. Louis (1904) and San Francisco (1915).

VONNOH, ROBERT WILLIAM (1858–). An American portrait, figure, and landscape painter. He was born in Hartford, Conn., and studied at the Massachusetts Normal Art School in Boston, and in Paris under Boulanger and Lefebvre; but he was more influenced by the prevailing realism. After his return to America he devoted himself, with much success, to portraiture, displaying skillful characterization, able technique, and warm agreeable color. Good examples include. "Miss Mildred Blair" (1900); "Little Louise" (1900); "Mrs. Vonnoh" (1904); "Portrait of the Artist" (Pennsylvania Academy, Philadelphia); "Dr. S. Weir Mitchell"; "John G. Milburn" (Buffalo); "Attorney General Griggs" and "Postmaster-General Charles E. Smith." Vonnoh was elected to the National Academy of Design in 1906, and was a teacher in the Boston Museum of Art School (1885–87) and at the Pennsylvania Academy, Philadelphia (1891–96). In 1915 he was awarded a gold medal at the Panama-Pacific Exposition, San Francisco. See also VONNOH, BESSIE POTTER..

VOODOO, vōō'doo, or **VAUDOUX,** vō'dōō' (perhaps a dialectic form of Fr. *Vaudois*, Waldensian, the Waldensians, as heretics, being suspected of sorcery). A term referring to certain beliefs and practices considered to be prevalent among the negroes of the West Indies and the southern United States. Research has made it certain, however, that there are no recognized beliefs and ceremonials which could be regarded as constituting a Voodoo religion. According to the formerly accepted view, the Voodoo cult came from West Africa, the term itself being the name of an all-powerful being, incarnate in the form of a snake, who communicates with his worshipers only through a priest and priestess, also known as king and queen, or papa and mamma, who are held in great veneration by the devotees. The worship is always at night, is

secret, and characterized by prayer to the snake, who is exhibited during the rite, by hysterical manifestations by the priest and priestess, by a dance for the initiation of novices said to be marked by wild debauchery and indecency, and by the sacrifice and eating of a human child. Careful examination of apparently circumstantial accounts of the Voodoo rites and orgies has eliminated the more shocking phases in practically every instance. If cannibalism has occurred, it has probably been merely sporadic. Other features are nothing more than shamanistic and magic practices common the world over

VOORHEES, vōōr'ēz, DANIEL WOLSEY (1827–97). An American politician, born in Ohio. He graduated at Indiana Asbury (now De Pauw) University in 1849, studied law, and in 1851 began the practice of his profession in Covington, Ind. He became at once interested in politics, and gained a wide reputation as a Democratic campaign speaker. He was United States District Attorney for Indiana from 1858 to 1861, and was a member of Congress from 1861 to 1867 and again from 1869 to 1875. In 1877 he was appointed United States Senator to fill the unexpired term of Oliver P. Morton, and was regularly elected in 1879, 1885, and 1891.

VOORHEES, EDWARD BURNETT (1856–1911) An American agricultural chemist, born at Mine Brook, N. J. He graduated from Rutgers College in 1881. From 1882 he was identified with the New Jersey Agricultural Experiment Station, of which he became director in 1893, and from 1890 he was also professor of agriculture at Rutgers He served as president of the New Jersey State Board of Agriculture after 1901, of the New Jersey State Forestry Commission after 1906, and of the New Jersey Conservation Commission after 1908, and was also president of the Association of Agricultural Chemists in 1894, and of the Association of Agricultural Colleges in 1904. Voorhees received the Nichols research medal in 1902 for a paper on dentrification contributed to the *Journal of the American Chemical Society.* He published: *First Principles of Agriculture* (1896); *Fertilizers* (1898; 9th ed., 1907); *Forage Crops* (1907; 2d ed., 1911).

VŌPADÉVA, vō'pâ-dā'vâ. A Sanskrit grammarian of India, who lived about the thirteenth century A.D. He wrote a grammar entitled *Mugdhabōdha,* or Enlightenment of the Ignorant, which is used mainly in Bengal. It is drawn up on different lines from the great work of Pānini (q.v.) and departs from it also in terminology. A commentary on the *Mugdhabōdha* was composed by Durgadasa. Besides several Calcutta and Bombay editions (e.g., 1826, 1861), there is a European edition by Böhtlingk (St. Petersburg, 1847).

VORA'GINE (or **VARAIGNE**), JACOBUS DE. See GOLDEN LEGEND.

VORARLBERG, fōr'ärl-bĕrk. The smallest and most westerly crownland of Austria (Map: Austria, A 3). Area, 1000 square miles. The Arlberg chain lies on the east of this mountainous territory. In the south, on the boundary, tower the Rhætian Alps, crowned by the Silvretta mass, the highest point in the crownland (about 11,300 feet). The Ill valley crosses the southwest portion. In the north part are the Bregenzerwald and Lechthal Alps, with the Bregenzer Ach valley in the extreme north. The Rhine valley from the Ill to Lake Constance is the feature on the west. A small section of Lake Constance belongs to Vorarlberg About one-third of the area is in Alpine meadow and over one-fourth in productive forests, the tilled land being small Some coal is mined and the manufacturing industries are conspicuous. There are shipbuilding plants, paper industries, cotton and weaving mills, and dye works. Embroideries are largely produced as the house industry. Vorarlberg has its own constitution (since 1861) and Landtag, but is administratively and judicially combined with the Tirol. The capital is Bregenz Pop, 1910, 145,794, nearly all Germans and Roman Catholics

VORONEZH, vō-rō'nyĕzh A government in the southern part of central Russia. Area, 25,450 square miles. Its surface is mostly undulating and hilly in the west and the north (Map: Russia, E 4). It is watered principally by the Don and its tributaries. The climate is continental and comparatively mild, but the rainfall is scanty. Voronezh has a very fertile soil. The ordinary cereals, flax, hemp, and sugar beets are produced The cultivation of fruit is widespread. Stock raising is extensively carried on. Horses of high breed are exported The manufactures have an annual value of over $10,000,000 and consist principally of sugar, spirits, flour, tobacco, and various animal products. Pop., 1912, 3,491,200

VORONEZH. The capital of the government of the same name, in Russia, on the right bank of the river Voronezh, five miles above its confluence with the Don, 332 miles south-southeast of Moscow (Map: Russia, E 4). It is a well-built town. Its industrial establishments include flour mills, oil presses, machine works, and railway shops. Pop (including suburbs), 1913, 79,000.

VÖRÖSMARTY, vĕ'rĕsh-märt-y', MIHÁLY (1800–55). An Hungarian poet. He was born at Nyék, County of Stuhlweissenburg, and studied law in Pest, but devoted himself to letters, and became one of the most important of the authors who regenerated Hungarian literature. Of his epic poems, *Zalán Futása* ("The Flight of Zalán," 1825) and *Eger* (1827) are the best. His dramas were less successful. His national anthem, *Szózat,* was immensely popular in the Revolution of 1848. At the time of his death he was translating Shakespeare into Hungarian. Consult the second edition of his works in 12 volumes (Budapest, 1884), by Gyulai, who also wrote an excellent account of his life (4th ed., ib., 1896)

VORPARLAMENT, fōr'pär'lâ-mĕnt. A preliminary Parliament which met at Frankfort-on-the-Main from March 31 to April 4, 1848, to devise ways and means for calling a national German Parliament to deal with the widespread demand for reorganization of the Germanic political system on the basis of a closer national unity. The Vorparlament, which consisted of some 500 Liberal leaders, decided that a national assembly, elected by direct vote of the people without distinction of property, rank, or religious belief, and endowed with sovereign powers, should meet at Frankfort for the purpose of drawing up a constitution for the German nation. Great dissensions prevailed in the Vorparlament between the monarchical and republican factions. The latter, headed by Hecker and Struve (qq.v.), finding themselves outnumbered, seceded from the Parliament, and with the aid of Polish and French radicals stirred up an insurrection in southern Baden, which was

suppressed in a short time. After the dissolution of the Vorparlament its work was continued by a committee of 50 until the assembling of the National Parliament on May 18. See GERMANY, *History*.

VORSPIEL, fôr'shpēl. The German word for introduction or prelude (qq.v.). Beginning with *Lohengrin* Wagner, in order to obtain an elastic form for the unhampered expression of the dramatic ideas, abandoned the form of the overture for his dramatic works and designated the orchestral introductions, both to the entire drama and the separate acts, as Vorspiel Several later operatic composers have also adopted this term Bach wrote a series of preludes for organ which he called *Choral-Vorspiele* These are intended as introductions to a chorale. Of course the chorale is made the basis of these Vorspiele, which treat certain phrases in canonic or fugal writing The same treatment is found in the 11 posthumous Choral-Vorspiele of Brahms.

VORSTERMAN, fôr'ster-man, LUCAS, the Elder (1595–1675). A Flemish engraver, born in Bommel (Gelderland). It is not known under whom he first studied, but he became a member of the Antwerp Guild in 1618, and was already trained as an engraver when he entered the studio of Rubens. Reforming his style, he became the greatest interpreter of that master's works, rendering in a wonderful manner the line, color, and spirit of the originals. Among his best plates are the "Adoration of the Magi"; "Descent from the Cross"; and "Susannah and the Elders." After quarreling with Rubens he went to England, where he worked for Charles I and the Earl of Arundel (1624–30). While there and after his return to Antwerp, Vorsterman executed numerous excellent plates after Van Dyck. His son LUCAS (1624–c.1667) was also an engraver, and practiced in Antwerp and in England

VORTEX, VORTEX RING. A mass of fluid rotating about a closed curve as an axis; a motion similar to that of the particles of a rubber ring (such as a pneumatic tire) when it is so turned that the inside of the ring is becoming the outside, and vice versa The most familiar form of vortex ring is that of a smoke-ring produced intentionally by a smoker, or accidentally by the discharge of a gun, or by the exhaust of an engine. Vortices are usually circular, but may be of other and complicated shapes, the essential condition being that the axis around which the whirl takes place must be either a closed curve, or a curve both ends of which rest upon a boundary surface of the fluid. Such rings are very persistent and have many interesting properties. They may be projected to considerable distances and exhibit mutual attraction and repulsion. See MATTER.

VORTICEL'LA (Neo-Lat., dim of Lat. *vortex*, whirl, whirlpool). A genus of Infusoria (q.v.), notable for the highly contractile stalk by which they are ordinarily attached. They are inhabitants of both fresh and salt water and often occur in large numbers together, although those which form actual colonies are now separated from the true vorticellas, as other genera. These minute creatures are very graceful in all their movements and under normal conditions are constantly extending and contracting their stalks. Under unfavorable conditions, and occasionally at other times, they detach themselves, draw in the stalk, and swim freely. When fully expanded the body is somewhat bell-shaped, the flaring end forming the oral disk (surrounded with long cilia); at one side of this is the mouth. The opposite end of the body tapers into the stalk, which may be two or three times the length of the body. They contract with rapidity and force, when irritated, until they become a mere globule. The cilia surrounding the oral disk are in constant motion when the animal is expanded, and by their movements cause a miniature whirlpool, with vortex at the animal's mouth. Consult G. N. Calkins, *The Protozoa* (New York, 1901)

VOR'TIGERN AND ROWENA, rō-ē'nà. A drama by William Henry Ireland, who pretended that it with other forgeries was the work of Shakespeare. It was produced in 1796 and gave rise to considerable controversy

VOS, vōs, CORNELIS DE (1585–1651). A Flemish portrait and historical painter. He was born in Hulst, studied with David Remeeus, and passed most of his life in Antwerp, where he became a master of the guild in 1608. Though influenced by Van Dyke and Rubens, he developed an independent style, good alike in line and color, and particularly excelled in depicting children. He is best represented in the Antwerp Gallery, which contains the "Meerbecker Epitaph" (once in the Cathedral); "St. Norbert with the Schnoeck Family," and the inimitable portrait of Abraham Grapheus, servant of the guild. Other fine works include the portrait of the artist with his family, at Brussels; "The Hutten Family" (Munich); and a portrait and group in the Metropolitan Museum, New York. His religious and historical paintings are of less value. A second CORNELIS DE VOS is known to have been a member of the guild in 1633.

VOS, GEERHARDUS (1862–). An American theologian, born at Heerenveen, Holland, and educated in Amsterdam, at the Seminary of the Holland Christian Reformed Church, at Princeton Theological Seminary, and at Berlin and Strassburg. He taught theology at the Holland Christian Reformed Seminary in Grand Rapids, Mich., in 1888–93, and then in Princeton Seminary. His works include: *The Mosaic Origin of the Pentateuchal Codes* (1886); *Die Kampfe und Streitigkeiten zwischen den Banu Umajja und den Banu Haschim von Takijj addin al-Makrizijj* (1888); *The Doctrines of the Covenant in Reformed Theology* (1891); *The Teaching of Jesus Concerning the Kingdom of God and the Church* (1903).

VOSE, vōz, GEORGE LEONARD (1831–1910). An American engineer, born in Augusta, Me., and educated there, at Salem, Mass, and at the Lawrence Scientific School at Harvard. He was professor of civil engineering at Bowdoin College from 1872 to 1881, and at the Massachusetts Institute of Technology from 1881 to 1886. His works include: *Handbook of Railroad Construction* (1857); *Orographic Geology, or the Origin and Structure of Mountains* (1866); *Bridge Disasters in America; the Cause and the Remedy* (1887).

VOSGES, vōzh. A department of northeast France, bordering on Alsace, and forming part of the former Province of Lorraine (Map: France, N., M 4). Area, 2303 square miles. The eastern part belongs to the west slope of the Vosges Mountains, and rises to a height of over 4000 feet. The Moselle rises in this department, and the Meuse crosses its west end. The greater part of the improved land is pasture, and dairy-

ing is more important than tillage The chief crops are oats and potatoes The most important manufactures are of textiles. Pop., 1901, 421,104; 1911, 433,914. Capital, Epinal

VOSGES MOUNTAINS (Ger. *Vogesen*, Fr. *Les Vosges*) A mountain range on the southwest frontier of Germany. It rises from the Belfort depression (*Trou de Belfort*), which separates it from the Jura Mountains, and extends in a north-northeast direction on the west side of the Rhine valley, parallel with the Black Forests (Map: Germany, B 4) In the south portion the main ridge forms the boundary between France and Alsace, but the north portion is wholly within German territory, partly within Alsace, partly on the boundary of Lorraine, while a northern continuation known as the Hardt Mountains extends through the Rhine Palatinate into Hesse. The Vosges and the Black Forests are remnants of an extensive mountain ridge, the crest of which has been depressed, forming the rift valley of the Rhine. Thus a steep escarpment, which the Germans in 1914–15 found practically impossible of capture, faces the Rhine valley, while the west-facing slope is much more gradual North of the Rhine-Marne Canal the elevations are generally less than 2000 feet, the southern portion being much the higher and the more rugged. The highest point in the whole range, the Sulzer Belchen, with an altitude of 4668 feet, is one of a number of eastern spurs. Other high points are the Honeck, 4472 feet; the Kleinkopf, 4373 feet; and the Rheinkopf, 4327 feet The range is composed mainly of crystalline schists and Paleozoic sedimentary rocks, chiefly Devonian and Carboniferous; mining has long been abandoned. The climate is rather mild, though snow remains for six months on the highest summits. Large forests exist on the mountains, but the valleys are very populous and contain many important industrial centres.

VOSS, vōs (Lat. *Vossius*), GERHARD JOHANNES (1577–1649). A Dutch classical scholar and author, born near Heidelberg, and educated at Dordrecht and Leyden. In 1600 he was called to be rector of the school at Dordrecht; in 1615 he was made director of the theological school at Leyden. In 1619, however, the opposition aroused by his work, *Historiæ Pelagianæ Libri IV* (1618), which was thought to favor the Arminians, cost him his place; but in 1622 he was appointed professor of oratory, an office he held for 11 years, until he was called from Leyden to be professor of history at the Athenæum in Amsterdam. There he remained until his death. In 1624 he had declined a call to Cambridge, England, but in 1629 he accepted a position from Archbishop Laud as prebendary in Canterbury Cathedral and visited England to be installed. He wrote: *Grammatica Latina* (1607); *Aristarchus, sive de Arte Grammatica* (1635); *De Vitiis Sermonis et Glossematis Latino-Barbaris* (1640). His other writings include his great work, *Commentariorum Rhetoricorum sive Oratoriarum Institutionum Libri VI* (1606); also his *Ars Rhetorica* (1623); *De Historicis Græcis* (1624); *De Historicis Latinis* (1627). His collected works were published in six volumes (Amsterdam, 1695–1701). The numerous valuable manuscripts which he gathered are now in the library at Leyden. Consult De Crane, *De Vossiorum Iuniorumque Familia* (Franeker, 1820); J. E. Sandys, *A History of Classical Scholarship*, vol. ii (Cambridge, 1908).

VOSS, ISAAC (1618–89). The youngest son of Gerhard Johannes Voss (q.v.), born at Leyden. In 1648 he accepted the invitation of Queen Christine to Stockholm, but ten years later, owing to differences with Salmasius, he returned to Holland. In 1670 he went to England, and in 1673 was made a canon of Windsor by Charles II. This office he held until his death. He edited the works of the geographers Scylax and Mela; also Justin, Catullus, etc. His other important writings were: *De Septuaginta Interpretibus* (1661); *De Poematum Cantu et Viribus Rhythmi* (1673); *Variæ Observationes* (1685). Consult De Crane, *De Vossiorum Iuniorumque Familia* (Franeker, 1820), and J. E. Sandys, *A History of Classical Scholarship*, vol. ii (Cambridge, 1908).

VOSS, fōs, JOHANN HEINRICH (1751–1826). A German poet, translator, and classical philologist, born in Sommersdorf, Mecklenburg. He studied under Heyne at Gottingen, was a prominent member of the *Gottinger Hain*, and after editing for a time the *Göttinger Musenalmanach*, was made rector of the Gymnasium at Ottendorf (1778). He translated the *Odyssey*, was promoted in 1782 to the rectorship of the Gymnasium at Eutin, and here in 1789 published a translation of Vergil's *Eclogues* and *Georgics*, his classical version of the Homeric poems (4 vols, 1793), and two volumes of controversial letters addressed to Heyne (*Mythologische Briefe*, 1794). In 1802 he moved to Jena, and in 1805 was made professor of classical literature at Heidelberg. Here he translated Horace, Hesiod, Theocritus, Bion, Moschus, and Tibullus, and attempted Shakespeare, Ovid, and Aristophanes with less success. Of his original poems in four volumes (1825) the idyl *Luise* (1795; new ed., 1912), in hexameters, is alone noteworthy. His later works, *Wie ward Fritz Stolberg ein Unfreier?* (1819) and *Antisymbolik* (1824–26), are painstaking and dignified, but dreary. Voss's *Letters* are in three volumes (Halberstadt, 1829–33). Consult the *Lives* by Paulus (Heidelberg, 1826) and Herbst (Leipzig, 1872–76); also Prutz, *Der Göttinger Dichterbund* (Leipzig, 1841).

VOSS, RICHARD (1851–1918). A German author born at Neugrape, in Pomerania. He studied at Jena and Munich, traveled in Italy, and in 1884 became librarian of the Wartburg. His works are very numerous His best-known dramas, many with a psychological-pathological bent, are: *Pater Modestus* (1882), dealing with religion; *Alexandra* (1886); *Brigitta* (1887); *Eva* (1889), patterned after Ibsen's "Nora"; *Schuldig* (1890); *Zwischen zwei Herzen* (1896); *Die Patrizierin*, a classical drama, which in 1896 won a Schiller prize offered by the Mannheim theatre to commemorate the first presentation of Schiller's *Räuber;* and *Jürg Jenatsch*, written in 1893, produced in 1906. His women are usually of abnormal disposition. His novels include: *Die Sabinerin* (1890), remarkable for its beautiful descriptions of Italian country; *Villa Falconieri* (1896); *Amata* (1901); *Römisches Fieber* (1902); *Die Leute von Valdaré* (1903); *Die Schuldige* (1906); *Narcissuszauber* (1909); *Zwei Menschen* (1911).

VOSSLER, fŏs'lĕr, KARL (1872–). A German critic and philologist, born at Hohenheim. He studied at Tübingen, Geneva, Strassburg, Rome, and Heidelberg, was professor at Innsbruck and Würzburg, and after 1910 held the chair of Romance philology at Munich. In German literature Vossler studied particularly

the German madrigal (*Das deutsches Madrigal*, 1898), but his activity was mainly in Italian literature and philology, where he figured as follower and critic of the esthetics of Benedetto Croce (q.v.) His principal works deal with Benvenuto Cellini (*Benvenuto Cellini's Stil in seiner Vita*, 1899), the Divine Comedy (*Die Gottliche Komodie*, 1907–10, Ital trans., 1909), and the history of Italian literature (*Italienische Litteraturgeschichte*, 1900, *Italienische Literatur der Gegenwart von der Romantik zum Futurismus*, 1914). His theories of applied esthetics in philology appear in *Positivismus und Idealismus in der Sprachwissenschaft* (1904, Ital trans., 1909) and in *Sprache als Schopfung und Entwickelung* (1905).

VOSTOKOV, vŏs-tō'kŏf, ALEXANDER CHRISTOFOROVITCH (1781–1864) A Russian philologist He was born in the island of Osel, in the Gulf of Riga, studied architecture, and later devoted himself to philology and paleography. In 1815 he became assistant in the department of manuscripts in the Imperial Library and five years later was chosen member of the Russian Academy of Sciences Vostokov's works include a comparative study of the Slavic languages, *Razsuždeme o slavjanskom Yazykě;* a descriptive catalogue of Slavic manuscripts (1842); a lexicon (1861) and grammar (1863) of the Old Church Slavic; and a *Russian Grammar* which appeared first in 1831, and reached a twelfth edition in 1874 Vostokov contributed to the great lexicon of the Russian Academy (1847). His minor works were edited by Sresnevsky in 1865

VOTE (from Lat. *votum*, wish, engagement, vow, from *vovere*, to wish, promise, dedicate, vow) A formal declaration or expression of the will or preference of a person in regard to a question or issue submitted to him together with others for action. The term is perhaps most commonly applied to the means whereby an elector or citizen expresses his choice of candidates for public offices and to the expressions of assent or dissent of legislators to the enactment of proposed measures, but is also correctly employed to describe the voice of a member of a corporation or any association of individuals in declaring his will as to any question submitted. The word is also used collectively to include the combined action of a number of individuals upon a given question. Various methods of voting have been devised, but practically only two are in use: by ballot (q.v.), and *viva voce,* by voice. Where the voting is by ballot one or more judges must be appointed to canvass or count the ballots which have been deposited in some receptacle by the voters. Where the more simple method of having each voter announce his will orally is adopted, a secretary is usually appointed to note the name and choice of every one entitled to vote.

In all political elections and legislative bodies in the United States every person entitled to vote must do so personally. However, in corporations and associations voting by proxy is usually permitted.

In order to secure a fair election and freedom of choice on the part of the voters, various means of voting have been devised. The Australian system, which practically insures absolute secrecy, is the most in favor. This system prohibits any marking of ballots for indentification, and as all the tickets which may be voted are printed upon one sheet of paper and marked and folded in a closed booth, there is perhaps no method of determining absolutely how a person votes See BALLOT, CORPORATION, ELECTORAL REFORM, PROXY; VOTING MACHINE.

VOTER. One entitled to a vote or voice in the determination of a question before a number of individuals. The term implies some qualification. For example, to entitle a person to vote for candidates for public office he must be a citizen of the jurisdiction in which the election is held, and, of course, no one can vote on any question before a private corporation or association unless he is a member.

The character of the qualifications required of voters in political elections varies somewhat in the different States. However, there are certain general requirements in all States, which may be summarized as follows: (1) Citizenship; (2) residence for a certain time in the State, county, and election district; (3) that the voter shall have attained his majority (21 years); (4) that the voter shall be of sound mind; (5) that he shall not be a convicted felon under sentence. Registration is also required in many States. Some of the States have established either property or educational qualifications This has been done in most of the southern States in order to exclude the negro vote. (See SUFFRAGE, *Grandfather Clause*) Several States permit women to vote. See WOMAN SUFFRAGE.

The election laws of most States contain provisions under which a person who suspects that another is illegally attempting to vote may challenge the latter's right to do so. Under such circumstances the person challenged is generally permitted to "swear in" his vote, i.e., state under oath that he possesses the qualification which the challenger denies, and his vote is counted subject to rejection later if the courts subsequently decide that he had no right to vote. See ELECTORAL REFORM, VOTE.

VOTING MACHINE. A mechanical device which automatically records and counts votes Besides preventing repeating and other fraud, an ideal voting machine has the additional advantages over the paper ballot system of greater secrecy, simplicity, rapidity, and cheapness

The first State law authorizing the use of automatic machines was passed by New York in 1892, allowing towns to use the Myers automatic ballot cabinet at elections of town officers Twenty-two States have since authorized the use of voting machines. They are: New York, 1892; Massachusetts and Michigan, 1893, Connecticut, 1895; Minnesota, 1897; Ohio, 1898; Idaho, Indiana, and Nebraska, 1899; Rhode Island, 1900; Kansas and Maine, 1901; California and Illinois, 1903; Colorado, Utah, and New Jersey, 1905; Montana, 1907; Maryland, 1912–14; New Hampshire, Washington, and Oregon in 1913. The first permanent State Voting Machine Commission to examine machines and make rules for their use was established in New York in 1897. Such commissions are almost invariably found in States using voting machines The attitude of the courts has been generally favorable to the use of this device. The Massachusetts courts, however, held their use unconstitutional (196 Mass. 410, 1907). In 1911 a constitutional amendment reëstablished their validity.

During the presidential election of 1900, 78 United States voting machines were in use, and they had been used at five preceding annual

elections This machine has the party lines arranged in horizontal rows, the candidates in each row being numbered consecutively. To vote the straight ticket a key is pulled out, but the vote is not registered until the voter swings the gate on the voting machine. Before he swings his gate he can rearrange his ballot to any extent he desires.

The Bardwell votometer consists of a series of sections of interchangeable form, except in the sections designed for the questions Yes and No, or for the selective or multiple votes, which differ only as to the interlocking or safety devices. The voter finds before him the complete ballot, and he is at liberty to make any selection of names he sees fit. If he desires to cast a vote for all the nominees of any one party at a single motion, he makes his selection in the straight-ticket column, and, inserting the key in the hole in the centre of the card bearing the party name, he gives it a turn to the right. This actuates a register at the back. Simultaneously with the turning of the key a blank disk, or indicator, located at the right of and 1 inch from the keyhole, changes and a cross or × appears, indicating his vote. It is now impossible to turn the key in any other hole in that column—i.e., to vote for an additional straight ticket—and it is likewise impossible to vote for any individual on the chosen ticket or any other ticket. But the optional column remains open, and in it the voter is free to make any choice he may desire. The affirmative and the negative of a question have corresponding keyholes.

After having voted the straight ticket and on the questions, all one can now do is to correct any mistakes that become evident upon inspection If the voter finds that he has turned the key in the wrong hole, he can reinsert the key and by turning it back cancel his vote. He may now make a new choice with the same limitations as before. The voter leaves the machine at the opposite end to which he entered. In passing out he raises a bar, which resets the machine and at the same time locks it. The bar at the entrance end of the machine cannot be raised till the exit bar has been operated, so that it is impossible for two to have access to the machine at the same time.

The Standard voting machine is about 4 feet square and 10 inches deep, and is supported by legs. The top is a little over 6 feet from the floor. A semicircular bar projects from the upper corners, on which is hung a curtain which forms a booth. An operating lever extends from the centre of the top of the machine, the outer end of which is attached to the curtain. When the voter advances to vote he throws the lever by a dependent handle to the opposite side of the machine, thus carrying the curtain behind him and inclosing himself in a booth.

The voter first selects his party ticket, and by pulling the straight-ticket knob over the party emblem down to the right, moves all the pointers for that ticket. If he desires to split his ticket, he can move the pointer back from over the name that does not suit him, and in the same office line move the pointer over the name he wishes to vote for. He now registers his vote by throwing the curtain open by means of the operating lever with which he closed it, thus casting and counting his vote in perfect secrecy.

The Standard machine had its first trial April 12, 1898, in a town election. During the presidential election of 1900 it was used in a large number of cities and towns in New York including Buffalo, Rochester, Utica, Ithaca Poughkeepsie Consult: "The Voting Mac in *Municipal Journal and Engineer* (New December, 1900); A C. Ludington, *Ame Ballot Laws, 1888–1910* (Albany, 1911); tional Municipal League, *Conference for City Government* (New York, 1910); F. A. C land, *Organized Democracy* (ib., 1913)

VOTKINSKY ZAVOD, vō-tyĭn'ski zȧ An industrial settlement in the Governme Viatka, East Russia, 380 miles southeas Viatka. It has extensive iron works and chine shops. There are also manufactur agricultural machinery and other iron and products, and a mining school. Pop., 27,637.

VO'TYAKS. A Finno-Ugrian tribe, n bors of the Permiaks, living between the Ve and Kama, tributaries of the Volga, in n eastern Russia. Other groups are found i governments of Ufa, Kazan, and Samara number about 360,000, and are skillful husb men, stock breeders, and apiarists. Their h is 1 619 meters and their cephalic index They have high cheek bones, straight nose, s lips, blue or gray eyes, blond or red hair, a slender physique. They are mentally u veloped. Polygamy is practiced, and, th nominal Christians, they secretly continue Pagan cult. Their speech is allied to tha the Zyrians (q.v.), and they have some Russian admixture. Consult: Wieden *Grammatik der wotjakischen Sprache* (R 1851); Buch, *Die Wotjaken* (Helsingfors, 18 De Baye, *Notes sur les Votiaks* (Paris, 18 Wichmann, *Wotjakische Chrestomathie* (singfors, 1901); Bonmariage, *La Russie e rope* (Brussels, 1903).

VOUCH'ER (from *vouch*, from OF. *vou vocher*, from Lat. *vocare*, to call, from voice). In law, a written or printed instru which records the particulars of a paymer money, or which entitles a person to rece sum of money. It is something more th receipt, as it sets forth more fully the esse facts of the transaction, and may operate a order as well as an acknowledgment. term was also formerly employed to descr person who was called into court by a t to defend the latter's title on a general warr In some instances, as in common recoveries person called upon to defend the title was c the vouchee.

VOUET, vōō'ȧ', SIMON (1590–1649). A F decorative and historical painter, born in I He early established himself in Rome, whe was appointed prince of the Academy o Luke. In 1627 he was called to Paris by XIII, who made him first painter to the c and commissioned him to decorate the palaces of the Louvre, the Luxembourg, tainebleau, and Versailles He also pa decorations in the Palais Royal and the Ch of Reuil for Cardinal Richelieu Vouet a facile, skillful, and brilliant painter. ushered in the great French school o seventeenth century, and strongly influenc pupils, among whom were the King hi Lebrun, Lesueur, and Mignard. His "Su and the Elders" and eight other canvase in the Louvre, and he is represented i French provincial museums.

VOUSSOIRS, vōō'swärz'. The indi stones or bricks forming an arch, of whic

central one is called the keystone They are generally of a truncated wedge form See ARCH.

VOW (OF. *vou, vo, veu*, Fr. *vœu*, from Lat *votum*, wish, engagement, vow). In religion, a promise of a future gift to a god, or of some action supposed to be pleasing to the god. In primitive religion, gifts or worship of any kind could commonly be made to the god only by the entire tribe, between the times of sacrifice, the favor of the god could be secured by promising a gift on the next proper occasion. The promise was often conditioned on the bestowal of a benefit by the gods, as in the case of Jacob (Gen xxviii. 20 ff) and Jephthah (Judg. ix. 30 ff.). Gradually the use of the vow widened. It might accompany a gift to a god, and pledge the giver to some future line of action. Survivals of this are found in the monastic vows of chastity, poverty, and obedience, and in the marriage vow, where a ceremony takes the place of the gift to the god. It might present the god, instead of a gift, with some action or abstention from action (taboo), such as the Nazarite's vows not to cut the hair (Num. vi. 18). It might impose duties upon another, with the threat of a curse if the vow were broken (1 Sam. xiv. 24) Every religion has used vows, but they are most prominent in religions with forms of sacrifice, or with a strong sense of personal relation between God and man. Confucianism, e.g., makes little of vows; Hebraism made much of them. The frequency of vows in Israel is indicated by their careful regulation in the law. Deuteronomy calls attention to the voluntary character of the vow, but also to the obligation of fulfilling it when taken (xxii. 21 ff). The priestly law provides for the nullification of vows by women (Num. xxx), and for the redemption of an object vowed which could not be offered (Lev. xxvii. 1–25). The Jewish custom of vows was inherited by the early Church (Acts xviii. 18). With the growth of monasticism, vows became of more importance, and began to receive more attention. Catholic theology discriminated between real and personal vows, dealing respectively with property and personal life; and between simple and solemn vows. The last are irrevocable and absolute, when accepted by competent authority. Vows of abstinence, pilgrimages, and individual acts of charity or piety are simple. So are the first vows of monastic orders. At present only the vow of chastity, and under certain conditions vows of poverty and obedience, taken by religious profession in an order is regarded as solemn. What constitutes a solemn vow was long discussed by moralists, with no final unanimity. Vows may be annulled by those in authority over the person making the vow, as a father over a minor, for good reason. Vows can only be dispensed by ecclesiastical authority. Certain vows, including the vows of chastity, are reserved for the Pope; other vows may be dispensed by a bishop or prelate. Protestantism, laying aside authority of the Church over individual Christian life, denied the perpetual binding power of vows, and left promises to God and the methods of their fulfillment with the individual conscience.

VOWEL. See ALPHABET; LETTERS.

VOWEL GRADATION. See ABLAUT.

VOWELS AND CONSONANTS. See PHONETICS.

VOX CLAMAN'TIS (Lat., voice of one crying). A Latin poem by John Gower, completed in 1384, but never printed. It describes allegorically the rising under Wat Tyler in 1381.

VOYAGE AUTOUR DE MA CHAMBRE, vwä'yäzh' ō'tōōr' de mà shaN'br' (Fr., journey around my room). A prose work by Xavier de Maistre (1794) written during an enforced confinement to the barracks.

VOYER, vwä'yā', RENÉ LOUIS DE, and MARC RENÉ DE See ARGENSON, MARQUIS D'.

VOYNICH, ETHEL LILIAN (1864–). An English novelist, daughter of George Boole (q.v.). She passed several years on the Continent, and married Wilfrid Michael Voynich, a native of Lithuania, who, after participating in the Polish national movement, escaped to England. She began her literary work by translating from the Russian, tales and plays, published under the title of *The Humour of Russia* (preface by Stepniak, 1895). Her first novel, *The Gadfly* (1897), met with instant success, and was followed by other books—*Jack Raymond* (1901); *Olive Latham* (1904); *An Interrupted Friendship* (1910); *Six Lyrics from Schevchenko* (1911).

VOYSEY, voi'zĭ, CHARLES (1828–1912). An English clergyman, founder of the Theistic church. He was born in London, graduated at Oxford (1851), and was curate of Hessle, Yorkshire (1852–59); of Craighton, Jamaica (1860–61); and of St. Mark's, Whitechapel, London (1861–63). From this last charge he was removed on account of a sermon against endless punishment. He was vicar of Healaugh, Yorkshire (1864–71). In 1866 he published, in *The Sling and the Stone*, sermons preached at Healaugh, which were deemed at variance with the Bible and the Thirty-nine Articles. The secretary of the Archbishop of York prosecuted him in the Chancery Court of the diocese From the sentence of condemnation he appealed to the judicial committee of the Privy Council, which confirmed the sentence (1871). He afterward preached and lectured in St. George's Hall, London, a fund having been raised called the Voysey establishment fund, the outcome of which was the Theistic church (1885). He published *Religion for All Mankind* (1903) and *Testimony of the Four Gospels Concerning Jesus Christ* (1907).

VOZNESENSK, vŏz'nyĕ-syĕnsk'. A district town in the Government of Kherson, south Russia, situated on the Bug, 100 miles northwest of Kherson (Map: Russia, D 5). It has extensive warehouses for the storage of grain and salt and manufactures brick and iron products. Pop., 1910, 19,300.

VRANIA, vrän'yä, or **VRANJA.** The capital of a department in Servia, 37 miles east by south of Prishtina, Turkey, on the Morava River (Map: Balkan Peninsula, C 3). It is an important railway and commercial centre, and is noted for the manufacture of rope. Hemp and flax are the principal products of the vicinity. There are numerous sulphur springs. Vrania was captured by the Bulgarians in 1915. See WAR IN EUROPE. Pop., 1900, 11,921; 1910, 11,439.

VRATZA, vrät'sä. The capital of a department in Bulgaria, 59 miles north by east of Sofia (Map: Balkan Peninsula, D 3). It manufactures leather, wine, and jewelry and carries on an important trade. There is a school of sericulture. Pop., 1900, 13,749; 1905, 14,832.

VRAZ, vräs, STANKO (1810–51). A Serbo-Croatian poet, born at Zerovec, in Lower Styria.

He was educated at Gratz and, as editor of the periodical *Kolo* (1842–50), joined the movement to fuse the Slovene and Serbo-Croatian languages under the name of Illyrian. This attempt was not successful; but Vraz (who is also known as Jacob Fraz) wrote many graceful lyrics and made collections of national songs which are of great value. His work has a strong Oriental coloring and he ranks as one of the most important Serbo-Croatian poets. His collected works, *Djela*, were published at Agram in four volumes (1863–64), and a fifth volume containing his letters was added in 1877.

VRCHLICKY, JAROSLAV. See FRIDA, EMIL BOHUSCH.

VREELAND, EDWARD BUTTERFIELD (1857–). An American legislator. He was born at Cuba, N. Y., received an academic education and served as superintendent of schools at Salamanca, N. Y., in 1877–82. Admitted to the bar in 1881, he practiced law at Salamanca, and after 1891 was president of the Salamanca National Bank. As a Republican he represented the 37th New York district in the 56th to the 62d Congress (1899–1913). As chairman of the House Committee on Banking and Currency, which had investigated the panic of 1907, Vreeland, in 1908, was part author, with Nelson W. Aldrich (q.v.), of the Aldrich-Vreeland Currency Law (expired 1915), which sought to prevent panics by the creation of an emergency currency, which national banks might circulate upon certain securities, the issue of all banks not to exceed $500,000,000. He became vice chairman of the National Monetary Commission, and endorsed the Aldrich plan of reform (see CURRENCY: RESERVE BANK, FEDERAL).

VRIBERG, HEINRICH VON See HEINRICH VON FREIBERG.

VRIES, vrēs (or **FRIES**), ADRIAEN DE (1560–1603). A Dutch sculptor, born at The Hague. In his boyhood he went to Florence and there studied under Giovanni da Bologna Many of his original works were done for the Emperor Rudolph II, who invited the sculptor to Prague. They include busts and reliefs of the Emperor (Vienna Museum); bronze statues and groups, such as "Mercury and Psyche" (Louvre), and reliefs in wax. From Prague De Vries went to Augsburg, where his greatest works were made and remain, the most famous being the Mercury Fountain (1599) and the Hercules Fountain (1602). Both are beautiful examples of the Italian Renaissance, with much profusion of figure and fine detail. Numerous later statues, executed for Wallenstein, are now in Drottningholm Park, near Stockholm, Sweden. A "Triton" is in the Metropolitan Museum, New York (Altman collection). Consult the monograph of Buchwald (Leipzig, 1899).

VRIES, MATTHIAS DE (1820–92). A Dutch philologist, born in Haarlem, and educated at Leyden, where in 1853 he became professor of Dutch language and literature. His most important publication was *Woordenboek der Nederlandsche taal* (1864 et seq.), which he began with Te Winkel and continued with the assistance of Cosijn and Verwijs, but was unable to complete. Another great lexicographical labor, also uncompleted, was the *Middelnederlandsch Woordenboek* (1864–65). It was in Middle Low German that his most typical work was done, mainly editions of Van Hooft's *Warenar* (1843), of Boendale's *Lekenspieghel* (1844–48), and of Von Maerlant's *Spieghel historiœl* (with Verwijs, 1863, concluded by Utenbroeke, 1879). Mention should be made as well of his orthographical work, *De grondbeginselen der Nederlandsche spelling* (with Te Winkel, 1865), which introduced the modern method, and of his many pamphlets on linguistic problems in general, of which *De Nederlandschetaalkunde* (1849) and *De heerschappij der taal, het beginsel der welsprekendheid* (1850) are most important. Consult Kluyver in *Vragen van den Dag* (The Hague, 1892), and Verdam in the *Jaarboek der Kon Akademie* (ib., 1893).

VRIES ISLAND. See OSHIMA.

VRIESLAND. See FRIESLAND.

VUL'CAN (Lat. *Vulcanus, Volcanus;* connected with Skt. *ulkā*, firebrand), or HEPHÆSTUS. In classical mythology, the god of fire. In Greek legend Hephæstus was the son of Zeus and Hera. Deformed at birth, he was hurled by his mother from Olympus. He fell into the sea, and was cared for by Thetis and Eurynome. Another story represents him as hurled from heaven by Zeus for interfering in behalf of Hera. He fell on Lemnos and was cared for by the Sintians. In the *Iliad* his wife is Charis (Grace), but later legend united him with Aphrodite, apparently for the contrast between the lame, awkward, and grimy smith and the goddess of beauty. His detection of her infidelity with Ares is told in the *Odyssey*, book viii. In spite of his prominence in legend the cult of Hephæstus was very limited. At Lemnos and in Sicily (both volcanic regions) he enjoyed honor, but in Greece proper his cult is scarcely known outside of Attica. Here he was the god of artisans, especially workers in metal, and was joined in worship with Athena Ergane, in a temple in the Ceramicus, identified by some with the so-called Theseum. In the suburb of the Academy (q.v.) in the sacred precinct of Athena was a common shrine of Hephæstus and Prometheus (q.v.), a very similar personage. The god seems to have developed from the conception of divinity in fire conjoined with local demons or gnomes honored or feared by smiths and potters. In Rome we find among the early Roman gods Volcanus, with a festival on August 23, and a sacred place, the Volcanal, not far from the Comitium. He seems to have been a god of the destructive fire, who was appeased by the offering of living fishes, and in whose honor captured weapons were burned. He certainly was especially invoked against danger from conflagration, and his worship became more prominent under Augustus, who had redistricted the city and provided special protection against fires. The poets of course identified him with Hephæstus, and we find him paired with Vesta and otherwise honored by the Greek ritual as early as the third century B.C. This did not, however, penetrate deeply into the common cult, and he does not seem to have been held in special honor by Roman artificers. Consult: W. W. Fowler, *Roman Festivals* (London, 1899); Otto Gruppe, *Griechische Mythologie und Religionsgeschichte* (2 vols., Munich, 1906); W. W. Fowler, *The Religious Experience of the Roman People* (London, 1911); C. M. Gayley, *The Classic Myths in English Literature and in Art* (2d ed., Boston, 1911); Georg Wissowa, *Religion und Kultus der Römer* (2d ed., Munich, 1912).

VULCAN. A hypothetical planet once supposed to be revolving around the sun within the orbit of Mercury. In 1859 Leverrier found cer-

tain perturbations in the motions of Mercury which indicated the existence of another body in the vicinity. Such a body could be no other than another planet. Soon afterward a certain Lescarbault announced that he had witnessed its transit across the sun's disk. It was thought that his observation was correct; but astronomers agree that he mistook some small sun spots for the supposed planet. Vulcan is not now believed to exist.

VULCANITE. See DENTISTRY.

VUL'CANIZING. See RUBBER.

VULCANO, vul-kā'nō, or **VOLCANO.** The southernmost island of the Lipari group, in the Mediterranean Sea, 12 miles north of the coast of Sicily (Map: Italy, E 5). It is 7 miles long, 3 miles wide, and contains the crater of a volcano 1200 feet high, from which issue sulphurous gases. The soil is fertile, producing grain, fruit, and grapes. Vulcanello, lying off the northern coast, containing two craters, is connected with it by a neck of land

VUL'CAN POWDER. See EXPLOSIVES.

VULGATE. See BIBLE

VULLUM, vul'lum, ERIK V. (1850–). A Norwegian political leader and author. He traveled for years in Denmark, Germany, Austria, and Italy, studying politics, economy, history, literature, and art. Returning in 1877, he contributed largely to the press, was editor of *Dagbladet* (1880), and throughout the country served as orator of the Liberal party. Among his works are: *Kristian Magnus Falsen, Grundlovens Fader* (1881), *Henrik Wergeland i Digt og Liv* (1881); *Leon Gambetta* (1881); *Folgerne af 9 Juni* (1883); *Unionen og dens Fremtid* (1894), *Hvorledes Norge blev Frit* (1913); *Norge og Begivenhederne i 1814* (1914).

VULNED, vulnd (from *vuln*, from Lat. *vulnerare*, to wound, from *vulnus*, wound) A term in heraldry, used to describe an animal or part of an animal, blazoned as wounded, with dropping blood. The pelican, when shown plucking at her breast, is described as vulning herself.

VULPEC'ULA (Lat., dim. of *vulpes*, fox). A small northern constellation, situated directly south of Cygnus. It was first described by Hevelius in 1690. Its chief objects of interest are the variable star, T Vulpeculæ, with a period of 4.4 days, and the well-known Dumb-bell nebula, M 27. In 1670 a nova was discovered in this constellation by Anthelmus, a Carthusian monk of Dijon.

VULPIUS, vul'pē-us, CHRISTIAN AUGUST (1762–1827). A German novelist and dramatist, born at Weimar. He studied at Jena and Erlangen, and, probably through Goethe's influence, obtained a post in the Weimar Library in 1797. In Weimar he published the typical penny dreadful of the period, *Rinaldo Rinaldini, the Robber Captain*, often translated and imitated, but unrivaled on its bad eminence. He published a number of romantic operas, dramas, and tales, and was active as editor. He died at Weimar His sister, CHRISTIANE (1765–1816), became the wife of Goethe. See GOETHE.

VULTURE (Lat. *vultur*, *voltur*, vulture, from *vellere*, to pluck). A representative of a group of carrion-eating rapacious birds classified in two distinct families. The vultures proper constitute the Old World family Vulturidæ, the other family, Cathartidæ, comprises the condors, turkey buzzards, etc. The true vultures have a long straight beak, slightly or not at all hooked at the tip, the head and neck bare or downy, a ruff or collar of soft feathers at the lower part of the neck, into which most of the head can be withdrawn for warmth. The legs and feet are large, but the claws are not nearly so large and strong as in the falcons They have long wings, great powers of flight, and soar out of human sight. Their plumage is dense, usually black and white, often with the naked parts of the head red. They are mostly found in warm climates, and many are inhabitants of mountainous regions. Their food is carrion. They seldom attack a living animal, but may put to death the wounded or sick; some of them regularly seek food in and about eastern towns, where they are suffered as scavengers. Vast numbers have been seen upon battlefields. They gorge themselves when prey is abundant, till their crop forms a projection, and sit, sleepy or half torpid, to digest their food. They do not carry food to their young in their claws, but disgorge it from the crop. The bareness of their heads and neck adapts them for feeding on putrid flesh, by which feathers would be defiled, they are very careful to wash and cleanse their plumage. The question has been much discussed whether vultures discern dead animals by the eye or are attracted by the smell. They possess great powers of vision, but the reasonable conclusion appears to be that the sense of smell is also of service in finding prey. The rapidity with which they congregate about a carcass has been remarked It is explained by their practice of soaring to a great height. Each one observes any signs of excitement on the part of others, and so numbers are lured, following one another towards the feast.

Among notable species are the tawny vulture or griffon (*Gyps fulvus*), found in southern Europe, northern Africa, and western Asia. It nests on inaccessible rocks of high mountains, as in the Alps and Pyrenees, and sometimes in tall forest trees. It is more than 4 feet in length, with yellowish-brown plumage, quills and tail feathers blackish-brown, the down of the head and neck white, the ruff white The same parts of Europe, northern Africa, and most of Asia, are also inhabited by the cinerous vulture (*Vultur monachus*), another large species, which departs from the typical vultures in having the greater part of the neck feathered, and comparatively large and powerful claws. Various species are known in Africa and eastern Asia, of which a familiar one in India is the rather small Pondicherry vulture (*Otogyps calvus*), which is black, and noted for its enormous nest.

The American vultures of the family Cathartidæ differ from those of the Old World technically rather than in appearance or habits. This family includes the huge condors, the California vulture and the king vulture of the genus *Sarcorhamphus* (see CONDOR), and several other species, among them the smaller carrion crow (q.v.) of the tropics, and the more familiar turkey buzzard (*Cathartes aura*) of the southern part of the United States; this bird is occasionally seen, however, in all parts of the United States, and occasionally beyond the Canadian line It is about 30 inches in length, with wing spread of about 75 inches; in color dingy brown; the tail is long, the wing is bent at a salient angle, and the tips of the longest quills spread apart and bend upward. No birds are better flyers or more expert in soaring.

Their only utterance is a sort of hiss. They breed sometimes in communities and sometimes in separate pairs, depositing the eggs on the ground, on rocks, or in hollow logs and stumps, usually in thick woods. Where a rookery is established the place becomes very foul. The eggs are one or two in number, roundish, about 2¾ inches in longest diameter, and yellowish-white blotched with brown and purplish tints. These birds are of great service as scavengers, especially in hot regions. Consult general works cited under BIRD. See also the article on EAGLE VULTURE.

VYĀSA, vyā'sà (Skt., distribution, arrangement). A legendary Hindu sage to whom is ascribed the authorship, or compilation, of a large body of ancient Sanskrit literature. The redaction of the Vedic hymns and the authorship of the *Mahābhārata* (q.v.) are attributed to him, while his name is attached to the *Purānas* (q.v.), to a *Brahmasūtra* (see VEDANTA), and to several other works. According to tradition his father was Parasara (q.v.), and his sons were Pandu and Dhritarashtra, the kings of the *Mahābhārata.* His full name is given as Krishna Dvaipayana Vyāsa, and legend accounts for the title *Krisna,* black, by his dark complexion, and for the attribute *dvāipāyana* by his birth on an island in the Yamuna or River Jumna. The immense mass of literature ascribed to him is so varied in character and so different in point of age, that Vyāsa is not regarded as an individual but is understood to typify the literary activity which brought order into the heterogeneous mass of Sanscrit literature.

VYATKA, vyät'kà. A government of northeast Russia Area, nearly 59,400 square miles. It is largely a plateau, somewhat elevated in the northeast, with hills reaching an altitude of 1400 feet. The chief rivers are the Kama and its tributary the Vyatka (Map: Russia, H 3). Agriculture is the principal occupation and is favored by a fertile soil, but is carried on by primitive methods. Stock raising is also an important industry. About one-half of the area of the government is under forests, but they are unequally distributed. Over 300,000 persons are engaged in household industries. The mineral and smelting industries employ about 45,000 persons and produce chiefly iron and steel. The manufacturing industries are gradually developing and the annual value of their products approximates $15,000,000. The chief manufactures are leather, flour, spirits, hardware, and machinery. There is an extensive gun factory owned by the government. Pop., 1912, 3,869,100. The Russians form about 80 per cent and the remainder is composed of Votiaks, Tcheremisses, and Tatars.

VYATKA. The capital of the government of the same name, in Russia, situated on the river Vyatka, 660 miles northeast of Moscow (Map: Russia, G 3). The trade in grain and animal products with St. Petersburg, Moscow, Archangel, and Siberia is extensive. Pop., 1911, 44,114. Vyatka, formerly Khlynov, dates probably from the twelfth century (1174). It was an important commercial city practically independent in its administration, and differing from Novgorod (q.v.) in that it had no princes. It was annexed to Moscow in the fifteenth century.

VYERNY, vyĕr'nĭ The capital of the Territory of Semiryetchensk, Russian Turkestan, situated at an altitude of 2430 feet, 2690 miles southeast of Moscow. Pop., 1910, 36,382. The town was founded on the site of a Kirghiz settlement in 1854. It has suffered greatly from earthquakes, that of 1887 having almost entirely ruined the place and killed over 330 persons.

VYSHNY-VOLOTCHEK, vĭsh'nyē vō'lō-chĕk'. The capital of a district in the Government of Tver, Russia, situated near the Tsna River, 224 miles southeast of St. Petersburg (Map: Russia, D 3). It has considerable commercial importance. The chief manufactures are cotton goods. Pop., 1910, 17,592.

W

W The twenty-third letter, and eighteenth consonant in the English alphabet. As its name in English indicates, the character is formed by a doubling of single *v*'s or *u*'s into a ligature. This composite letter was first employed to transliterate the Latin semivocalic *v* (*w*) and the earliest recorded instance of its occurrence is in a diploma of Clovis III at the end of the seventh century. It appeared in English usage in the eleventh century, although *uu* or *vv* (without ligature) had already occasionally been employed.

Sound and Philological Value. As a phonetic character *w* is a voiced labial spirant, corresponding very nearly to *u* in the position of its formation The sound is produced by contracting the tongue in the back of the mouth and allowing the breath to escape between the slightly rounded lips. In words beginning with *wh*, like *white*, *what*, *wheel*, where the more original Anglo-Saxon had *hw*, the *w* is pronounced voicelessly, and with the aspiration preceding. The older spelling *hw* (Anglo-Saxon *hwit*, *hwæt*, *hwēol*) was transposed after the twelfth century and *wh* became the generally accepted orthography. In some words now beginning with *wh*, the *w* is not original, but has been adopted since the fifteenth century, thus *whole* (Anglo-Saxon *hāl*), *whoop* (Middle English *houpen*). The silencing of *w* before *r*, as in *wrath*, *wrestle*, and also in *sword*, *answer*, is a later development since the Norman Conquest. The representation of the intermediate *w* sound in *quell*, *queen*, where *qu* stands for an older *cw* (Anglo-Saxon *cwellan*, *Cwēn*), is likewise of later date. (See Q.) The labialized *w* in the form *ow* at the end of *sorrow*, *arrow*, and similar words is evolved from an earlier guttural *g* or *h* (Anglo-Saxon *sorg*, *earh*, etc.). In *cow*, *now*, *how* (Anglo-Saxon *cū*, *nū*, *hū*) the *w* is graphic. The labio-guttural character of the letter is also evinced in such interchanges as French *Guillaume*, *guerre*, English *William*, *war*, which gives rise also to such doublets in English as *guard* and *ward*, *warranty* and *guarantee*. The strongly marked labial character of *w* tends furthermore to color adjacent vowels, as in English *two* (*tu*), Anglo-Saxon *twā*; English *who*, Anglo-Saxon *hwā*.

In regard to its philological value, the English *w* may represent (1) Indo-Germanic *v* (*u̯*), as English *new*, German *neu*, Latin *novus*, Sanskrit *navas*, Indo-Germanic **neu̯os;* (2) Indo-Germanic *gh*, as in English *warm*, Latin *formus*, Greek *θερμός*, Sanskrit *gharmas*, Indo-Germanic **ghuarmas;* (3) English *wh* stands for Germanic *hw* (Indo-Germanic *kᵘ̯*), as Sanskrit *kas*, Anglo-Saxon *hwā*, English *who*

As a symbol in chemistry W stands for *tungsten* (from the Latinized German designation *Wolframium*). Consult: Henry Sweet, *The Sounds of English* (Oxford, 1908); P. Passy, *Petite phonétique comparée des principales langues européennes* (2d ed, Paris, 1912); Daniel Jones, *Outlines of English Phonetics* (Leipzig, 1913); Laura Soames, *Introduction to English, French, and German Phonetics* (3d ed., London, 1913).

WAAGEN, vä'gen, GUSTAV FRIEDRICH (1794–1868). A German art-historian. He was born at Hamburg, studied at the universities of Breslau and Heidelberg, and took part in the War of Liberation in 1813–14. He became at once favorably known through his work *Ueber Hubert und Johann van Eyck* (1822), one of the landmarks in modern art history, which led to his being called to the Berlin Museum. From 1830 until his death he was director of the picture gallery, and in 1844 he was appointed professor at the University of Berlin. In 1862 he published his *Handbuch der deutschen und niederlandischen Malerschulen.* Other important works are *Kunstwerke und Künstler in England und Paris* (1837–39), afterward revised and extended under the title *The Treasures of Art in Great Britain* (1854), and supplemented by *Galleries and Cabinets of Art in Great Britain* (1857); and *Kunstwerke und Künstler in Deutschland* (1843–45). His *Kleine Schriften* were collected and edited with a biography of Woltmann (Stuttgart, 1875). His work was scholarly and thoroughly critical for its day.

WAAHOO, wä-hōō'. See SPINDLE TREE

WAAL, väl. The southernmost and largest arm of the Rhine delta. It flows westward through the Dutch Province of Gelderland, and is joined by the Meuse or Maas (q.v.) near Gorinchem (Map: Netherlands, D 3).

WAALS, wäls, JOHANNES DIDERIK VAN DER (1837–1923). A Dutch physicist. He was born at Leyden, took the degree of Ph.D. in 1873, taught in secondary schools at Deventer and The Hague, and after 1877 was professor of physics at the University of Amsterdam. In 1910 he was awarded the Nobel Prize in physics. His publications deal with the continuity of state of liquids and gases, electrolytic dissociation, thermodynamic theory of capillarity, and similar subjects, one of the most important being *Die Continuität des gasformigen und flussigen Zu-*

standes (2 vols, 2d ed., 1899–1900). He originated a formula known by his name

WABASH, wą'băsh. A city and the county seat of Wabash Co, Ind, 42 miles southwest of Fort Wayne, on the Wabash River, and on the Cleveland, Cincinnati, Chicago, and St. Louis and the Wabash railroads (Map: Indiana, F 3). It has public and high school libraries and the Wabash City Library, and the Wabash County Hospital. Other features include Memorial Hall, and the Masonic Temple, City Park, and Charley Falls and Park. The principal industrial establishments are railroad shops of the Big Four, engine works, a foundry, a canning factory, and manufactories of paper, motor trucks, cabinets, hats, church and school furniture, etc. Pop, 1900, 8618; 1910, 8687; 1915 (U. S. est.), 8723.

WABASHA, wą'ba-shâ. A city and the county seat of Wabasha Co., Minn., 70 miles southeast of St. Paul, on the Mississippi River, and on the Chicago, Milwaukee, and St. Paul Railroad (Map: Minnesota, E 6). It is a residential place and summer resort. There are some industrial establishments, including marine boat yards and flour mills. Pop., 1900, 2528; 1910, 2622.

WABASH COLLEGE. A college for young men at Crawfordsville, Ind., founded in 1832. It has no organic connection with any ecclesiastical body, but is closely affiliated with the Presbyterian church. Students are admitted on examination or by certificate from accredited schools. All undergraduate courses lead to the degree of B.A. The master's degree is given on completion of one year's graduate work at the college. The college grounds consist of 40 acres in the heart of the city, valued, with the buildings, at $243,800. In 1915 the total attendance was 335, the faculty numbered 23, and the library contained 50,000 volumes. The endowment was $750,000. The president in 1916 was G. L. Mackintosh, A.M.

WABASH (wą'băsh) **RIVER.** The chief river in Indiana and the largest north tributary of the Ohio (Map: Indiana, C 4). It rises in the southwestern part of Mercer Co., Ohio, flows northwest, then southwest to Covington, where it takes a more southerly direction, finally forming for 120 miles the boundary between Indiana and Illinois until it enters the Ohio River at the extreme southwestern corner of Indiana. Its length is about 410 miles, and it is navigable for steamers 300 miles to Covington at high water as far as Lafayette. Its middle course, from Terre Haute to Huntington, is followed by the Wabash and Erie Canal, which connects the river with Lake Erie. The chief tributary of the Wabash is the White River (q.v.).

WACE (c.1100–c.1175). An Anglo-Norman poet. He was born on the island of Jersey, about 1100. When a boy he was taken to Caen, in Normandy, where he learned Latin in preparation for the Church. He then studied "a long time" at Paris, returning between 1130 and 1135 to Caen, where he became "a clerc lisant" in the royal chapel. Henry the Second made him a prebendary at Bayeux (apparently in 1169). As there is no trace of him after 1174, it may be inferred that he died in that or the next year. Wace was the author of two great poems. The first, the *Geste des Bretons*, or the *Roman de Brut*, was completed in 1155, and presented with a dedication to Queen Eleanor some time before 1160. It comprises over 15,000 lines, in the prevailing octosyllabic couplet. The narrative begins with the settlement of Britain by Brut, or Brutus, the great-grandson of Æneas, and closes with Cadwalader, the last of the shadowy kings of Britain. The poem is based mainly on the Latin *History of the British Kings* by Geoffrey of Monmouth (q.v.), but Wace drew on other Kymric traditions. He describes the round table, which was unknown to Geoffrey. The *Brut* was translated into English with changes and additions by Layamon (q.v.). Wace's second poem is the *Roman de Rou*, composed between 1160 and 1174. It is partly in Alexandrine verse and partly in octosyllabic couplets. After summarizing the history of the Norman kings and dukes from Henry the Second back to Rolf, Wace reverses the order in more detail. Of most interest to an English reader is a description of the Norman Conquest, which seems based upon the best traditions. But he never completed his chronicle, for old age was approaching and he became discouraged on hearing that his patron had asked Benoît de Sainte-More to write on the same theme. Belonging to Wace's middle life are three minor poems: the *Vie de St. Nicolas* (edited by Delius, Bonn, 1850); the *Vie de la Vierge Marie* (edited by Luzarche, Tours, 1859); and the *Vie de Ste. Marguerite* (edited by Joly, Paris, 1879) The *Brut* has been edited by Le Roux de Lincy (Rouen, 1836–38), and the *Roman de Rou* by Andresen (Heilbronn, 1877–79) For the life and work of Wace, consult Gaston Paris, *Littérature française au moyen âge* (Paris, 1888).

WACE, HENRY (1836–1924). An English clergyman and Church historian, born in London After graduating at Oxford in 1860, he was a curate in London (1861–72), chaplain (1872–80) and preacher (1880–96) of Lincoln's Inn, and rector of St. Michael's, Cornhill (1896–1903). He also served as professor of ecclesiastical history in King's College, London (1875–83), and as its principal (1883–97). In 1881 he became a prebendary of St. Paul's; in 1896 examining chaplain to the Archbishop of Canterbury; in 1900 dean of the East City, and in 1903 dean of Canterbury. He became an honorary royal chaplain in 1884, and chaplain in ordinary in 1889. In addition, he delivered Boyle and Bampton lectures and preached much at Oxford and Cambridge. His chief literary work is his *Dictionary of Christian Biography, Literature, Sects, and Doctrines from the Time of the Apostles to the Age of Charlemagne* (4 vols., 1877–87), prepared in coöperation with William Smith. He was author of *Sermons on the Sacrifice of Christ* (1898); *The Bible and Modern Investigations* (1903); *The Principles of the Reformation* (1910); *Prophecy: Jewish and Christian* (1911); *Some Questions of the Day* (1912; new ed., 1914).

WA CHAGA. See CHAGA.

WACHENHUSEN, vä'gen-hōō'zen, HANS (1823–98). A German author, born at Treves. During the Crimean War he was a war correspondent of several prominent papers, embodying his observations afterward in such books as *Von Widdin nach Stambul* (1855), *Ein Besuch im türkischen Lager* (1855), and those of later campaigns in *Tagebuch vom italienischen Kriegsschauplatze* (1859), *Halbmond und Doppeladler* (1860), *Freischaren und Royalisten* (3d ed., 1867), *Vor den Düppeler Schanzen* (1864), *Tagebuch vom österreichischen Kriegsschauplatz* (6th ed., 1867), and *Tagebuch vom französischen*

Kriegsschauplatz (1871), all of which form a faithful and spirited history of these modern campaigns. In the meanwhile he had lived repeatedly in Paris, where he wrote *Das neue Paris* (1855), *Die Frauen des Kaiserreichs* (7th ed., 1872), and a trip through Spain to Africa he described in *Reisebilder aus Spanien* (1857). He also published several novels and tales, notably *Rom und Sahara* (3d ed., 1867), *Unter dem weissen Adler* (2d ed, 1885), based upon the Polish insurrection of 1863, *Die bleiche Grafin* (6th ed., 1894), but his most interesting works are his memoirs, which appeared under the title *Aus bewegtem Leben* (2d ed., 1895). His works appeared in 17 vols. (1865–68).

WACHSMUTH, vaks-mōōt, CHARLES (1829–1896). An American paleontologist, born in Hanover, Germany. He was educated for the law but abandoned it because of ill health and went to the United States, where he settled in 1854 in Burlington, Ia. Here he became interested in the crinoids of the Burlington limestones, of which he made extensive collections. With Frank Springer he published the important papers: "Discovery of the Ventral Structure of Taxocrinus and Haplocrinus" (1889); "The Perisomic Plates of the Crinoids" (1891); "The North American Crinoidea Camerata" (posthumous, 1897).

WACHSMUTH, vâgs'mut, GOTTLIEB (1784–1866). A German historian, born at Hildesheim. After studying philology and theology at Halle, he taught in various positions at Magdeburg, Zerbst, and Halle until 1820, when he was called as professor of history to Kiel. Thence he went to Leipzig in 1825, and there published his most important works: *Historische Darstellungen aus der Geschichte der neuern Zeit* (3 vols., 1831–35) and *Hellenische Altertumskunde* (2 vols., 2d ed., 1843–46); *Europaische Sittengeschichte* (5 vols., 1831–39); *Geschichte Frankreichs im Revolutionszeitalter* (1840–44); *Allgemeine Kulturgeschichte* (1850–52); *Geschichte deutscher Nationalität* (1860–62), and many others.

WACHT AM RHEIN, vâgt ăm rīn, DIE (Ger., The Watch on the Rhine). A famous German patriotic song, the words by Max Schneckenburger (1819–49) and the music by Karl Wilhelm (1815–73). The poem was written in 1840, when the left bank of the Rhine seemed threatened by France. The music, which is a part song for men's voices, was composed and first sung in 1854, but did not become a national song until the Franco-Prussian War. In 1871 the composer was granted a pension of 3000 marks.

WACHUSETT, wą-chū'sĕt, MOUNT. An isolated monadnock in the central part of Massachusetts, 7 miles southwest of Fitchburg (Map: Massachusetts, D 3). Its altitude is 2108 feet, and its summit affords a fine view.

WACKENRODER, vâk'en-rō'dĕr, WILHELM HEINRICH (1773–98). A German author of the Romantic school. He was born at Berlin, and was educated in law at the universities of Erlangen and Göttingen. While a schoolboy he became the friend of Ludwig Tieck (q.v.), and was closely associated with him till his death. Tieck contributed an introduction and one or two sketches to his friend's *Herzensergiessungen eines kunstliebenden Klosterbruders* (1797; new ed., 1904), and after his death published two works which were the fruit of their joint authorship: *Franz Sternbalds Wanderungen*, largely Tieck's work (1798), and *Phantasien uber die Kunst* (1799). In these books the two young men expressed for the first time the principles of æsthetics which were to govern the Romanticists. Consult "Tieck und Wackenroder," edited by J Minor in Kurschner's *Deutsche Nationallitteratur*, vol cxliv (Berlin, 1882–99), and Koldewey, *Wackenroder und sein Einfluss auf Tieck* (Leipzig, 1904).

WACKERNAGEL, vak'er-nà'gel, JACOB (1853–). A Swiss-German Hellenist and comparative philologist, son of Wilhelm Wackernagel, born in Basel, and educated there, in Gottingen, and in Leipzig. He became professor of Greek at Basel in 1881 and in 1902 was called to Göttingen. Wackernagel's publications include: *Der Ursprung des Brahmanismus* (1877); *Das Dehnungsgesetz der griechischen Komposita* (1889); *Das Studium des klassischen Altertums in der Schweiz* (1891), an historical sketch of humanistic study in Switzerland; the important *Altindische Grammatik*, vols. i, ii, part 1 (1896–1905); *Vermischte Beitrage zur griechischen Sprachkunde* (1897).

WACKERNAGEL, WILHELM (1806–68). A German scholar, born and educated at Berlin. In 1833 he was called to the University of Basel and in 1835 was made professor of German language and literature there. He was primarily a student of Germanics, though he wrote much on other subjects. His works include: *Deutsches Lesebuch* (1835–36); an edition of the *Schwabenspiegel* (1840); *Altfranzosische Lieder und Leiche* (1846); *Geschichte der deutschen Litteratur* (1848–56), completed by Martin; *Walther von der Vogelweide* (ed., with Rieges, 1862). In 1873 appeared *Poetik, Rhetorik und Stilistik*, and in 1876 his *Altdeutsche Predigten und Gebete*, both edited by associates of Wackernagel.

WACO, or **HUECO,** wā'kō. A small tribe of Caddoan stock (q.v.), one of the divisions of the Tawakoni, formerly residing on the middle Brazos River, about the present town of Waco, Texas, which takes its name from them. Like all the other tribes of the stock, they were agricultural and sedentary, living in conical houses of grass laid over a framework of poles. They cultivated an abundance of corn and pumpkins, in addition to which they obtained a supply of meat from the buffalo. In 1855, with several other small tribes, they were gathered upon a reservation near Fort Belknap, but were driven off by the Texans, and in 1859 were removed to a new reservation established north of the Washita, where they became incorporated with the Wichita (q.v.). During the Civil War they fled to Kansas, where they suffered greatly from disease and famine. They are still resident with the Wichita upon the same reservation, but had been reduced by disease and removals from an estimated 400 in 1804 to five individuals in 1910.

WACO. A city and the county seat of McLennan Co, Tex., 97 miles southwest of Dallas; on both sides of the Brazos River, connected by two suspension bridges, and on the St. Louis Southwestern, the Missouri, Kansas, and Texas, the San Antonio and Aransas Pass, the Gulf, Colorado, and Sante Fe, the Houston and Texas Central, and the International and Great Northern railroads (Map: Texas, D 4). The city is laid out parallel with the river, the residential portion occupying the more elevated regions on either side. There are numerous

artesian wells with medicinal properties The educational institutions include Baylor University (q.v), Academy of the Sacred Heart, and Paul Quinn College (African M. E.), opened in 1881. Other important features are the natatorium, Federal building, auditorium, public library, Texas Cotton Palace, Amicable Building, Provident Sanitarium, and the Methodist Orphanage. Waco carries on an enormous jobbing business; and has grain elevators, cotton-seed oil mills, flour mills, and manufactories of mattresses, saddlery, sashes and doors, etc The city has adopted the commission form of government. Pop, 1900, 20,686; 1910, 26,425; 1915 (U. S. est.), 32,756; 1920, 38,500.

WAD. A manganese oxide of doubtful composition, black in color and earthy in texture. It occurs with other ores of manganese (q v.).

WADAI, wä-dī. Formerly one of the most powerful native states of the Sudan, and now part of French Equatorial Africa, situated east of Lake Chad (Map Africa, F 3). Its area with dependencies is given as 170,000 square miles. It is a long, narrow, semicivilized state, stretching from north to south. It largely possesses the character of a region of steppes, with here and there naked mountain groups In the southwest lies a wild, broken, thick-forested region, where the Guere Mountains reach over 3000 feet. In the east is the Tir range, 2000 feet high. The watercourses dry up during the year except the Aukadebbe in the south, an important tributary of the Shari. The most important oases are the Bahr-es-Salamat and the Batha. From the last the Fitri Lake, east of the mouth of the Shari, gathers its waters. Wadai is especially arid in the north. The flora and fauna are similar to those of Bornu. The region, where the Guere Mountains reach over are rice and wheat. The leading occupation is pastoral. Cattle, horses, and camels are raised of a superior kind. Ostrich feathers, ivory, and slaves are the prominent items in the trade. The population is estimated by the French at about 1,000,000. The Mabas are the foremost race and form about one-seventh of the population—a negro people of the Mohammedan faith and belonging to the Senussi sect. Arabs are numerous. Market communities take the place of cities. Vassal states are Fitri, East Kanem, and Runga. Abeshe is now the Sultan's capital.

The Wadai kingdom was founded in 1635, and paid tribute to both Bornu and Darfur. The country has had powerful rulers. The Sultan Ali conquered, after about 1860, the territory of Runga, the east half of Kanem, and also Borku. The Sudanese Rabaj conquered Wadai during 1892–93, and extended his rule to surrounding states. The present native conditions of political rule are not definitely known. In 1901 a revolution occurred owing to local political feuds, and a new sultan was enthroned. Eduard Vogel was the first European to enter the land, about the middle of the nineteenth century. Nachtigal explored it in 1873 and Matteuci and Massari in 1879. By the Anglo-French agreement of 1898–99 the region passed definitely to the French, who extended their colonial system to it in 1903.

WADDELL, wŏd-dĕl', James Iredell (1824–86). An American naval officer, born in Pittsboro, N. C. He became a midshipman in the United States navy in 1841, and a second lieutenant in September, 1855. In 1859 he was assistant professor of navigation at the Naval Academy, and in 1860 was at the China station. In November, 1861, he resigned from the navy, and in March, 1862, was commissioned lieutenant in the Confederate navy. He commanded the ram *Louisiana* at New Orleans, and blew her up to prevent capture. In October, 1864, he took command, in England, of the *Shenandoah*, with which he made his way to the northern Pacific and Arctic oceans by way of Australia, and almost destroyed the United States whaling fleet. Thirty-eight vessels were captured, and the amount of damage done was estimated at only $400,000 less than that done by the *Alabama* (See Alabama Claims.) Most of this was done after the collapse of the Confederate government, as Waddell did not hear of the end of the war until Aug. 2, 1865. He at once made his way to Liverpool and surrendered his ship to the British government, which afterward turned it over to the United States. In 1875 he became commander of the *San Francisco* of the Pacific Mail line.

WADDING, wŏd'ĭng, Luke (1588–1657). An Irish Franciscan friar and historian of the order. He was born at Waterford, educated at the Irish Jesuit College at Lisbon, and entered the Franciscan Order there. He pursued his studies at the University of Coimbra and was ordained priest in 1613. He taught theology at Salamanca for a while, and went to Rome, where the rest of his life was to be passed, in 1618, in the suite of the Bishop of Cartagena, sent by Philip III to request the Pope to define the dogma of the immaculate conception His account of this mission (1624) is his first important work. He founded the College of St. Isidore and another at Capranica, for the members of his order, and was influential in founding the Irish College at Rome. He was procurator of the Franciscans, and a member of the important Roman congregations; the revision of the breviary under Urban VIII is largely the result of his work in the Congregation of Rites. His fame rests principally, however, on his historical studies: *Annales Ordinis Minorum* (1625–54; new ed., in 24 folio vols., 1731–1860); *Scriptores Ordinis Minorum* (1650; new ed. 1806).

WADDINGTON, wŏd'ĭng-tŭn, Charles (1819–1914). A French philosopher, cousin of Richard and William H. Waddington. He was born at Milan, of a Protestant family of English origin. Graduating from the Ecole Normale Supérieure at 19, he taught at various institutions, including the Protestant Seminary of Strassburg, the Lycée Louis le Grand, and the Sorbonne, where in 1879 he was appointed professor of ancient philosophy In 1888 he became a member of the Academy of Moral and Political Sciences. His works, notable for clearness and penetration, include: *Essai de logique* (1858); *De l'idée de Dieu dans l'athéisme contemporain* (1859); *De l'âme humaine, études de psychologie* (1863); *Dieu et la conscience* (1870); *De la science du bien* (1875); *L'Athéisme en France à la fin du XVIIIième siècle* (1892); *La philosophie ancienne et la critique historique* (1904).

WADDINGTON, Richard (1838–). A French legislator and historian, brother of William Henry Waddington and cousin of Charles Waddington (qq.v.). He was born at Rouen. In 1870–71 he served as a captain of artillery. Elected a deputy in 1876, he sat with the Left Centre until 1891, when he was elected senator

for Seine-Inférieure. He was reëlected to the Senate in 1900 Waddington wrote *Louis XV et le renversement des alliances* (1896), and *La guerre de sept ans: histoire diplomatique et militaire* (4 vols., 1899–1908).

WADDINGTON, WILLIAM HENRY (1826–94). A French statesman and archæologist, brother of Richard and cousin of Charles Waddington. He was born of English parentage at St. Rémy-sur-l'Avre, France, and was educated at the University of Cambridge, England, but on his return to France in 1849 became a naturalized citizen of that country. He engaged in important archæological expeditions in Asia Minor and Palestine, the results of which were published in his works, *Voyage en Asie Mineure au point de vue numismatique* (1852); *Mélanges de numismatique et de philologie* (1861). The work of Le Bas, *Voyage archéologique en Grèce et en Asie Mineure* (Paris, 1868–77), was also continued by him With these should be named his other important publications within the same field, *Inscriptions grecques et latines de Syrie* (1870), and his *Edit de Dioclétien* (1864). His services to classical scholarship were recognized in 1865 by his election to the Académie des Inscriptions.

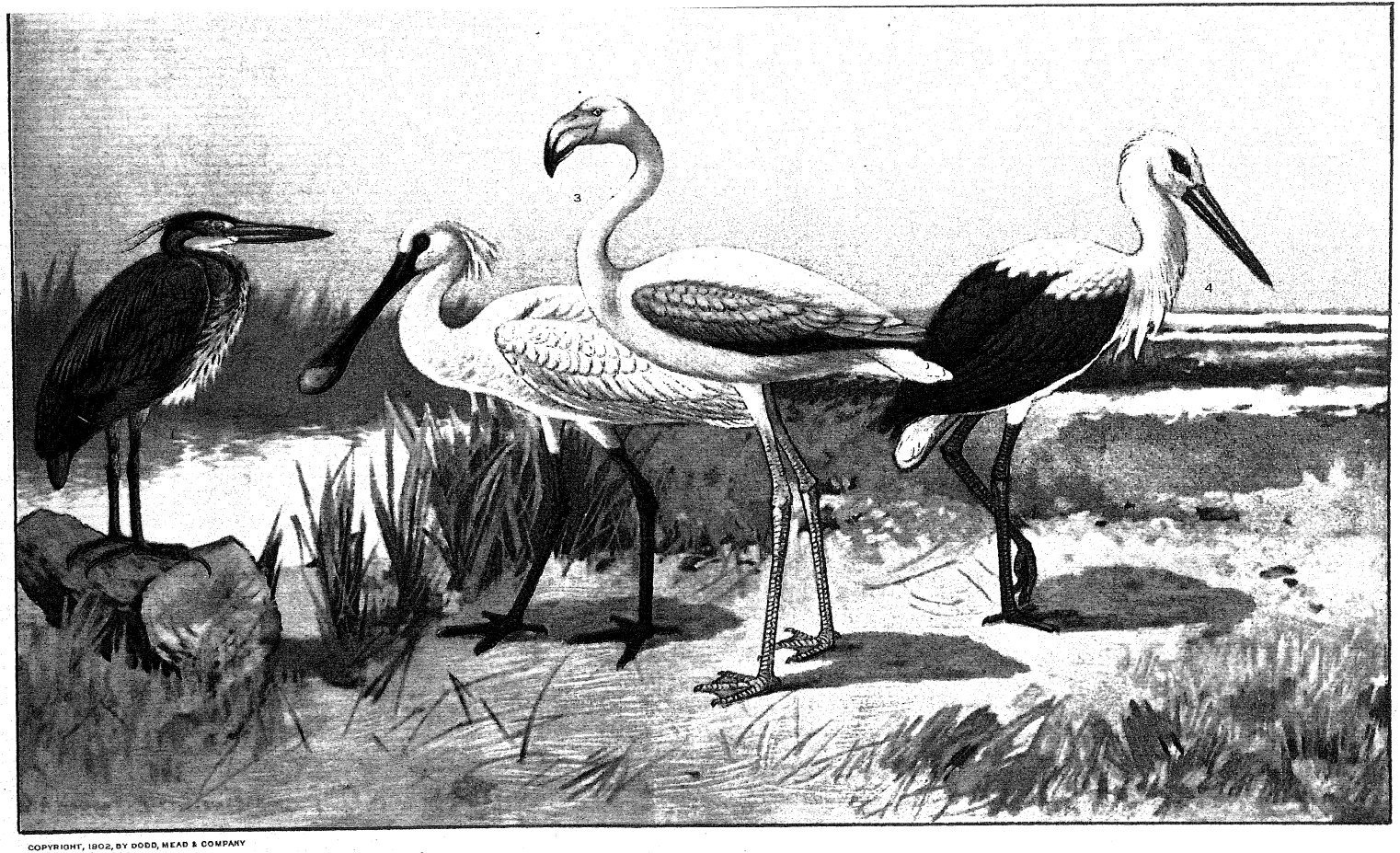
Waddington became prominent in political life in 1871, when he entered the National Assembly; in 1873 he was Minister of Public Instruction under Thiers, but for six days only; and in 1876 he was chosen Senator. On Dec. 13, 1877, he became Minister of Foreign Affairs in Dufaure's Cabinet, and as such took part in the Berlin Congress (1878). In February, 1879, he was appointed by President Grévy to the presidency of the Council. He resigned in December of that year. From 1883 to 1893 he was the French Ambassador at the Court of St. James's. Consult: Mme. Waddington, *Letters of a Diplomat's Wife, 1883–1900* (London, 1903); id., *Italian Letters of a Diplomat's Wife* (ib., 1905); J. E. Sandys, *A History of Classical Scholarship*, vol. iii (Cambridge, 1908).

WADE, BENJAMIN FRANKLIN (1800–78). An American political leader, born of humble parentage, near West Springfield, Mass. He removed to Ohio in 1821; was admitted to the bar in 1827, and in 1831 became the partner of Joshua R. Giddings (q.v). He was elected prosecuting attorney of Ashtabula County in 1835, and State Senator in 1837 and 1841; and was chosen presiding judge of the third judicial district of the State in 1847. From 1851 until 1869 he was a member of the United States Senate. He was a Whig, and a strong opponent of slavery; voted for the repeal of the Fugitive Slave Law in 1852; and opposed the Kansas-Nebraska Bill (q.v.) of 1854, the purchase of Cuba, and the admission of Kansas under the Lecompton Constitution (q.v.). After the election of Lincoln in 1860 he opposed all compromise between the North and the South; was chairman of the Committee on the Conduct of the War in 1861–62, and advocated a more vigorous policy, urging a law to confiscate the property of the leading secessionists and to emancipate the slaves. With Henry W. Davis and other Republicans he caused, in the summer of 1864, an open breach with the President upon the proper method and policy of Reconstruction (q.v.), and issued the Wade-Davis Manifesto, condemning in strong language the policy of the President. As chairman of the Committee on Territories, he reported in 1862 a bill to abolish slavery in all the Territories, and prohibit it in all future Territories. He was elected president of the Senate in 1867, and was sent in 1871 as one of the commission to Santo Domingo to report in regard to its annexation to the United States Senator Wade was popularly known as Ben or Old Ben, and was greatly admired by his associates for his rugged, fearless manner, his honesty of purpose, and independence of thought Consult Riddle, *Life of Benjamin F. Wade* (Cleveland, 1888).

WADE, JAMES FRANKLIN (1843–1921). An American soldier, born at Jefferson, Ohio. He was appointed first lieutenant in the 6th United States Cavalry in 1861; was breveted captain and major for services respectively at Beverly Ford, Va., and Marion, Tenn.; and was mustered out of the volunteer service with the brevet rank of brigadier general in 1865. Entering the regular army as captain in 1866, he was promoted through the grades to brigadier general in 1897. During the Spanish-American War he served as major general of volunteers, and in 1898 was head of the Cuban Evacuation Commission. Sent to the Philippines in 1901, he was promoted major general U. S. A., in 1903, and in 1903–04 commanded the Division of the Philippines. Thereafter he was in command of the Atlantic Division until 1907, when he was retired.

WADE, THOMAS (1805–75). An English poet, born at Woodbridge, in Suffolk. He went to London at an early age with a competence, and began to publish remarkable verse under the inspiration of Shelley and Keats. He met with some success in the acting drama; but he eventually turned to journalism, becoming editor and part proprietor of *Bell's Weekly Messenger*. After losing much by this undertaking, he retired to the Isle of Jersey, where he edited the *British Press*, and continued to write verse until his death. Wade's first volume of poems, *Tasso* (1825), displaying rare imaginative qualities, especially in the piece called "The Nuptials of Juno," was followed by a collection strangely called *Mundi et Cordis, de Rebus Sempiternas et Temporariis, Carmina* (1835), and by remarkable verse pamphlets: *The Contention of Death and Love* (1837), *Helena* (1837), *The Shadow Seeker* (1837), and *Prothanasia and Other Poems* (1839). In the meantime, he had written for the stage *Woman's Love* (Covent Garden Theatre, 1828), a romantic drama; *The Phrenologists*, a farce (Covent Garden, 1830); and *The Jew of Arragon* (Covent Garden, 1830), a tragedy. The play last named failed because of its exaltation of the Jew. Of two other dramas written at this period, *Elfrida* is lost, and *King Henry II* exists only in manuscript, as does his translation (made in 1845–46) of Dante's *Inferno* in the original metre. Some of a series of sonnets inspired by his wife have been published. Consult: A. H. Miles (ed.), *Poets and Poetry of the Nineteenth Century*, vol. iii (London, 1896), which contains an estimate by Forman; Nicoll and Wise (ed.), *Literary Anecdotes of the Nineteenth Century*, vol. i (ib., 1895), which contains a specimen of the Dante, 50 sonnets, and the first two verse pamphlets cited above.

WADE, SIR THOMAS FRANCIS (1818–95). A British diplomat, born in London. He was educated at Harrow, spent a year at Trinity College, Cambridge, and entered the army (1838). Promoted lieutenant, he went to Hongkong,



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1 PURPLE HERON - ARDEA PURPUREA 1/12 NATURAL SIZE
2 SPOONBILL - PLATALEA LEUCORODIA 1/7 " "
3 FLAMINGO - PHŒNICOPTERUS ROSEUS 1/12 NATURAL SIZE
4 WHITE STORK - CICONIA CICONIA 1/10 " "

and took part in the attack on Chinkiang, and in the operations near Nanking during the Opium War. In 1853 he became chief of the commission that established the customs administration which developed into the Imperial Maritime Customs Service. He was attached to Lord Elgin's mission in 1857, and negotiated the treaty of Tien-tsin (1858). He assisted in establishing the legation at Peking (1861), where, after experience as chargé d'affaires, in which capacity he conducted the difficult negotiations arising from the Tien-tsin massacre of 1870, he became Minister in 1871. Largely through his effort, audience to Ministers was granted by the Emperor T'ungchih in 1873. As a result of the murder of A. R Margary in Yun-nan, he negotiated with Li Hung Chang the Chifu convention of 1876. Wade was made K.C B. in 1883, and retired. In 1888 he was appointed first professor of Chinese at Cambridge. Among his publications, which include several valuable books for the study of Chinese, are: *The Hsin Ching Lu*, or *Book of Experiments* (1859); *Wenchien Tzu-erh Chi* (1867), dealing with documentary Chinese; and *Yu-yen Tzu-erh Chi* (1867; enlarged 1886), a progressive course in the colloquial Peking variety of the Mandarin dialect. Wade bequeathed his large Chinese library to Cambridge University.

WADHAM (wŏd'am) **COLLEGE.** A college at Oxford, England. It was founded by Nicholas Wadham, of Merifield, Sussex, and Dorothy, his wife, daughter of Sir William Petre, the great benefactor of Exeter College. Sir Nicholas dying in 1609, his plan was carried out by his wife. The site and ruins of the old priory of the Austin Friars were purchased, and the building of the college was begun in 1610, the society being founded by letters patent from James I, in 1612. The original foundation was for a warden, 15 fellows, 15 scholars, two chaplains, and two clerks. In 1882 there was a change in the statutes, which provided for a warden, eight fellows, several honorary fellows, two chaplains, college officers, a number of lecturers, 18 scholars, and some 100 undergraduates in all. The buildings (seventeenth century) are attractive, though not remarkable. The garden is one of the most pleasant in Oxford. The college presents to 10 livings. Among distinguished men of Wadham have been Admiral Blake, Sir Christopher Wren, Bishop Ward, Dr. Kennicott, and Frederic Harrison. Consult J. Wills, *Wadham College* (London, 1898).

WADI, wä'dē, or **WADY** (Ar. *wādi*, from *wadaya*, to flow). Properly, a river or water course, more generally a valley or ravine; sometimes also an oasis. These various meanings are due to climatic and physical conditions in Arabia and Palestine, where fertility is dependent upon the presence of water, and the streams are usually during most of the year mere beds with low streams, though in the rainy season they may become raging torrents.

WADI HALFA, wa'dē hăl'fā (valley of grass), or HALFA. The chief town of the district of Wadi Halfa, Egyptian Sudan, on the right bank of the Nile 1 mile below the second cataract (Map: Africa, G 2). Here the Sudan military railway branches, one line going to Kerma and the other to Khartum. There are mosques and a primary government school. Pop. with Dabrosa, 1912, 4653.

WADING BIRDS. A popularly named group of birds, within the order Ciconiiformes, prominently characterized by having very long, naked legs, the feet partly webbed, the neck long and capacious, and the beak long, pointed, and strong. The group includes the herons and bitterns (suborder Ardeæ); storks, ibises, and spoonbills (Ciconiæ); and flamingoes (Phœnicopteri). Their associates in the order are the totipalmate sea birds (suborder Steganopodes). They haunt swamps and marshes, and walk in the shallows, never swimming or diving, where they catch fish, frogs, crayfish, etc, by a dart of the bill. Some are nearly terrestrial and live largely on insects; while the flamingoes (q v.) are otherwise exceptional. Most of these birds are of large size and have white, gray, or brownish plumage, some developing ornamental plumes (see AIGRETTE); the character and distribution of powder-down patches are an important tribal feature. They are mainly migratory and gregarious, most of them nest in companies on trees. All are precocial and lay unspotted eggs. See HERON; STORK; ETC.; and Colored Plate of WADERS.

WADLIN, wŏd'lĭn, HORACE GREELEY (1851–). An American librarian and statistician, born at Wakefield, Mass In 1875 he began practice as an architect, and from 1888 to 1903 was chief of the Massachusetts Bureau of Statistics and Labor. Thenceforth he was librarian of the Boston Public Library. He also served as a member of the Massachusetts House of Representatives (1884–88), and as a supervisor of the United States Census (1899–1900). Besides editing *The Decennial Census of Massachusetts for 1895* (7 vols.) and other statistical works, he published *Carroll Davidson Wright, a Memorial* (1911), and *The Public Library of the City of Boston: A History* (1911).

WADMAN, wŏd'man, WIDOW. A designing, middle-aged woman in Sterne's *Tristram Shandy*, who seeks to captivate Uncle Toby.

WADSWORTH, wŏdz'wŭrth. A village in Medina Co., Ohio, 14 miles southwest of Akron, on the Erie and the Northern Ohio Traction and Light Company railroads (Map: Ohio, G 3). Salt, injectors, and matches are the principal manufactured products. Pop., 1900, 1764; 1910, 3073.

WADSWORTH, JAMES SAMUEL (1807–64). An American soldier, born at Geneseo, N. Y. He was educated at Hamilton College, at Harvard, and at Yale, though he did not graduate at any of these institutions; studied law under Daniel Webster in Boston and under McKeon and Deniston in Albany, and in 1833 was admitted to the bar, but never practiced his profession. He took an active interest in agricultural affairs, and in 1842 was president of the New York State Agricultural Society. In 1861 he was a member of the Peace Convention (q.v.), in which he opposed the granting of extreme concessions to the South, and in June, 1861, soon after the outbreak of the Civil War, he became a volunteer aide, with the rank of major, on the staff of General McDowell. He participated in the first battle of Bull Run; was promoted to the rank of brigadier general of volunteers in August, 1861; and from March to December, 1862, was Military Governor of Washington, D. C. In 1862 he was defeated by his Democratic opponent, Horatio Seymour, for the governorship of New York. He led a division with great gallantry at Fredericksburg and Chancellorsville, and at Gettysburg took a

conspicuous part in the first day's fighting and then occupied Culp's Hill, where he helped to repel the Confederate assaults on the second and third days of the battle. Early in 1864 he made a tour of inspection through the Western and Southwestern States, and subsequently, while commanding a division in the battle of the Wilderness (q.v.), May 6, was mortally wounded, dying two days later. He received the brevet of major general of volunteers to date from May 6, 1864

WADSWORTH, wŏdz'wŭrth, JAMES WOLCOTT, JR. (1877–). An American legislator, born at Geneseo, N. Y., grandson of Gen James S. Wadsworth. He graduated from Yale University in 1898, and immediately entered the live-stock and farming business in which his father was interested both in New York and Texas He became active early in Republican politics, being elected to the State Assembly in 1905 (when 28 years old) and serving continuously until 1910. As Speaker of the Assembly from 1906 to 1910 he was regarded as perhaps the most able young leader in his party His conservative views led him to oppose Governor Hughes's progressive programme, especially the direct primary election bill. In 1914 Wadsworth was elected to the United States Senate as successor of Elihu Root. He served as a delegate to the Republican national conventions of 1908 and 1912 and to the New York State Constitutional Convention in 1915, and in 1916 was permanent chairman of the Republican State Convention. He married a daughter of John Hay (q.v.).

WAECHTER, vāk'tĕr, ALFRED VON KIDERLEN-. See KIDERLEN-WAECHTER, ALFRED VON

WAECHTER, KARL GEORG VON (1797–1880). A German jurist, born at Marbach-on-the-Neckar, and educated at Tübingen and Heidelberg. In 1819 he left the university for legal practice, but was recalled in the same year to Tübingen as professor of law. There he stayed until 1833, and in 1836 returned thither after three years in Leipzig to become professor and chancellor of the university, which he represented in the Estates From 1839 to 1851 he was president of the Chambers. In 1852 he was called to Leipzig to become professor of the law of the Pandects. He was made a member of the Saxon Council of State in 1855 and privy councilor in 1872. As a jurist Waechter showed great range of knowledge, lecturing and writing on almost every branch of law with an equally remarkable grasp of theory and practice His more important works are: *Lehrbuch des romisch-deutschen Strafrechts* (2 vols, 1825–26); *Gemeines Recht Deutschlands* (1844); *Beitrage zur deutschen Geschichte* (1845); *Pandekten* (2 vols., 1880–81); *Deutsches Strafrecht* (1881). Consult his *Life* by his son Oscar (Leipzig, 1881).

WAFA, wä-fä', or **WEFA,** we-fä', ABUL. See MOHAMMED BEN MOHAMMED BEN YAHAYA.

WAFER ASH. See HOP TREE.

WAGE EARNERS, HOUSING OF. See TOWN PLANNING AND HOUSING.

WAGEL, wăg'el. See GULL.

WAGER (from OF *wager, gager,* Fr. *gager,* to pledge, wager, from ML. *wadiare,* to pledge, Ger. *Wette,* AS. *wedd,* obsolete Eng. *wed,* pledge). A promise or agreement to pay money or transfer property to another upon the happening or determination of an uncertain event. The promise is given in consideration of the payment of money or transfer of property by the other party to the wager, or a promise on his part to pay money or transfer property if the event fails to happen or if it happens in a particular manner specified by the agreement. The uncertainty of the event may arise either because it has not happened or because it is not known to the parties to the wager. Thus a wager may be made as to the outcome of a race which has not taken place, or a wager may be made as to the weight or size of an existing object, the only uncertainty being in the knowledge of the parties to the wager. It will thus be seen that many common forms of commercial contracts are technically wagers. Thus contracts of insurance, contracts dealing in futures in stocks or any commodity, are strictly speaking wagers. At early common law wagering contracts were held to be valid unless they involved some element in addition to the wager which rendered them contrary to public policy and therefore illegal. Generally speaking, however, wagering contracts are illegal and void, and hence no action at law may be predicated upon such an agreement.

There have been numerous statutes also affecting wagers in the form of commercial contracts. The Act of 7 Geo. II c. 8 made illegal all wagers upon the price of stocks by agreements to pay differences, i.e., to settle a contract for the sale of stocks for future delivery by paying the difference between the contract and market prices on the date of delivery. This statute was subsequently repealed.

For further consideration of the subject, see the titles BETTING; GAMBLING; ETC.

WAGER OF BATTLE. See BATTLE, TRIAL BY, or WAGER OF.

WAGER POLICY. In insurance law, a policy covering a risk on a person in whom, or property in which, the insured has no financial interest of dependency, technically known as an insurable interest. Such policies are void by the old English common law, and also by virtue of statutes in England, and in the United States where similar statutes have not been enacted, the English law is held to be a part of their common law and applied to such cases. The English insurance companies insure the life of the sovereign for the benefit of tradesmen on the theory that the sovereign's death would cause depression in trade and consequent loss to trade, this is near the border line of speculative insurance. See INSURANCE, and authorities there cited.

WAGES. The reward of economic labor, i.e., exertion systematically directed towards the creation of goods or utilities. Popular usage tends to limit the application of the term to the earnings of hired labor, and frequently the meaning of the term is still further restricted so as to exclude the earnings of professional labor, such earnings being known as fees, honoraria, salaries, etc. Economic writers make no distinction between the rewards for the different classes of services, a prima donna's income being regarded as wages just as the income of the day laborer. Furthermore, economists treat as wages a part of the income of a man who works with his own instruments of production, as, e.g., a small farmer. The same thing is true of a part of the profit of the *entrepreneur* who performs the routine work of management. In this sense of the term wages are contrasted with interest (q.v.), rent (q.v.), and profit (q.v.).

The four incomes, taken together, make up the whole of the social dividend.

Nominal and Real Wages. Wages are most frequently paid in money; but sometimes they are paid partially in goods, privileges, and advantages which possess a definite money value. In domestic service, e.g., the money value of board, lodging, etc., must be added to actual money payments to give the true wage. Wages thus expressed in terms of money are called nominal wages. To estimate the true welfare of the laborer, given the rate of nominal wages, it is necessary to take into account the purchasing power of money. Nominal wages, reduced to terms of purchasing power, are termed real wages. The importance of the distinction becomes apparent when one attempts to compare the position of labor in different countries. Differences in money wages signify nothing, unless we are able to estimate differences in the purchasing power of money The distinction is even more important in historical study. The nominal annual wages of a hind in the thirteenth century, according to Thorold Rogers, amounted to 35s. 8d, less than one-twentieth of the nominal wages of agricultural labor in modern England (£39 in 1891, according to the British Labor Commission). It is certain that real wages have not increased in anything like the same proportion.

Theory of Wages. The earliest school of scientific economists, the Physiocrats (q.v.), taught that wages naturally afford the laborer no more than a bare subsistence. The competition of laborers and the strategic advantage of the employer, it was believed, made this result inevitable. Adam Smith advanced a similar view, admitting, however, that in societies in which wealth is increasing wages may exceed the minimum of subsistence. The effect of Malthus's *Essay on Population* was to confirm the view that wages are naturally limited to mere subsistence. The alleged tendency of population to outrun subsistence appeared to demonstrate conclusively that any temporary rise in wages above the necessary minimum would soon be overcome by increase in population. Ricardo held in the main a similar view, but he admitted that the comforts to which a laboring class had become accustomed could not be withdrawn without a slackening in increase of population. The natural price of labor Ricardo defines as "that price which is necessary to enable the laborers, one with another, to subsist, and to perpetuate their race, without either increase or diminution." This theory was adopted by the Socialists as a correct explanation of wages under a capitalistic régime, and has served as one of the chief arguments against the continuance of the present order.

James Mill, McCulloch, Senior, and John Stuart Mill, the followers of Ricardo and Malthus, developed a theory of wages which is known as the wages-fund theory. It emphasizes the dependence of labor upon capital. Assuming that present wages are paid out of past accumulations, these writers argued that total wages must be limited by capital, or (in the completed theory) by that part of capital which is devoted to the subsistence of labor. Given the magnitude of the wages fund, the average rate of wages may be found by an arithmetical division, the number of laborers being the divisor. In order to increase wages, it was held to be necessary either to increase the wages fund or to decrease the number of laborers. According to this theory, attempts of the laborers to raise wages through combination would necessarily be unavailing, since such combination could affect neither dividend nor divisor. If some laborers succeeded in raising their wages, it would necessarily be at the expense of other laborers.

From about 1820 to 1870 the wages-fund theory was generally accepted by English economists. In 1869 the theory was abandoned by John Stuart Mill as a result of Thornton's attacks upon it The idea that a definite portion of capital is set apart for the support of labor was seen to be fallacious. To a considerable extent modern economists have adopted the so-called productivity theory, the ablest of the earlier exponents of which was Francis A Walker. Wages are not paid out of capital at all; the product of labor is the natural reward of labor, and the money wage represents not an advance, but a price paid for a product already created. The same idea was ably defended by Henry George. Recent discussions of the wages question have largely turned upon the significance of the term "productivity of labor." Von Thunen demonstrated that it is the product of the laborer who is in the least advantageous situation that really determines wages. This theory has been still further developed by Prof. J. B. Clark, whose work makes it clear that under free competition it is possible to discover units of labor which are virtually unaided by capital or land, and that the pure product of such units sets the standard for all units of labor.

Adherents of the productivity theory are under no necessity of believing that the wages of labor are incapable of substantial and indefinite rise. An increase in wages naturally increases the efficiency of labor, and hence its natural reward. High wages may thus be more economical from every point of view than low.

A revival of the old idea that wages depend on the cost of subsistence of the laborer appears in the modern theory of the dependence of wages upon the standard of living. As expounded by Gunton, this theory teaches that wages tend towards a standard which just covers the needs of labor; to raise wages, it is essential that needs should be increased. Labor of women and children is regarded as having a depressing influence on the wages of men, since the needs of the husband and father are reduced through the possibility of an income earned by other members of the family. Savings of laborers, resulting in an income through interest, result in a proportional decline of wages. If laborers eschew comforts and luxuries, with the hope of having a surplus of income above needs, the only result in the long run will be a fall in wages until they cover necessaries only. Critics of this theory point out that it would be true only if the Malthusian doctrine that population tends to outrun subsistence were correct; and at present no one would hold to that doctrine in its unqualified form. Employment of women and children may, indeed, depress wages of men; but that fact is due partly to the decline in efficiency of the population, and partly to the fact that an increase in labor supply renders necessary the resort to poorer opportunities of employment, and a consequent lowered standard of wages

Causes Determining the Rate of Wages.

The wage level depends, not on the minimum for subsistence nor mainly on the standard of living, but chiefly on the specific productivity of each group An increase in the quantity of land available for cultivation through improvements in transportation will make it possible for labor to abandon employments which produce little, and devote itself to the cultivation of new lands of unimpaired fertility. The product of the laborer in the least advantageous position rises, and with it wages. On the other hand, an increase in population, attended by no other change, must force labor to poorer and poorer positions, with a universal lowering of wages. An increase in capital, again, will give each laborer a more complete outfit of tools, etc., and thus increase his productivity, raising wages. Labor-saving inventions, it is generally believed, while they lower wages of certain classes of labor, increase in the long run the productivity of labor. But while productivity determines what the laborer will, in the long run, secure, it is far from true that the laborer is always able to secure his whole product. The laborer may be able to sell his labor to only one employer, who thereby is enabled to fix his own price. Only if competition among employers were active or if capital and labor could meet on equal terms would the laborer be sure of getting exactly what he produces.

Trade Unions and Wages. A trade union, by preventing an employer from taking advantage of the weakness in bargaining of the individual workman, may raise the rate of wages to the level of productivity. Where wages fail to keep up with productivity of labor, strikes can secure the amount withheld, but strikes cannot permanently hold wages ahead of productivity. By excluding labor from a certain occupation, a union may artificially raise productivity therein, and so gain at the expense of the public. On the other hand, by putting pressure on the employer to increase efficiency, a union has power, not only to raise wages, but to benefit the public. For a general discussion of the effect of trade unions upon wages, see TRADE UNIONS.

Trusts and Wages. In respect to wage rate, as in certain other particulars, there seems to be an improvement in the status of labor through concentration of industry. This is a normal corollary of the productivity theory. See TRUSTS.

Restriction of Output and Wages. Many laborers believe that wages would be increased if the hours of labor could be reduced in number, or if laborers would systematically endeavor to produce as little as possible. Prices, they believe, would rise, and with them wages. The view is fallacious, since it fails to take into account the fact that rise in prices would force the laborer to pay more for everything which he buys, so that the apparent rise in wages would represent no net gain. Restriction of output in some one industry, however, may raise wages there, if other labor can be excluded from the industry. Such a raising of wages is largely at the expense of the excluded labor, the disadvantage to laborers as a class exceeding the advantages to special groups.

Time and Piece Wages. Time wages represent the price for a certain number of hours of the workers' time; piece wages, a payment for a task accomplished. When labor consists in a series of definite operations, as in the making of certain portions of shoes, etc, the efficiency of labor can be accurately tested by quantity of product Payment in proportion to product is likely to stimulate the workers to greater effort than payment in proportion to time The plan is, however, unpopular with most laborers, because they believe that it results in a degree of strain which is injurious to the physical health of the worker; and, moreover, because of a tendency of employers to reduce wages whenever the increased energy of the workers affords them much more than the average rate of pay From the point of view of society, it is probable that every increase in the efficiency of labor increases the sum of wealth obtained by the working class as a whole; and, therefore, so far as the piece-wage system increases time efficiency, it is advantageous to labor.

Custom, Inertia, and Wages. In so far as the theory of wages rests upon the assumption of free and decisive competition, it is subject at every point to qualifications made necessary by failures to realize the competitive norm Labor is not completely fluid. Inertia, poverty, and ignorance prevent free movement from place to place and from trade to trade, and nullifies the theoretical bargaining power of labor; so that the custom of the locality or of the industry plays a larger part in fixing wage levels than pure theory supposes.

Women's Wages. In most countries the average wages of women are much lower than those of men. An inquiry made in 1884 showed that in Great Britain the average earnings of women were 41 per cent of those of men; in Massachusetts, 51 per cent In manufacturing in the United States, women get but little more than half what men receive Of persons 16 years of age and over in a wide range of industries (Census of Manufactures, 1905) the following was the wage classification:

NUMBER COUNTED	PER CENT RECEIVING YEARLY WAGE RATE LESS THAN			
	$250	$500	$750	$1000
Men: 2,124,069	8	47	79	94
Women: 488,832..	34	92	99	..

See WOMEN'S WORK.

Wages in the United States. In his *Industrial Evolution of the United States* (1895) Carroll D. Wright, United States Commissioner of Labor, traces the course of wages in American industry during the progress of a century, but the data are of relatively small value apart from reliable price figures, which are not at hand for the earlier years. He reaches the conclusion, however, that for the 30 years preceding 1860, wages advanced to a much greater degree than prices.

The best figures available for wages (as distinguished from salaries) are those of W. I. King, *Wealth and Income of the People of the United States* (New York, 1915). The index numbers which he gives are contained in the tables on the following page.

The two tables are calculated on slightly different plans, but it is improbable that the difference in weighting systems would materially change the indexes.

Wage studies make it clear that the wage worker receives a smaller share of the total product of industry than 20 or 30 years ago. The most probable causes for the decline would seem to be the disappearance of free land and the influx of alien labor of low efficiency.

INDEXES OF REAL WAGES FOR MEN IN ALL INDUSTRIES—BASE, 1890–99

YEAR	Hour wages	Day wages	YEAR	Hour wages	Day wages
1850	46 8	54 5	1870	58 2	61 9
1851	42 8	49 4	1871	61 5	65 4
1852	44 2	50 2	1872	63 5	67 5
1853	41 5	47 5	1873	64 8	68 9
1854	43 4	48 8	1874	62 9	66 9
1855	42 5	47 8	1875	62 9	65 5
1856	41 9	46 7	1876	63 4	66 0
1857	42 2	46 6	1877	64 9	67 7
1858	41 6	46 3	1878	69 1	72 0
1859	46.1	51 8	1879	75 3	78 5
1860	48 1	53 5	1880	69 9	72 9
1861	51 5	57 2	1881	71.3	74.3
1862	48 8	53 3	1882	71.9	74.9
1863	44 0	48 1	1883	76 6	79 9
1864	38 1	41 7	1884	77 6	80.8
1865	31 6	34 2	1885	85 7	89.3
1866	40 6	44 3	1886	86 4	89.2
1867	48 4	52 9	1887	87 5	88.6
1868	47.3	50 7	1888	86 7	87.8
1869	54 8	58.8	1889	87 3	88.4
			1890	94 9	95.8

COMMODITY VALUE OF LABOR OF MEN IN ALL INDUSTRIES—BASE, 1890–99

YEAR	Hour index	Week index	YEAR	Hour index	Week index
1890	94 8	95 8	1900	101 6	99.0
1891	95.0	96 3	1901	102.5	99.7
1892	98 1	99 6	1902	101 6	98.5
1893	97 1	97 7	1903	104 6	100.9
1894	98.4	98.6	1904	106.6	102.3
1895	102.3	101 8	1905	108.8	104.3
1896	104.7	103 8	1906	110 0	105.1
1897	104 8	103 7	1907	109 0	103.9
1898	102.6	101 6	1908	106 4	100.9
1899	103.5	101 8	1909	102 2	96.8
			1910	101.8	96.3
			1911	105.8	99.3
			1912	103 0	96.3

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WAGES FUND. See WAGES

WAGNER, vȧg'nĕr, ADOLPH (1835–1917). A German economist, brother of Hermann Wagner (q.v.). He was born at Erlangen. He studied jurisprudence and political science at Göttingen and Heidelberg and was professor successively in the Commercial Academy at Vienna, and at the universities of Dorpat, Freiburg (from 1870), and Berlin. He was also made a member of the Royal Statistical Bureau of Prussia. From 1882 to 1885 he was a member of the Prussian Lower House. He was one of the founders of the Verein fur Social-politik. Wagner's doctor's dissertation was a monograph on the science of banking (*Beitrage zur Lehre von den Banken*, 1857). Beginning in 1862 he published numerous works on banking, taxation, and social reform. His work in economics proper began with a revision of Rau's *Lehrbuch der politischen Oekonomie* (1875–76). In later editions, the work, which came to bear no direct relation to the original work of Rau, was published under the title *Lehr- und Handbuch der politischen Oekonomie*, of which the *Grundlegung* was Wagner's own work (1892–94), as well as the *Finanzwissenschaft* (in four parts, 1877–1901). The *Grundlegung* and the *Finanzwissenschaft* are his best-known and most ambitious works. In addition, he published many books and articles, chiefly on practical problems of economics and social science. Wagner approaches economics from the point of view of jurisprudence and statistics. His method is mainly inductive, although in his *Grundlegung* he shows a marked tendency towards the deductive methods of the theoretical branch of economics. Although sometimes classed with the Historical school (see POLITICAL ECONOMY), he was vigorously opposed to the view that historical and inductive studies make up the whole of fruitful economic science. In his work on finance he manifests a decided predilection for the extension of State functions, and has therefore not infrequently been regarded as a Socialist; he recognizes, however, the weaknesses of the pure Socialistic theory, and seeks to establish the proper limits of individualism and Socialism.

WAGNER, ALEXANDER (1838–). An Hungarian historical and genre painter, born at Budapest. He studied at the Vienna Academy and then under Piloty in Munich, and first won success with "Isabella Zápolya Taking Farewell of Transylvania," and two historical mural paintings, in the National Museum in Munich. These were followed by a series of frescoes in the Redoutengebäude at Budapest,

including the "Banquet of Attila," and by numerous paintings with motives from Hungarian history, such as the "Death of Titus Dagovich," National Museum, Budapest. In 1866 he became professor at the Munich Academy. As an historical painter he was one of the chief representatives of the school of Piloty, but his best works are the scenes of Hungarian peasant life, with a special view to the spirited action of the horse, such as "Csikós Race" (1876). A journey to Spain resulted in numerous Spanish scenes, including "Post Near Toledo" (1879), and his versatility was further shown in a fine panorama of ancient Rome. Wagner excels in the grouping of gorgeously colored animated masses of men and horses.

WAGNER, vág'nâr', CHARLES (1852–1918). A French moral essayist and Protestant clergyman, born at Wiberswiller, Meurthe. After studying at Paris, Strassburg, and Gottingen he served in several Protestant missions in the provinces, went to Paris in 1882, and aroused general interest by his effective protest against the degenerating tendencies of Parisian literature and life in *La jeunesse* (4th ed., 1892; Eng. trans., 1893); *Le courage* (1894; Eng. trans., 1894); and *La vie simple* (1895), translated as *The Simple Life* (1901; 13th ed., 1903), which had a great vogue in the United States, partly because it received the enthusiastic endorsement of Theodore Roosevelt. The author visited the United States in 1905, and recorded his observations in *My Impressions of America* (1906). He wrote also: *Pour les petits et les grands* (1907; 5th ed., 1915), *Par la loi vers la liberté* (1908); *A travers les choses et les hommes* (1909); *Ce qu'il faudra toujours* (1911); *A travers le prisme du temps* (1912).

WAGNER, vág'nĕr, HEINRICH LEOPOLD (1747–79). A German poet, born at Strassburg. He studied law in his native city, and in 1774 settled at Frankfort. At Strassburg he made the acquaintance of Goethe, while both were students. The friendship was continued at Frankfort. Wagner published two tragedies, *Die Reue nach der That* (1775) and, his best work, *Die Kindesmorderin* (1776), both of which discuss social problems with revolting crudity. His talent is seen to better advantage in *Prometheus, Deukalion, und seine Rezensenten* (against Goethe's critics) and *Voltaire am Abend seiner Apotheose*, dramatic satires. Wagner was among the oldest of Goethe's followers, and a typical poet of the so-called storm and stress period. He had a lively fancy, but lacked taste and the sense of literary form. Consult Schmidt, *Heinrich Leopold Wagner, Goethes Jugendgenosse* (2d ed., Jena, 1879).

WAGNER, HERMANN (1840–). A German geographer and statistician, a brother of Adolph Wagner (q.v.), born at Erlangen. He studied at Erlangen and Göttingen, and in 1864 received an appointment in the gymnasium at Gotha. He became connected with the Justus Perthes Geographical Institute, edited from 1868 to 1876 the statistical section of the *Gothaer Almanach*, and in 1872 founded *Die Bevölkerung der Erde*, a periodical devoted to the statistics of area and population. In 1880 he became professor of geography at Göttingen. After 1879 he was editor of the *Geographisches Jahrbuch*. He published *Lehrbuch der Geographie* (1894; 9th ed., 1913) and *Methodischer Schulatlas* (12th ed., 1907).

WAGNER, JOHANNA (1828–94). A German dramatic soprano, niece of Richard Wagner, born at Hanover. Her talent showed itself very early, and she virtually grew up on the stage. At 17 (in 1845) she created the rôle of Elisabeth in *Tannhauser*, but after that studied for two years with Viardot-Garcia (q.v.). From 1850 to 1861 she was one of the chief artists at the Royal Opera in Berlin. The sudden loss of her voice necessitated her retirement from the operatic stage, and thereafter she appeared with great success as a tragedienne in the spoken drama until her final retirement in 1872. Upon her uncle's special request she participated in the first Bayreuth Festival as Schwertleite and the First Norn.

WAGNER, JOHANN MARTIN VON (1777–1858). A German sculptor, born at Wurzburg. He was a pupil of his father, J. P. A Wagner, a sculptor, and studied painting in Vienna under Fuger. He then went to Rome where he turned to sculpture, and in 1840 Louis I made him director of the gallery at Munich. The bas-relief "An Eleusinian Festival" (1819), the great frieze in the Valhalla (1827–37) at Regensburg, and the classic reliefs and "Triumphal Chariot" on the Siegesthor at Munich are among his best works. Consult Ulrichs, *Johann Martin von Wagner* (Wurzburg, 1866).

WAGNER, MORITZ (1813–87). A German traveler and naturalist, born at Bayreuth. He studied at Erlangen and Munich, after which he traveled in Algeria, and upon his return published *Reisen in der Regentschaft Algier* (3 vols., 1841). In 1842–45 he explored the Caucasus, Armenia, and Kurdistan. The results of these explorations appeared in *Der Kaukasus und das Land der Kosaken* (2 vols., 1848); *Reise nach dem Ararat und dem Hochlande Armenien* (1848); *Reise nach Persien und dem Lande der Kurden* (2 vols., 1852). Later he spent three years in North America and Central America with Karl Scherzer, and they jointly published *Reisen in Nordamerika* (3 vols., 1854) and *Die Republik Costa-Rica* (1856). From 1857 till 1860 Wagner was engaged in exploring the region of Panama and of the northern Andes. On his return he became professor of geography and ethnology in the University of Munich. His later publications include *Die Darwinsche Theorie und das Migrationsgesetz der Organismen* (1868) and *Naturwissenschaftliche Reisen im tropischen Amerika* (1870). See MIGRATION, WAGNER'S LAW OF.

WAGNER, OTTO (1841–). An Austrian architect, born at Prentzling near Vienna. He was educated in the Vienna Polytechnic, the Berlin Academy of Architecture, and the Vienna Academy of Art, and had his office training under Van der Null (see NÜLL) and Siccardsburg. His first independently executed work was the Kur-Salon in the City Park, Vienna—a prize design (1862); after which date he was in continuous active practice. In 1894 he was made professor of achitecture in the Imperial Academy of Fine Arts; he also was appointed imperial surveyor in chief of buildings. Wagner became the acknowledged leader of his profession in the Austrian Empire, designing a great number of important public and private buildings. His later works were in a very free style, sometimes of a decided secessionist sort, but always controlled by refined taste and marked by monumental qualities. He published several brochures, e.g., *Modern Architecture* (Eng. trans. by N. C. Ricker, Boston,

1902) and "The Development of a Great City" (Eng trans by M. L. Hamlin, in *Architectural Record*, New York, May, 1912).

WAGNER, RICHARD (1813–83). The originator of the music drama, and one of the greatest of musical geniuses He was born at Leipzig, May 22, 1813, the ninth child of Karl Friedrich Wilhelm Wagner and Johanna Rosina Peetz. The father, who was a clerk in the police court, and during the French occupation of Leipzig was chief of police, died five months after Richard's birth. His widow, in straitened circumstances, married in 1814 Ludwig Geyer, an actor, playwright, and portrait painter in Dresden, whither the family removed.

Wagner's father had been fond of poetry and the drama, and devoted to amateur acting. From him Richard inherited, and in his stepfather's home absorbed, that love of the theatre which later directed his musical gifts towards the stage. At the Kreuzschule he wrote, in competition with his classmates, verses on the death of a schoolmate, which attained the distinction of print. He aimed at the colossal even as a boy; his admiration for Shakespeare led him at 14 years to begin a tragedy, *Leubald*, which he described as a jumble of *Hamlet* and *Lear*. So many people died in the course of four acts that their ghosts had to return to keep the fifth act going. He was deeply impressed by Weber's music, and so moved by Beethoven, several of whose symphonies and whose *Egmont* music he heard at the Gewandhaus, in Leipzig—the family having returned there after Geyer's death in 1820—that he decided to write music for his tragedy. First he tried to teach himself; then he took lessons of Gottlieb Muller, who was too pedantic, however, for Wagner's assertive individuality. An overture in B flat composed by him at this time was played between the acts at the theatre where his eldest sister had an engagement. Every four bars a loud beat was required of the drum player. At first the listeners were puzzled, then they became impatient, finally they laughed. In 1830 he entered the University of Leipzig, and also began studying music with Theodor Weinlig, to whom as late as 1877 he paid a high tribute. A sonata and a polonaise (piano duet), without Wagnerian characteristics, date from this period, and a *C Major Symphony*, which was performed at Leipzig in January, 1833, has an interesting history. Wagner gave it to Mendelssohn, hoping for another performance. Nothing came of it. We know it was Mendelssohn who played the *Tannhauser* overture at the Gewandhaus "as a warning example." After Mendelssohn's death, search for the manuscript failed. But in 1872, in an old trunk which Wagner had left in Dresden when he fled during the Revolution of 1849, an almost complete set of the parts was found. From these Anton Seidl reconstructed a new score, and Christmas Eve, 1882, nearly half a century after its composition and within a few weeks of his death, Wagner conducted this early work at a private performance in Venice. Since then it has had several public performances in Germany, and in 1911 was heard in New York.

In 1833, at the age of 20, he became a professional musician, accepting the post of chorus master at Würzburg, where his brother Albert was a tenor, actor, and chorus master. He became successively for brief periods conductor at Magdeburg, Königsberg, and Riga, composed the operas *Die Hochzeit* (fragment), *Die Feen*, and *Das Liebesverbot* (based on Shakespeare's *Measure for Measure*); the overtures *Konig Enzio*, *Polonia*, *Columbus*, and *Rule Britannia*, seven compositions to Goethe's *Faust;* and an unfinished *Symphony* in E. He also wrote a libretto sketch *Die hohe Braut*, which he sent to Scribe, who took no notice of it, and added to his financial burdens, already critically heavy, by marrying, in 1836, Minna Planer, an actress in Königsberg.

As Kapellmeister at Riga (1837–39) Wagner completed the libretto and the first two acts of *Rienzi*. With his wife he sailed from Pillau to London, and during the tempestuous voyage gained his first inspiration for *Der fliegende Hollander*. After eight days in London and four weeks in Boulogne, he arrived in September, 1839, at Paris, where he remained until April, 1842, passing through bitter experiences. At one time he was so impoverished that he offered himself as a chorus singer at a small Boulevard theatre, but was refused for his lack of voice. The first version of *A Faust Overture* was finished in 1840 (remodeled in 1855), and, through Meyerbeer's influence, he sold to Pillet, director of the Opéra, his *Flying Dutchman* sketches, for which, however, Foucher and Revoil were commissioned to write the libretto and Pierre Louis Philippe Dietsche the music. The result, the *Vaisseau fantôme*, soon disappeared from the stage, but Dietsche conducted nearly 20 years later the *Tannhäuser* performances which made such a colossal and famous fiasco at the Opéra.

After selling his *Flying Dutchman* sketches Wagner set to work on his own version. He had sent the score of *Rienzi* to Dresden, where it aroused the enthusiasm of the chorus master, Wilhelm Fischer, and of the tenor, Tichatschek. It was accepted and produced Oct. 20, 1842 Schroeder-Devrient was the Adriano, and Tichatschek the Rienzi. *Rienzi's* success led to the production of *Der fliegende Hollander*, Jan. 2, 1843, which was received with moderate favor. This sombre, but beautiful work, was ahead of the times. Spohr, who produced it at Cassel the following June, was the only eminent musician who then approached Wagner with cordiality. Had Wagner not been as true as steel in all matters relating to art, he would have taken his cue from the ill success of the *Dutchman* and reverted to the brilliant style of *Rienzi*. But *Tannhauser* was his answer to the public that had failed to appreciate the *Flying Dutchman*.

Meanwhile, in January, 1843, he had become one of the conductors of the Dresden opera. His revival and revision of Gluck's *Iphigenia in Aulis* attracted much attention, as did also his performance of the *Ninth Symphony*, with new and striking readings of the score. In fact, his extraordinary ability as conductor was quickly recognized. In the same year he produced with the *Liedertafel* his only oratorio, *Das Liebesmahl der Apostel*. In his official capacity of court conductor he was obliged to write a *Gelegenheits Kantate* (1843) and *Gruss an den Konig* (1844), both for chorus and orchestra, and on the removal of Weber's remains from London to Dresden (1844) he composed a funeral march on themes from *Euryanthe*.

Tannhäuser was produced at Dresden, Oct. 19, 1845, and proved even a greater puzzle to the public than the *Flying Dutchman*. Liszt, however, brought it out at Weimar late in 1848,

an achievement which led to the now historic Wagner-Liszt friendship, in which Liszt played one of the noblest and most self-sacrificing rôles ever taken by genius. "I once more have courage to suffer," wrote Wagner after hearing of the Weimar performance, while Liszt replied: "So much do I owe to your bold and high genius, to the fiery and magnificent pages of your *Tannhauser*, that I feel quite awkward in accepting the gratitude you are good enough to express."

Lohengrin was finished in 1848, but Dresden was afraid to produce it. Wagner took up other subjects. Sketches for an opera on the Saviour are interesting in view of his allegorical treatment of this 30 years later in *Parsifal*. The story of Barbarossa also was considered, but abandoned for the Nibelung myth. The drama *Siegfrieds Tod*, in alliterative verse, which formed the basis of the *Gotterdammerung*, was written in the autumn of 1848. More than a quarter of a century and much heart-breaking storm and stress were to intervene before Wagner's ambitions regarding the work into which this drama developed were realized.

A venture in publishing his scores resulted in great pecuniary embarrassment. Believing that political changes might lead to more advanced ideas in art, he joined in the revolutionary agitation of 1848–49. When the revolution failed he fled first to Paris and then to Zurich. He was so impoverished that Liszt was obliged to furnish Frau Wagner with the means of joining her husband, and in spite of the moral stamina which came to Wagner through his passionate devotion and loyalty to his art, it is questionable if he could have stood the strain without the aid of his brother artist. An even greater satisfaction was the first production of *Lohengrin* at Weimar (Aug. 28, 1850) by Liszt. It acted as a tonic on Wagner. He became all activity. Although at a distance, he directed the production as well as he could through numerous written instructions. This performance was one of the most important events in Wagner's career. It opened the now historic "Wagner question," a controversy fought out in a fierce war of words, with vituperation previously unheard of in art matters. The Wagner cause forged steadily ahead and finally became triumphant. A letter from Wagner to Liszt, Nov 20, 1851, shows that the texts of the *Nibelung* dramas were written in reverse order. Finding that certain narrative episodes in *Gotterdammerung* needed to be set forth on the stage, he wrote *Siegfried*. Finding that even this did not wholly clear up matters, he wrote *Die Walkure*, and as a further explanatory prelude to these three, *Das Rheingold*. The same letter proves that he also appreciated the impossibility of producing the work except "at a great festival, to be arranged perhaps especially for the purpose of this performance."

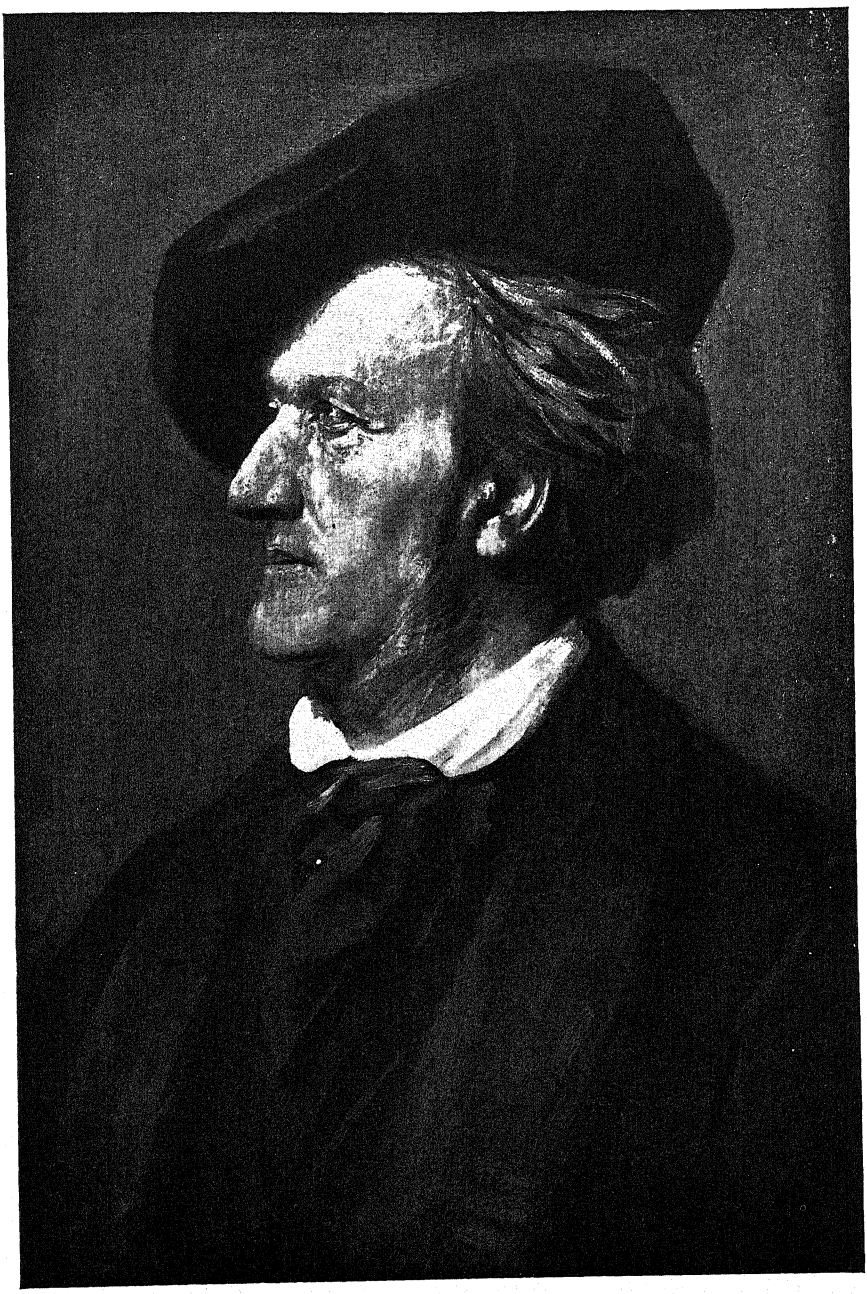
Wagner began the composition of *Rheingold* in November, 1853, and finished it in May, 1854. By the end of December of the same year *Die Walkure* was completed. In 1855 he was somewhat relieved financially by an engagement to conduct the London Philharmonic concerts. For that conservative body he was far too progressive. "The directors continually referred me to what they chose to call the Mendelssohn traditions." After this short interruption the composition of the *Ring* continued, but not without times of depression. By the summer of 1857 the work had proceeded as far as the forest scene in the second act of *Siegfried*. Circumstances then combined to cause the master to cease work on this task for 11 years.

In 1852 Wagner made the acquaintance of Otto and Mathilde Wesendonk, who both showed a deep understanding of the composer's works and ambitions. The friendship between Wagner and Mathilde soon ripened into love, and the published correspondence between the two shows the growth of this absorbing passion, which, after heroic struggles on the part of both, ended in noble renunciation. This intense personal experience led to the creation of *Tristan und Isolde*.

Besides personal inclination, two external circumstances supervened which determined Wagner to lay aside, temporarily, his great tetralogy. Negotiations with Breitkopf and Härtel for publication of the work were broken off, because the publishers did not believe actual production possible. However, they expressed their willingness to undertake publication of a less ambitious work which could be performed on one night. At the same time Dom Pedro, the Emperor of Brazil, an enthusiastic admirer of *Tannhauser* and *Lohengrin*, urged Wagner to write an opera for Rio de Janeiro. Thus the text of *Tristan und Isolde* was written in August and September of 1857, and two years later the orchestral score was finished. *Tristan* was intended to be a thoroughly practicable work—short and comparatively easy to perform. As a fact it is the most difficult of Wagner's music-dramas. In Vienna, in 1861, it was pronounced impossible after 54 rehearsals; and its production could not be secured until June 10, 1865, at Munich, after King Ludwig of Bavaria had become Wagner's patron.

The famous Paris fiasco of *Tannhauser* occurred in March, 1861. The hostile demonstrations which resulted in its withdrawal after three performances were instigated by the Jockey Club, partly because Wagner refused to introduce a ballet, partly to show disrespect towards the Emperor, who, at the urging of Princess Metternich, had commanded the production. This treatment made a hero of Wagner in Germany and the ban of exile was lifted, except in Saxony, where it came later. On May 15, 1861, in Vienna, he heard *Lohengrin* for the first time. He had been obliged to wait 13 years after its composition for this privilege.

Wagner now took up *Die Meistersinger*. As early as 1845 he had sketched the story as a humorous sequel to *Tannhauser*. He worked on the score at Biebrich and also at Penzing, near Vienna, where in 1863 he published his *Nibelung* dramas, expressing the hope that the bounty of some German ruler would make the production of his work possible. But in the spring of 1864, worn out by his struggle with poverty and broken in spirit, he was obliged to flee from his creditors, and found shelter with a friend in Switzerland. On a détour to Stuttgart he was found there by a messenger from King Ludwig of Bavaria, and thus, at a most critical moment of his life, he received promise of the aid which was to enable him to realize his artistic hopes. *Tristan* was produced in Munich in June, 1865, after exacting rehearsals under Von Bülow. Intrigues at court and in musical circles forced Wagner to leave Munich, and he took up his residence near Lucerne. The King continued his steadfast patron, and *Die Meistersinger von Nürnberg* was produced June 21, 1868, at the Bavarian capital, where in 1869 and 1870 *Rhein-*



RICHARD WAGNER
FROM A PAINTING BY FRANZ LENBACH

gold and *Die Walküre* also were given by command of the King and against Wagner's wishes

Immediately after the production of *Die Meistersinger* Wagner resumed work on *Siegfried*, completing it in February, 1871 While still engaged upon its orchestration he began the composition of *Götterdämmerung* When, in the spring of 1872, the master took possession of his villa Wahnfried at Bayreuth the actual composition of the last part of *Der Ring des Nibelungen* was finished The completion of the orchestration was delayed by many details connected with the realization of the plans and personal superintendence of the festival theatre erected at Bayreuth, the corner stone of which was ceremoniously laid May 22, 1872 In November, 1874, the orchestral score of *Götterdämmerung* was finished The next summer rehearsals began, and on Aug 13, 14, 15, and 17, 1876, the first performance of the gigantic tetralogy, under the direction of Hans Richter (q v), took place Wagner's indomitable energy and iron will had made the impossible possible The importance of this victory is admirably characterized by Max Koch "The controversy about Wagner, lasting more than half a century, is by no means concerned with a purely musical question So unprecedented an event as the Bayreuth Festivals is a landmark also in the history of literature, for the issue at stake was not a series of musical productions, but the creation of a national drama through the cooperation of music and poetry, such as Lessing, Mozart, Schiller, Jean Paul had longed for"

The artistic success of the first festival was so complete that many bitter enemies became converted, but there was a deficit of 150 000 marks In order to reduce this sum Wagner visited London, where, in May, 1877, he conducted alternately with Richter a famous series of six subscription and two extra concerts, performing excerpts from all his works

Scarcely had Wagner returned to Bayreuth, before he completed the text of *Parsifal*, which was begun early in that year, before his departure for London The musical composition occupied him from March, 1878, to August, 1879, but owing to various interruptions, chiefly concerning plans for the resumption of the Festivals, the orchestral score was not finished until January, 1882 Under the direction of Herman Levi (q v) the last of Wagner's creations was heard for the first time at Bayreuth, July 26, 1882 The material success was such that the original guarantee fund of 140,000 marks not only remained intact, but could even be increased to 200,000 marks This sum was set aside as a fund for the perpetuation of the Bayreuth Festivals, which since then have been held, at first every other summer, and later, annually Until the expiration of the copyright, Dec 31, 1913, *Parsifal* was the exclusive property of Bayreuth However, in spite of legal proceedings instituted by the heirs of Wagner, the Metropolitan Opera House of New York produced the work on Christmas Eve, 1903 Since then it has been regularly in the repertory, but has always occupied a position of distinction, being given only on special occasions outside the regular subscription nights.

After the Revolution Wagner's life is practically the story of his works After his flight from Dresden he never occupied a post of any kind His first marriage with Minna Planer was unfortunate Minna was an estimable woman, who dutifully looked after her husband's physical needs The suffering in Paris she bore without complaint, even with fortitude, for she believed in Wagner's future and success But the brilliant external success of *Rienzi* was all she could understand Wagner's art, his ideals and artistic convictions, always remained to her a sealed book She died Jan 25, 1866 On Aug 25, 1870, Wagner married Cosima von Bülow, a daughter of Liszt, a woman of rare character and gifts He found true happiness in the constant sympathy and companionship of a real helpmate So profoundly had she penetrated into and assimilated Wagner's ideals, that after his death she became the leading spirit of Bayreuth and the keeper of his precious heritage to mankind

After 1879 Wagner's health compelled him to spend the winter months in a warmer climate, and the beautiful Palazzo Vendramin on the Grand Canal in Venice became his regular winter residence Even then, his active spirit knew no rest On the afternoon of Feb 13, 1883, death came to him suddenly in the midst of his work On the 18th, with solemnities worthy of the illustrious dead, his body was placed in the mausoleum in the garden of Wahnfried

Wagner's Art. In order to appreciate Wagner's position in the world of art—not alone the art of music—it is necessary to understand the nature of what the master himself termed the *Kunstwerk* (Art-work) His own creations, *Tristan und Isolde*, *Die Meistersinger*, *Der Ring des Nibelungen*, *Parsifal*, are the full realization of that wonderful ideal which he first proclaimed to an incredulous and scoffing world in three of his most important books, *Das Kunstwerk der Zukunft* (1849), *Oper und Drama* (1851), *Eine Mitteilung an meine Freunde* (1851)

The Greek drama was a combination of the arts of poetry, music, and dancing Its effect, however, depended primarily upon the spoken word addressed to the intellect The mask hiding the features of the actor eliminated one of the most potent factors of dramatic expression, facial play, without which even gesture and pantomime lose most of their meaning That music without harmony (such as the Greek was) can express virtually nothing—at least, as we to-day understand musical expression—is an axiom Therefore the whole expression must have been concentrated in the beauty of the language and its distinct declamation The Shakespearean drama, while demanding the same beauty of language and distinctness of declamation, adds the all-important factors of facial expression and pantomime Thus it addresses itself not only to the intellect, but also to the eye Even music is intuitively assigned its proper rôle, that of assisting in the delineation of moods (blare of trumpets, dead marches, and the innumerable lyrics interspersed) Nowhere does the all-embracing genius of the great dramatist give more palpable proof of correct intuition than in *Hamlet* (IV 5), when Ophelia sings her answers Instinctively Shakespeare felt that only music could adequately express the inner soul of the distraught maiden

With the same unerring instinct Wagner, even in his earliest works, felt and, as yet unconsciously, employed this power of musical expression He chose the form of the opera, because at that time he believed that this offered him the proper medium for the conveyance of his

thoughts. His practical experience as conductor, however, soon revealed to him to what a low level opera had sunk; that, in spite of Gluck's reform, it had entirely lost sight of the drama, and had become a superficial amusement addressing itself merely to the eye and ear, without offering any stimulus to the intellect. All the while, that is, up to the Revolution of 1848, and through the composition of *Lohengrin*, Wagner was concerned with the problem of making the operatic form a medium for adequate expression, both musical and dramatic. These two elements were always inseparable in his mind His reflections at Zurich brought to him a clear understanding of the problem and, at the same time, its final solution. Each of his own works meant a notable advance over its predecessor, and in *Lohengrin* the cherished ideal was almost realized But not quite, for in many portions the music preponderates over the drama, thus disturbing the perfect balance of the component elements. Wagner discovered that he had misstated the whole question by putting it "How is it possible to attain perfect expression in opera?" He had to become convinced that it was not possible. And now he he was able to state the question correctly as follows: "What dramatic subjects imperatively demand the cooperation of music for their full expression?" It was not a question of *how?* but of *what?* In this investigation he was helped by a comparison of two of his own dramatic sketches, *Siegfried's Tod* and *Friedrich der Rotbart*, both dating from the year 1848. To his surprise he found that the former imperatively demanded the coöperation of music, whereas the latter was absolutely complete as a spoken drama Thus he arrived at the conclusion that "the subject to be treated by the *Worttondichter* (word-tone-poet) is the purely human, freed from all convention and everything historically formal." Now that the all-important problem of *what* had been solved, a close analysis of the score of *Lohengrin* disclosed the fact that the secondary problem of *how* had been solved intuitively through the employment of the leading motive. See LEITMOTIV; MUSICAL DRAMA

Before 1848 Wagner had created intuitively, his inborn genius leading him unconsciously in the right direction. After that date he concentrated all his powers upon the conscious attainment of an ideal he had clearly set before his mind. That this full consciousness of purpose reacted in no manner as a check upon the spontaneity of Wagner's creative faculty is attested—aside from the great music dramas themselves—by the master's own explicit statement. In his essay *Zukunftsmusik*, written in 1860 as an introduction to a French translation of his earlier works, Wagner says: "I am willing to submit this work [*Tristan*] to the severest test that can be devised from the application of my theoretical assertions; not because I created it according to my system, for all theory was completely forgotten by me; but because here at last I proceeded with the utmost disregard of all theoretic reflection, in such a manner that during the execution of the work I myself realized how far I was transcending my system." Wagner is generally regarded as the great reformer of opera. According to his own statement he began his career as a composer of operas. But when he began the composition of his *Nibelungen* dramas he had forever renounced opera and the operatic public. He was creating an entirely new form, and for its appreciation he was obliged to create also a new public.

The spoken drama of Shakespeare and Schiller reaches the highest point in the power of depicting soul states through appeal to the intellect (the word) and the eye (pantomime). In Wagner's drama a new factor is added, the ear, i.e., the inner, musical ear If one grants that music is preeminently the language of the soul, it becomes the most important medium for the portrayal of soul states. Where the spoken word ends, music begins The true development of the Wagnerian music drama, then, is from the Greek drama through Shakespeare and Schiller; not through the Florentines, Monteverde and Gluck. Even on the purely musical side the development is in the direct line leading from Bach through Beethoven, inasmuch as the fundamental principle of the music drama is the leading motive, i.e, continuous thematic development; whereas the opera with its set numbers, each formally complete in itself, precludes the employment of this very principle. That opera has actually been reformed is not due to any direct effort on the part of Wagner; it is merely one of the results of the tremendous influence exerted by Wagner's art upon every form of music. The most notable improvements in the modern opera are the vastly better libretti (a poor text being rather the exception), the employment of the orchestra as a means of expression, and a striving after musical characterization and expressiveness. The stereotyped forms of the aria, recitative, finale, duets, quartets, etc, have been swept away; senseless repetition of words and meaningless coloratura are no longer tolerated. Many composers have even adopted the title music drama and consciously imitated Wagner's form, but without the least success; for the very nature of Wagner's art work demands a combination of several talents, each in an extraordinary degree

The tremendous influence of the new art work upon instrumental music is merely the reflex of the demonic force inherent in its specifically musical element, and this irresistible quality is due, above all, to the plasticity and expressive power of the thematic material, quite apart from its masterly development and the gorgeous orchestral coloring in which it is presented. These, naturally, greatly enhance the total effect, in the attainment of which orchestration, even as superb as Wagner's, is of secondary importance in comparison with thematic invention. Nothing proves so conclusively the inherent power and lasting quality of this music as performance on the piano, where only the essential elements of melody, harmony, and rhythm are preserved. The means by which Wagner produces his overwhelming effects—his innovations in harmony, rhythm, and orchestration—have become common property of all modern composers; and if by the employment of the same means they cannot produce the same effect, the chief reason is that they are not gifted with Wagner's power of thematic invention.

The history of music furnishes no second example of a composer whose development shows such extraordinary advance as that of Wagner from *Die Feen* to *Parsifal*. This development may be represented by a rapidly ascending line up to the master's fortieth year. After that it runs perfectly level, without the slightest declension even towards the end. *Tristan und Isolde, Die Meistersinger, Der Ring des Nibelun-*

gen, Parsifal differ widely in their subject matter and the character of the music, and it would be impossible to find a basis for establishing the superiority of one of these works over the others A preference can only be a question of personal taste Each work produces the impression that it is the perfect, full, and only possible expression of that particular subject Each exhibits those marked characteristics recognized as typically Wagnerian, yet each has its pronounced style, imparting to it an individuality quite distinct from that of every other work The emotions expressed range through all gradations from the heights of the sublime to the grotesquecomical, thus exhibiting the universality of Wagner's genius, while in respect to his powers of musical characterization he stands without a peer even among the greatest masters

The bitter opposition encountered by Wagner's later works was due to absolute inability to understand the master's ideals Neither musicians nor public could see in the new works anything else than operas presenting insuperable difficulties Not until Wagner had been amnestied and could superintend the rehearsals personally was the first of the music dramas, *Tristan und Isolde*, produced But before this result was achieved the master was obliged to train each of the artists in the new style of interpretation, and this process was repeated in the case of every succeeding work Thus Wagner became the founder of the new school of interpretative conducting and dramatic singing His personal superintendence however, extended also to the minutest details of the mechanical departments, and perhaps his most important innovation in this respect is the invisible orchestra After he had educated a body of enthusiastic artists capable of interpreting his works according to his intentions, the compelling power of his music, in a comparatively short time, finally forced the public, at least the more seriously inclined, under its spell Nothing attests more convincingly the firm hold of Wagner's music—considered purely as music—on the general public than its constant performance by the largest symphony orchestras throughout the world In their repertory the overtures, preludes, and certain excerpts occupy the same position as the symphonies of Beethoven Incidentally, this very fact conclusively refutes the often-made assertion that Wagner's music, abstracted from the actual scenic representation, fails to impress the hearer

As the years pass, the figure of Wagner seems to assume greater and greater proportions Even now his influence, like that of Shakespeare and Goethe and Beethoven, is felt and recognized as one of the living and moving forces of civilization

Besides the operas and the music dramas and other works mentioned in the above sketch Wagner wrote for piano a *Sonata* in B♭, a *Polonaise* in D, a *Fantasie* in F♯ minor (all in 1831), an *Albumblatt* in C (1861) and one in E (1875) During his first residence in Paris he set to music three French romances *Dors, mon enfant, Mignonne, Attente*, and two German lieder, *Die beiden Grenadiere* and *Der Tannenbaum* (1839–40) Five poems of Mathilde Wesendonk, *Der Engel, Stehe still, Im Treibhaus, Schmerzen, Traume*, were composed 1857–58 For orchestra he wrote *Huldigungsmarsch* (1864), dedicated to King Ludwig, *Siegfried Idyll* (1870), *Kaisermarsch* (1871), dedicated to Emperor William I, *Grosser Festmarsch* (1876), for the Centennial Exhibition at Philadelphia

Rienzi, Der fliegende Hollander, Tannhauser were published by Wagner at his own expense, *Lohengrin, Tristan und Isolde*, by Breitkopf and Hartel, the *Ring* dramas, *Die Meistersinger, Parsifal*, by B Schott's Sohne In 1914 Breitkopf and Hartel issued a monumental folio edition in 18 volumes, edited by Michael Balling, which contains, besides the full orchestral scores of all the famous works, all the earlier works not published before Wagner's literary works were published by E W Fritzsch (9 vols, Leipzig, 1871–73) A tenth volume was added in 1883 In 1911 Breitkopf and Hartel issued an octavo edition in 12 volumes An English translation of the prose works by W A Ellis was brought out in London (8 vols, 1892–99)

Bibliography Probably more has been written about the Bayreuth master than about any figure in the history of art or literature, not excepting Shakespeare and Goethe The following list, therefore, contains only a few of the most important works embodying the results of original investigation

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nérienne française (Paris, 1902); L. Frankenstein, *Richard Wagner Jahrbuch* (Leipzig, 1907 et seq.).

See BAYREUTH MUSICAL FESTIVAL; CONDUCTOR, HARMONY; INSTRUMENTATION; LEITMOTIV; LIBRETTO; MELOS, MUSIC, HISTORY OF, XXVIII, MUSICAL DRAMA, OPERA; ORCHESTRA, OVERTURE; PRELUDE, PROGRAMME MUSIC; TEMPO, VORSPIEL.

WAGNER, RUDOLF (1805–64). A German physiologist, born at Bayreuth. He studied medicine at Erlangen and Wurzburg (M D, 1826), and comparative anatomy under Cuvier at Paris. After traveling in Normandy and along the Mediterranean coast of France and Italy, making geological observations, he went to Erlangen (1829), where he became professor of zoology in 1833. From 1840 till his death he occupied a chair at Gottingen. Wagner discovered the germinal spot in the human ovum. In his later years he became a defender of Christianity and an opponent of materialism, his writings in this field leading to a controversy with Karl Vogt (q.v.). Wagner was also known as an anthropologist and archæologist. Among his writings are: *Lehrbuch der vergleichenden Anatomie* (1834–35), republished under the title *Lehrbuch der Zootomie* (1843–47); *Lehrbuch der Physiologie* (1839), *Handwörterbuch der Physiologie* (1842–55); *Neurologische Untersuchungen* (1854).

WAGNER, SIEGFRIED (1869–). A German musical conductor, son of Richard Wagner, born at Triebschen, near Lucerne. Although intended for the career of an architect, he early determined to follow his father's profession, and accordingly left the Polytechnic School, in which he was studying, to commence his musical training under Kniese and Humperdinck (q.v.). Outside of Germany he is better known as a conductor than as a composer. In 1893 he entered upon his career as a musical conductor, and toured through Germany, Austria, Italy, and England, meeting with marked success. In 1896 and 1899 he won general favor by his work as conductor of *Der Ring des Nibelungen* at Bayreuth. His published works include the operas *Der Barenhauter* (1899), *Herzog Wildfang* (1901), *Der Kobold* (1904), *Bruder Lustig* (1905), *Das Sternengebot* (1908), *Banadietrich* (1910), *Schwarzschwanenreich*, *Der Hardenkonig* (the last two not produced up to 1916). Other compositions are a symphonic poem *Sehnsucht*, *Fahnenschwur*, for male chorus and orchestra, a concerto for violin and orchestra. Consult C. Glasenapp, *Siegfried Wagner und seine Kunst* (Berlin, 1911).

WAGON. See CARRIAGE.

WAGON, AMMUNITION. See AMMUNITION WAGON.

WAGONER. A city and the county seat of Wagoner Co., Okla., 16 miles north of Muskogee, on the Missouri, Kansas and Texas, the St. Louis, Iron Mountain and Southern, and the Missouri, Oklahoma, and Gulf railroads (Map: Oklahoma, F 3). It has a Carnegie library. The leading industrial establishments are cotton gins, a cotton-oil mill, grain elevators, roller flour mills, foundry and machine shops, railroad yards, and a wagon wood factory. Wagoner adopted the commission form of government in 1911. Pop., 1900, 2950; 1910, 4018.

WAGONER, THE. See AURIGA.

WAGONETTE. A four-wheeled horse-drawn carriage having a capacity for six or more passengers. It has a transverse seat for the driver and two longitudinal seats behind, which are usually entered by a step at the rear. Wagonettes are ordinarily supplied with a canopy and prior to the introduction of motor vehicles were extensively used in the country on account of their large capacity.

WAGRAM, va'gràm, or DEUTSCH-WAGRAM. A village of Lower Austria, on the left bank of the Russbach, about 20 miles northeast of Vienna, notable as the scene of one of Napoleon's most celebrated victories, gained over the Austrians under the Archduke Charles, July 6, 1809. After the French defeat at Aspern (q.v.) in May of that year, Napoleon had retired to the island of Lobau in the Danube, whence with his forces increased by the arrival of Eugène Beauharnais, he prepared to set out for a decisive struggle with the Austrians. On the night of July 4 the French began to cross the Danube, and early in the morning of the following day their forces, 181,700 in number with nearly 450 guns, were drawn up on the left bank of the river. The Austrians numbered about 128,600 men with 410 guns. The battle began early with an assault by Masséna on the Austrian right, which was driven from the village of Aspern and Essling. Davout's attempt, however, to encircle the Austrian left failed, and the night closed with the advantage on the side of the Austrians, who had sustained by desperate fighting repeated charges against their right and centre by Oudinot, Bernadotte, and Beauharnais. The Archduke Charles had dispatched orders to the forces under the Archduke John to advance from Pressburg and take the enemy in the rear, while the main army, confident of success, prepared to assume the offensive. John, however, could not arrive in time, and when the Austrians advanced to the attack on the morning of the 6th they met determined resistance from the French. Towards noon Davout with excellent support succeeded in turning the Austrian left, and, though the Austrian right and centre had held fast, the Archduke Charles was compelled to retreat. The Austrian loss is estimated at nearly 35,000 in killed and wounded, and the French loss was nearly 30,000. The battle of Wagram was followed by the treaty of Schönbrunn (October 14), in which Austria was forced to cede to the conqueror. See NAPOLEON I. Consult Bleibtreu, *Aspern und Wagram* (Vienna, 1902); Binder von Krieglstein, *Aspern und Wagram* (Berlin, 1906).

WAGTAIL. A small bird of the European family Motacillidæ, characterized by slenderness of form and a long narrow tail, which the bird incessantly wags up and down, with a jerking motion. The wagtails run with great speed, and frequent the margins of rivers and lakes, inundated fields, and other moist grounds, feeding almost entirely upon insects and worms. They make their nests on the ground, among moist herbage, or in stony places. One species, the yellow wagtail (*Budytes flavus alascensis*), occurs abundantly in Alaska in summer, migrating to and from Asia; and the American titlark (q.v.) is a member of the family. The name wagtail is often given in the United States, however, to the similarly appearing American warblers (q.v.) of the genus *Seiurus*, especially to the two water thrushes *Seiurus noveboracensis* and *Seiurus motacilla*. Like their congener the oven bird (*Seiurus aurocapillus*), they are among the largest of warblers, and are olive

above and buffy-white below, streaked with black See OVEN BIRD; WATER THRUSH.

WAH, wä A mammal. See PANDA.

WAHABIS, wa-hä'bēz, or **WAHABITES.** A Moslem sect, named after its founder, Mohammed Abd al Wahhab. He seems to have been born in 1704 (1116 A H.), probably at Ayane in the District of Arid, Nejd, Central Arabia, and died at Deriye in 1792 (1206 A H) He was the son of Suleiman, a poor shepherd of the tribe of the Beni Tamim. He studied at Basra, Bagdad, and Damascus, and came under the influence of Hanbalite teaching through perusal of the works of Ibn Taymiyya (died 1327; 728 A H.) and his disciple Ibn Kayyim al Jauziyya, which he copied with his own hand, as is known from two Leyden manuscripts. Like these followers of Ahmed ibn Hanbal, he became a staunch supporter of Koran and Sunna, and an opponent of the Ijma', or consensus of opinion, and the Bida', or novelty. On his pilgrimage to Mecca and Medina he must have been shocked at the formalism, laxity of morals, cult of the saints, and pagan survivals at these shrines. His stern preaching and ascetic life were not calculated to win for him a ready adherence in Nejd where people cared little for religion, and he was forced to leave both Ayane and Horeimle. In Deriye, however, he made a convert of the ruler, Mohammed ibn Sa'ud, in 1746. Before his death in 1765 this Emir of Deriye had extended his power and the influence of Abd al Wahhab through the neighboring towns But Riad was not finally captured until 1772 by his successor 'Abd al Aziz (1765–1803). Mohammed Abd al Wahhab himself never sought political power; he remained to the end a warner and a spiritual guide, faithful to Koran and tradition as interpreted by the Hanbalite school, and fighting all innovations, such as the mention of Mohammed and other men in prayer, and the veneration of local saints, as well as all luxury, the use of tobacco, music, dancing, and gambling. He had in the course of his life 20 wives, by whom he had 18 children; but he followed in this respect the law which he recognized, and his life was free from many of the blemishes attaching to that of the prophet Mohammed. His followers did not call themselves Wahabis, a name given them by their enemies, but Muslimin and Muwahhidin, because they insisted upon the unity and transcendence of Allah. Like the Almohades (q.v.) they regarded all other Mohammedans as Kuffar (unbelievers) and Mushrikin (polytheists).

Abd al Aziz spread the power of the Wahabite state beyond the boundaries of Nejd. In 1801 he sent his son Sa'ud to Kerbelah, the greatest shrine of the Shiites, and he destroyed the sanctuary, killed the priests, and brought back enormous booty. Mecca was plundered in 1803; but in that year Abd al Aziz was murdered at Deriye by a Shiite in revenge for the destruction of Husain's shrine. Sa'ud (1803–14) captured Medina in 1804 and in 1810 opened Mohammed's grave and carried away its treasures; at Mecca he cut the black stone of the Ka'bah to pieces. In 1811 Damascus was held for ransom, and the territory east of Jordan paid tribute. Then Mahmud II directed Mehemet Ali (q.v.), Viceroy of Egypt, to restore Turkish authority in Arabia. He first sent his son Tusun who after an initial defeat captured Jidda, Mecca, and Medina in 1812; then Mehemet Ali came himself and defeated the Wahabis at Bessel in 1815, finally Ibrahim Pasha was sent who destroyed Deriye after a long siege in 1818. The brave defender, Abdallah ibn Sa'ud, was put to death in Constantinople About 1820 the Egyptian governor was overthrown, and Turki made himself independent Emir at Riad He was succeeded by his son Faizal (1830–36), and he by his brother Abdallah (c.1866–92) The recent history of the Sa'udian dynasty is not known

In 1830 Abdallah ibn Rashid, of the tribe of Abde, in Jebel Shammar, was made governor of Hail as a reward for services to Faizal. Gradually he made himself ruler of northern Nejd, though recognizing the Wahabite Emir at Riad. His son, Talal (1845–68), was an excellent ruler who extended the power of this Wahabite state, and was a capable administrator. His brother Met'ab was murdered by two of Talal's sons, and one of these, Bender, by his uncle, Mohammed ibn Abdallah In 1892 he gained a victory at Aneiza which forced the southern oases to recognize his suzerainty. European visitors speak highly of his ability, justice, and power. The recent history of the Rashidian dynasty is unknown. The first information concerning the Wahabites came to Europe through Niebuhr who obtained it in Arabia in 1763–65. Derije was visited by Reinaud in 1799, and G. F. Sadlier in 1819; Riad by G. W. Palgrave in 1862, and Lewis Pelly in 1865; Eduard Nolde went to Bereida in 1893. Wallin lived at Hail for two months and at Jof four months in 1845, and visited Hail again in 1848; this capital has since been visited by Palgrave in 1862, Guarmani in 1864, Doughty and Huber in 1875, Lady Anne Blunt and her husband in 1879, and Euting in 1883. From Arabia the Wahabi movement spread into Africa, where it influenced the founder of the Senussi brotherhood (see SENUSSI), into India where Sa'id Ahmed, a reputed descendant of Mohammed, declared a religious war against the Sikhs, but was defeated and slain in 1831, and elsewhere in the Moslem world. Among the works that set forth the doctrines of the Wahabis may be mentioned the Sirat al Mustakin and the Tawiyet al Iman, and among Wahabite theologians especially Abdallah ibn Abd al Rahman al Sindi.

Bibliography. Carsten Niebuhr, *Beschreibung von Arabien* (Copenhagen, 1772); J. L. Burckhardt, *Bedouins and Wahabys* (London, 1831); G. A. Wallin, *Reseanteckningar från Orienten åren 1843–49*, utgifna af S. G. Elmgren (Helsingfors, 1864–66); Lewis Pelly, *Visit to the Wahabee Capital* (London, 1865); W. G. Palgrave, *Central and Eastern Arabia* (ib., 1865); C. Guarmani, *Il Neged settentrionale* (Jerusalem, 1866); C. M. Doughty, *Travels in Arabia Deserta* (Cambridge, 1888); Lady Anne Blunt, *A Pilgrimage to Nejd* (London, 1881); Eduard Nolde, *Reise nach Innerarabien* (Brunswick, 1895); Julius Euting, *Tagbuch einer Reise in Inner-Arabien* (Leyden, 1896); Ignaz Goldziher, in *Zeitschrift der Deutschen Morgenlandischen Gesellschaft*, vol. lii (Leipzig, 1898); D. B. MacDonald, *Muslim Theology* (London, 1903); also: L. A. Corancez, *Histoire des Wahabis* (Paris, 1810); F. Mengin, *Histoire de l'Egypte sous le Gouvernement de Mohammed Aly* (ib., 1823); Albrecht Zehme, *Arabien und die Araber seit Hundert Jahren* (Halle, 1875); Hogarth, *The Penetration of Arabia* (London, 1905); Huart, *Histoire des Arabes* (Paris, 1913).

WAHL, väl, ADALBERT EMIL AUGUST (1871–). A German historian, born at Mannheim. He was educated at Oxford, Bonn, Vienna, and Berlin, and was assistant professor at Freiburg (1905–08), and then professor of history at Hamburg till 1910, when he was called to Tubingen. His writings include: *Komposition und Succession Verhandlungen unter Kaiser Matthias* (1895); *Notabelnversammlung von 1787* (1899); *Studien zu Vorgeschichte der französischen Revolution* (1901); *Politische Ansichte der offiziellen Frankreich in 18. Jahrhundert* (2 vols., 1905–07); *Beitrage zu deutsche Parteigeschichte* (1910), *Robespierre* (1910); *Geschichte der europaischen Staatensystems* (1912); *Die Ideen von 1813* (1913); *Beitrage zur Geschichte der Konfliktszeit* (1914).

WAHLSTADT, väl'shtat, PRINCE OF. See BLUCHER, G. L. VON.

WAHLSTATT, väl'shtät. A battlefield near Liegnitz (q.v.), Silesia.

WAHLVERWANDTSCHAFTEN, val'fĕr-vant'shaft-en (Ger., Elective Affinities). A fatalistic romance by Goethe (1809).

WAHNFRIED, vän'frēt. The residence of Richard Wagner at Bayreuth, built in 1873 by Wölfle

WAHOO. See ELM; SPINDLE TREE.

WAHRMUND, vär'munt, ADOLF (1827–1913). An Austrian Oriental scholar. He was born at Wiesbaden, studied at Göttingen and Vienna, and was connected with the Imperial library in the latter city from 1853 to 1861. In 1871 he became teacher of Arabic in the Oriental Academy, and was its head from 1885 till 1897. He published grammars of modern Arabic, Persian, and Turkish, and a modern Arabic-German dictionary; *Die christliche Schule und das Judenthum* (1885); *Das Gesetz des Nomadenthums* (1887; 2d ed., 1892), *Der Kulturkampf zwischen Asien und Europa* (1887); *Das Reich der Zwecke* (1895).

WAIFS (OF. *waif, gaif*, from Icel. *veif*, flapping or moving thing, from *veifa*, to vibrate). In English law, stolen goods which are thrown away or abandoned by a thief on being pursued. Such goods belong to the crown, but this prerogative is usually waived if the true owner diligently endeavors to prosecute the thief. This doctrine does not prevail in the United States where the owner may reclaim stolen goods under such circumstances. See CRIMINAL LAW and authorities there referred to.

WAIGATZ. See VAIGATCH.

WAIILATPUAN, wī'ĕ-lăt-pōō'an. A linguistic family composed of the Cayuse (q.v.) and Molala tribe, occupying the headwaters of the Walla Walla River in Oregon. Of the Molala but 31 survived in 1910.

WAIKATO, wī'kä-tō. The most important river in the North Island of New Zealand. It rises near Lake Taupo and flows out of the lake, and for 170 miles north, past towns like Cambridge, Hamilton, and Mercer, and reaches the Pacific Ocean on the west coast of the island. It is navigable for small steamers for 100 miles (Map: New Zealand, N. I., B 5).

WAILAKI, wī-la'kī. A small Athapascan tribe in Round valley, on Eel River in northern California. Their culture was like that of their neighbors. They numbered 227 in 1910.

WAILING PLACE OF THE JEWS. See PLACE OF WAILING.

WAINFLEET, WILLIAM. See WAYNFLEET.

WAINSCOT. A wooden lining or covering of an interior wall usually paneled The term originally was applied in Great Britain to oak of superior quality imported and used for panels Eventually any wooden covering or facing of a wall of an apartment, especially when of elaborate workmanship, came to be known as a wainscot or wainscoting. See DADO.

WAIN'WRIGHT, JONATHAN MAYHEW (1793–1854). An American Protestant Episcopal bishop, born in Liverpool, England, of American parentage He graduated at Harvard (1812), and became rector at Hartford, Conn. (1816), assistant minister of Trinity Church, New York (1819), rector of Grace Church (1821), and of Trinity Church, Boston (1834). He took charge of St. John's Chapel, Trinity Parish, New York (1838); and was elected provisional Bishop of the diocese of New York, and consecrated in 1852. Among his published writings are: *There Cannot be a Church Without a Bishop* (1844); *The Pathways and Abiding Places of Our Lord* (1851), *The Land of Bondage* (1852). Consult his memoirs by J. N. Norton (New York, 1858).

WAINWRIGHT, RICHARD (1849–1926). An American naval officer, born in Washington, D. C. He graduated at the United States Naval Academy in 1868, became a lieutenant in 1873, commanded the coast-survey vessel *Arago* for a time, was successively flag lieutenant to Admiral Patterson, and secretary to Admiral Jouett, and was promoted to the rank of lieutenant commander in 1894. In February, 1898, he was executive officer of the battleship *Maine*, when that vessel was destroyed in Havana Harbor, and during the Spanish-American War he commanded the converted yacht *Gloucester*, taking a distinguished part in the naval battle of Santiago and being largely responsible for the destruction of Cervera's topedo-boat destroyers, the *Pluton* and the *Furor*. He became a commander in 1899, a captain in 1903, and a rear admiral in 1908. He commanded the cruiser *Newark* in 1902–04; was a member of the General Board, 1904–07, commanded the battleship *Louisiana*, 1907–08; and the second and third divisions of the Atlantic fleet, 1908–10. He became Aid for Operations in 1910 and continued as such until his retirement in December, 1911.

WAITE, MORRISON REMICK (1816–88). An American jurist, Chief Justice of the Supreme Court of the United States from 1874 to 1888. He was born at Lyme, Conn., and graduated at Yale in 1837. He was admitted to the bar at Maumee City, Ohio, in 1839. In 1849 he was elected to the Ohio Legislature as a Whig, of which party he was a member until the organization of the Republican party. He first attracted national attention when in 1871 he was appointed with Caleb Cushing and William M. Evarts to represent the United States before the tribunal for the arbitration of the *Alabama* and other claims at Geneva, Switzerland. In 1873 he was president of the Ohio Constitutional Convention. In January, 1874, President Grant nominated Waite to succeed Salmon P. Chase as Chief Justice of the United States, and he was at once unanimously confirmed. This position he held until his death. As Chief Justice he was dignified and impartial, and absolutely unbiased by political considerations. In the numerous constitutional questions growing out of the interpretation of the amendments following the Civil War, he maintained a balance between the rights of the States and

the extended powers of the Federal government, and many of the most important opinions of this period were written by him.

WAITS (OF. *waite, gaite*, Fr. *guet*, watch, guard, from Ger. *Wacht*, watchman, from Ger. *wachen*, Eng. *watch;* connected with Lat *vigil*, wakeful, watchful). A name which has, at successive periods of English history, been given to different classes of musical watchmen. In the time of Edward IV the waits appear to have formed a class distinct from both watch and minstrels They were not confined to the court, there were musical watchmen very early in many provincial towns. In Exeter a company existed in 1400. The word in the provinces was afterward sometimes applied to the town musicians, who may have represented the old waits, but with no duties as watchmen. The name was also given to the town band, or to private musicians when employed as serenaders. At present in England, the waits are musicians who play or sing during the night or early in the morning for two or three weeks before Christmas.

WAITZ, vīts, GEORG (1813–86). A German historian, born at Flensburg, in Schleswig. He was educated in the schools of his native town and at the universities of Kiel and Berlin. In 1842 he was called to the chair of history at Kiel, where he remained for five years. In 1849 he became professor of history at Göttingen. He remained there until 1875, when he was called to Berlin as chief editor of the *Monumenta Germaniæ Historica*. He was actively engaged on this work till his death. Waitz was turned from the study of law at the university by the influence of Ranke, and he is usually regarded as one of that historian's principal disciples. In his own field of mediæval history he was the foremost German scholar of his day. His important publications include: *Jahrbucher des deutschen Reichs unter Heinrich I.* (1837); *Ueber das Leben und die Lehre des Ulfila* (1840); *Deutsche Verfassungsgeschichte* (1844–84; rev. ed, 1893–96); *Lübeck unter Jurgen Wullenweber und die europaische Politik* (1855–56); *Grundzuge der Politik* (1862); and *Deutsche Kaiser von Karl dem Grossen bis Maximilian* (1872), besides a great number of contributions to the *Monumenta*. Consult Steindorff, *Bibliographische Uebersicht über Georg Waitz's Werke* (Göttingen, 1886).

WAITZ, THEODOR (1821–64) A German psychologist and anthropologist, born at Gotha. He studied at Leipzig and Jena, and in 1848 was appointed professor of philosophy in the University of Marburg. He attempted to point out the weakness of the philosophy of Fichte, Schelling, and Hegel, and made an Herbartian psychology the basis of all philosophy. He also studied anthropology and ethnology extensively. His works include: *Grundlegung der Psychologie* (1846; 2d ed., 1878); *Lehrbuch der Psychologie als Naturwissenschaft* (1849); *Allgemeine Padagogik* (1852; new ed., 1910); *Die Anthropologie der Naturvölker* (1859–72; vols. v and vi edited by Gerland).

WAITZEN, vī'tsen (Hung. *Vácz*). A town of Hungary, at the base of the Waizenberg, on the left bank of the Danube, 22 miles north of Budapest (Map: Hungary, F 3). It is the seat of a bishop and has a fine cathedral. Pop., 1900, 16,808; 1910, 19,057.

WAIVER (from OF. *weyver, guever*, to waive, refuse, surrender, resign, probably from Icel. *veifa*, to vibrate, waiver). A voluntary abandonment or renunciation of a known legal right. A contractual right can usually only be waived for a consideration, but where a person possessing a certain right acts inequitably to the detriment of the person against whom the right exists, he may be deemed to have waived it upon the principle of estoppel. The doctrine of waiver is, perhaps, most frequently applied to the renunciation of statutory rights and privileges, such as: statutory and common law liens; the right to notice of protest and dishonor of commercial paper; also, conditions of forfeiture in contracts, as in insurance policies; and many technical irregularities in pleading and practice which are not necessarily fatal to the cause of action. Consult CONTRACT; ESTOPPEL.

WAIVER OF TORT. See QUASI CONTRACT.

WAI-WU-PU, wī'wōō-pōō'. The Foreign Office of China (q.v.), formerly known as the Tsung-li Yamen, and later as the Waichiaopu.

WAKAMATSU, wä'kä-mät'sụ. A town in the Prefecture of Fukushima, Japan, situated in the northern part of the island of Hondo, 79 miles east-southeast of Niigata (Map: Japan, F 5). The castle of the Prince of Aidzu has been completely demolished. The chief manufacture is lacquer ware. Pop., 1903, 32,534; 1908, 39,265.

WAKAN or **WAHKAN,** wä-kän'. See WAKONDA.

WAKASHAN (wä-käsh'an) **STOCK** (Nootka *wakash*, good). A well-marked Indian linguistic group occupying the west coast of British Columbia from about 50½° N. to Gardner Channel, the west and northwest coast of Vancouver Island, and a narrow strip of territory about Cape Flattery, Wash. The stock consists of a large number of small tribes, each speaking a separate dialect, all of which may be grouped into three languages, Hailtzuk (q.v.), Kwakiutl (q.v.), and Nootka (q.v.), the last including the Makaw of Cape Flattery. All the tribes of this stock are maritime in habit, daring sailors, fierce fighters, and strongly conservative. They build large communal houses of cedar planks, are organized upon the clan system, and have slavery and the potlatch (q.v.) as recognized institutions The population of the various tribes in 1910 was about 5000 of whom 388 reside in the State of Washington.

WAKAYAMA, wä'kä-yä'mä. The capital of the Prefecture of Wakayama, in Japan, situated on the south coast of the island of Hondo, 39 miles by rail southwest of Osaka (Map: Japan, D 6). It is the former castle town of the princes of Kishu, one of the three august families The castle rises on a wooded hill and is one of the most perfect examples of the old architecture of Japan It dates from 1850 A short distance from Wakayama stands the temple of Kiimiidera, celebrated for its beautiful situation. Tradition gives the date of its founding as 770 A.D. The principal manufacture is cotton flannel. Pop., 1903, 68,527; 1908, 77,303.

WAKE (AS. *wacu*, watch, from *wacian, wœccan*, to watch). The English equivalent of the ecclesiastical vigil (q.v.); a name for English festival celebrations, preceded by a night vigil. The saint's-day festivals are still kept in many English parishes under the name of country wakes. A lykewake or lichwake is a watching of a dead body all night by the friends and neighbors of the deceased. This watching,

called simply a wake, still persists as a common custom among the humbler Irish It no doubt originated in superstitious fear either of passing the night alone with a dead body or of its being interfered with by evil spirits Consult Brand, *Popular Antiquities*, in Bohn's Antiquarian Library (London, 1849) See MORTUARY CUSTOMS

WAKE, WILLIAM (1657–1737) Archbishop of Canterbury He was born at Blandford, Dorsetshire, England, graduated at Oxford in 1676, and accompanied Viscount Preston as chaplain to the English Embassy to France in 1682, returning in 1685, he was elected preacher to Gray's Inn (1688) He became canon of Christ Church (1689), rector of St James's, Westminster (1693), Dean of Exeter (1703), Bishop of Lincoln (1705), and Archbishop of Canterbury (1716) In 1717–20 a union was proposed between certain members of the Gallican church and the Church of England, to which he showed himself favorably inclined He published many works, including *The State of the Church and Clergy of England in Their Councils, Synods, Conventions, and Their Other Assemblies, Historically Deduced* (1703), and a translation of *The Apostolic Fathers* (1693) Consult J H Lupton, *Archbishop Wake and the Project of Union between the Gallican and the Anglican Churches* (London, 1896)

WAKEFELD, ROBERT (?1480–1537) An English Oriental scholar He was born probably at Pontefract, Yorkshire After graduating from Cambridge in 1513–14 he went abroad for study and remained to teach at Louvain and at Tubingen Being summoned home in 1523, he was appointed chaplain to Henry VIII, and lecturer on Hebrew in Cambridge He was among the advisers of the King on the subject of his divorce In 1530 he went to Oxford as teacher of Hebrew, and in 1532 was appointed canon of King's College or Christ Church, newly refounded by Wolsey He is remembered for his efforts to prevent the destruction of books during the dissolution of the lesser monasteries Among his works printed by Wynkyn de Worde was one reputed to be the first book printed in England with Hebrew and Arabic characters, *Oratio de Laudibus et Utilitate Trium Linguarum Arabicæ, Chaldaicæ, et Hebraicæ* (1524).

WAKEFIELD An episcopal city, market town, and municipal and parliamentary borough, the capital of the West Riding of Yorkshire, England, on the Calder, 9 miles south of Leeds (Map England, E 3) Among the chief buildings are the cathedral, formerly the parish church, founded in 1329, the grammar school (1591), a wealthy institution; a library, corn exchange, etc The town has long been famous for its manufactures of woolen yarn and cloths It dates from the Wackefield of Domesday, and was the scene of a Yorkist defeat in 1460 Pop, 1901, 41,544, 1911, 51,511

WAKEFIELD A town, including several villages, in Middlesex Co, Mass, 10 miles north of Boston, on the Boston and Maine Railroad (Map Massachusetts, E 2) It has the Beebe Town Library and the Wakefield Home for Aged Women The town hall was the gift of Cyrus Wakefield 1st, a public-spirited citizen Wakefield is mainly engaged in manufacturing The most important products are rattan goods, knit goods, pianos, stoves, pipe, and shoes The town owns and operates the electric light and gas plants and the water works Originally a part of Reading, Wakefield was settled about 1639, and was incorporated as South Reading in 1812. It received its present name in 1868 Pop, 1900, 9290, 1910, 11,404, 1915, 12,781, 1920, 13,025

WAKEFIELD, EDWARD GIBBON (1796–1862) An Anglo-Australian colonist and statesman He was born in London, and was educated in Westminster and in Edinburgh In 1814 he received a minor appointment in the diplomatic service at Turin and later at Paris He subsequently resided in Australia, in Canada, where he was elected member of Parliament (1843), and in New Zealand, introduced the Wakefield colonization system, resembling the preemption plan of the United States, took part in abolishing penal transportation, and edited and wrote various treatises on social and political questions, of which the most important is *A View of the Art of Colonization* (1849) He was a member both of the Provincial Council of the Province of Wellington and of the Colonial House of Representatives (1853) Consult Richard Garnett, *Edward Gibbon Wakefield* (London, 1898)

WAKEFIELD, GILBERT (1756–1801) An English classical scholar, born at Nottingham At the age of 20 he graduated from Jesus College, Cambridge In 1778 he was ordained a deacon in the Church of England, but after holding for a brief time two curacies, he gave up his profession owing to his inability to subscribe to the doctrine of the Trinity He turned to teaching for support, becoming classical tutor in Warrington Academy (1779–83) and in the dissenting college at Hackney (1790–91) Resigning this position on account of his objection to public worship (elaborated in *An Enquiry into the Expediency and Propriety of Public or Social Worship*, 1791), he devoted the rest of his life to study and controversy He wrote a reply to Paine's *Age of Reason* (1795), and was imprisoned for two years (1799–1801) in Dorchester jail for seditious libel contained in a violent *Reply* to Bishop Watson's *Address to the People of Great Britain* Wakefield's scholarship is well represented by a critical edition of *Lucretius* (3 vols, 1796–99), and *Silva Critica* (1789–95), an attempt to illustrate the Scriptures "by light borrowed from the philology of Greece and Rome" Among other works are a translation of the New Testament (1792), a group of Greek tragedies edited under the title of *Tragœdiarum Delectus* (1794), editions of Vergil's *Georgica* (1788), of Horace (1794), Moschus (1795), and a treatise on Greek metres called *Noctes Carcerariæ* (1801)

WAKEFIELD, THE VICAR OF See VICAR OF WAKEFIELD

WAKE FOREST COLLEGE An educational institution under Baptist control at Wake Forest, N C, founded in 1834 as Wake Forest Institute and reorganized as a college in 1838. It is organized in schools of Latin, Greek, English, modern languages, pure mathematics, applied mathematics and astronomy, chemistry, biology, physics, moral philosophy, political science, law, the Bible, education, and medicine (first two years), and confers the degrees of B A, B S, LL B, and M A There is no preparatory department, but subcollegiate classes are maintained in Latin, Greek, mathematics, and English for students not fully prepared for collegiate work In 1915–16 the students numbered 503, the faculty 40, and the library contained 20,000 volumes The endowment was $508,139, with a total income of about $60,000 The value of the college property in buildings,

grounds, and equipment was about $235,000 The president in 1916 was W. L. Poteat, LL.D

WAKE ISLAND. A small island in the Pacific Ocean belonging to the United States, 1505 miles east-northeast of Guam (Map Guam, B 9). It is only about 1 square mile in area, and is uninhabited. It was acquired for the United States by the second Philippines expedition in 1898.

WAKE'LEY, JOSEPH BEAUMONT (1804–76). An American Methodist Episcopal minister. He was born at Danbury, Conn., and entered the New York Conference in 1828. He filled various appointments in the neighborhood of New York and won renown as an ecclesiastical antiquary. As the result of his researches he published *Heroes of Methodism* (1856); *Lost Chapters Recovered from the Early History of Methodism* (1858); *Anecdotes of the Wesleys* (1869); *Portraiture of Rev. William Cravens* (1869); *A Prince of Pulpit Orators—Whitefield* (1871); *Temperance Cyclopædia* (1875); *The Wesleyan Demosthenes: Comprising Select Sermons of Joseph Beaumont* (1875).

WAKE'MAN, HENRY OFFLEY (1852–99). An English historical writer, educated at Eton and at Christ Church, Oxford, graduating B A. in 1873, with first honors in modern history. His life was passed at Oxford. He became a tutor in Keble College, and afterward fellow and bursar of All Souls. His *Introduction to the History of the Church of England* (1896; 5th ed., 1898) is regarded as the standard work from the Anglican point of view. Next to this comes *The Church and the Puritans, 1570–1660* (1887; 3d ed., 1892). Among his other works are *History of Religion in England* (1885); *Europe, 1598–1715* (1894); and *Life of Charles James Fox* (1890).

WAKE ROBIN. See ARUM; TRILLIUM.

WAKIDI, wȧ-kē'dē (Ar. *Abū 'Abd Allāh Muḥammad ibn 'Umar al Wāḳidā*) (747–823). One of the first biographers of Mohammed. He was born in Medina, the centre of the traditions concerning the Prophet. Unsuccessful as a merchant, he finally gained patronage in Bagdad, and found opportunity for his literary labors. His chief work is the *Kitāb al maghāzi*, or Book of the Campaigns of Mohammed. He was a close student of the traditions concerning the Prophet, and excelled in chronology. The book has been translated by Kremer, *History of Muhammed's Campaigns* (Calcutta, 1856), and it has been condensed into German by Wellhausen in *Muhammed in Medina* (Berlin, 1882). A number of later works have been erroneously ascribed to this historian. Consult: Carl Brockelmann, *Geschichte der arabischen Litteratur*, vol. i (Weimar, 1898); R. A. Nicholson, *A Literary History of the Arabs* (New York, 1907); C. I. Huart, *Histoire des Arabes* (Paris, 1912).

WAKLEY, wāk'lĭ, THOMAS (1795–1862). An English surgeon and reformer, born at Membury, Devonshire. In 1823 he founded the *Lancet*, a weekly medical journal which became famous, and through which he made many bitter enemies, but accomplished much good. He attacked abuses in his profession and especially in the College of Surgeons. From 1835 till 1852, while a member of the House of Commons, he carried through many humanitarian reforms. In 1851 he began in the *Lancet* a crusade against adulterated foods which resulted in legislation to correct the evil.

WAKONDA, wȧ-kŏn'da. A Sioux Indian term now found in general literature and expressing a native religious concept of the essential supernatural element in the universe. It appears in various forms, as wakonda, wakanda, wakan, etc., according to the dialects of the various Siouan tribes. Such a concept is not peculiar to the Sioux, for we have the almost parallel terms, orenda (Iroquois), manitou (q.v.) (Algonquian), tirawa (Pawnee), natosiwa (Blackfoot), etc. Consult Clark Wissler, "North American Indians of the Plains," in American Museum of Natural History, *Handbook Series*, No. 1 (New York, 1912).

WALAFRID (vȧ'lȧ-frēt) **STRA'BO** (c.808–849). A mediæval German monk and scholar. At an early age he went to the famous cloister of Reichenau for his education, and entered the Benedictine Order at the age of 15. He spent about three years at Fulda under Rabanus Maurus (q.v.) and then returned to the Imperial court as instructor of the young son of Louis the Pious. As a reward, the Emperor bestowed on him the Abbey of Reichenau (838). In the contest that followed the death of Louis, Walafrid, like Rabanus, took the side of German unity as represented by Lothair; he was obliged to leave his abbey, but recovered it in 842. Little is known of his life after this. He was of a poetical nature, and left some notable verse, distinguished by elevation of thought. Conspicuous is the *Visio Wettini*, a description of the experiences of his teacher Wettin in the other world, and the first of that class of mediæval poems which reached its highest point in the *Divina Commedia*. His name is even better known for his *Glossa Ordinaria*, partly a compilation, but the most popular commentary on Scripture throughout the Middle Ages. His works are in Migne, *Patrologia Latina*, cxiii and cxiv. Consult J. C F. Bähr, *Geschichte der romischen Literatur in Karolingischen Zeitalter* (Karlsruhe, 1840).

WALAPI, wȧ'lȧ-pī, or **HUALAPAI** (Pine People). A tribe of Yuman stock (q.v.) originally residing about the Great Bend of the Colorado and extending eastward into Arizona. They are now gathered upon a reservation in the same country. They numbered 501 in 1910. Consult G. A. Dorsey, *Indians of the Southwest* (Chicago, 1903).

WALCH, vȧlk, CHRISTIAN WILHELM FRANZ (1726–84). A German theologian, born at Jena, where he studied theology. He traveled in Holland, France, Switzerland, and Italy; became professor of philosophy at Jena in 1750, and three years afterward at Göttingen; and in 1754 was made professor of theology at that institution. His writings include: *Entwurf einer vollstandigen Historie der romischen Papste* (1756; 2d ed, 1758); *Entwurf einer vollstandigen Historie der Kirchenversammlungen* (1759); *Entwurf einer vollstandigen Historie der Ketzereien* (11 vols., 1762–85); *Neueste Religionsgeschichte* (9 vols., 1771–83).

WALCHEREN, vȧl'kĕr-en. An island belonging to the Province of Zealand, Netherlands at the mouth of the Scheldt (Map: Netherlands B 3). The Sloe, now bridged, passes between it and the island of South Beveland on the east Length, 12 miles; area, 80 square miles. The island is protected from the sea by dunes and dikes, and is very fertile. It contains Middelburg and Flushing. Walcheren was the scene of a British military disaster during the Na

poleonic wars. In July, 1809, a British fleet comprising nearly 250 vessels of war and 400 transports carrying some 40,000 men set sail for Holland with the intention of seizing Antwerp and obtaining command of the Scheldt Criminal negligence was displayed in the preparations for the expedition, and both Sir Richard Strachan, the naval commander, and the Earl of Chatham, who was placed at the head of the land forces, were markedly incapable. Valuable time was wasted in the reduction of Flushing, and not until late in August was Chatham prepared to march on Antwerp By that time, however, the French forces in Holland had been greatly strengthened, and the British commander deemed it inexpedient to pursue the campaign. The French assumed the aggressive and in the first days of September the British abandoned Flushing. Chatham with part of the forces returned to England, leaving 15,000 men on the island of Walcheren. There the swamp fever played havoc with the men, and the medical authorities were utterly incompetent to combat the ravages of the disease. The island was finally abandoned in the latter part of December, the results of the expedition being a loss of 7000 dead and the permanent disablement of half of the remainder

WALCKENAER, väl'ke-nâr', CHARLES ATHANASE, BARON (1771–1852). A French scientist and writer, born in Paris. He became general secretary of the prefecture of the Seine in 1816, and prefect of Nièvre in 1826. He retired to Paris in 1838, and in 1840 was chosen life secretary of the Academy of Inscriptions. He published *Essai sur l'histoire de l'espèce humaine* (1798); *Histoire naturelle des aranéides* (1805); *Le monde maritime* (4 vols., 1818; 2d ed., 12 vols., 1819); *Histoire de la vie et des ouvrages de Lafontaine* (1820; 4th ed., 1858); *Histoire naturelle des insectes* (3 vols., 1836–44); *Histoire de la vie et de poésies d'Horace* (2 vols., 1840; 2d ed., 1858); *Mémoires touchants la vie et les écrits de la marquise de Sévigné* (5 vols., 1842–52; 6th vol. by Aubenas, 1865).

WALCOTT, wôl'kŏt, CHARLES DOOLITTLE (1850–1927). An American geologist and paleontologist, born at New York Mills, N. Y. He early showed a decided bent towards the study of natural history. In 1876 he became one of the assistants of the Geological Survey of the State of New York, and three years afterward entered the service of the United States Geological Survey, of which he was the director from 1894 to 1907. In 1897–98 he was at the head of the National Museum, and in 1905–07 served also as director of the United States Reclamation Service. He was secretary of the Carnegie Institution in 1902–05, and secretary of the Smithsonian Institution after 1907. Walcott served as president of the Geological Society of America (1901) and as vice president of the National Academy of Sciences (for the term 1913–19) He was the author of many important geological memoirs and reports.

WALD, vält. A town of the Rhine Province of Prussia, 10 miles southeast of Düsseldorf There are important manufactures of steelware, cutlery, wire, and pottery. Pop., 1910, 25,274.

WALD, wäld, LILLIAN D. (1866–). An American social worker, born in Ohio. She studied at the New York Hospital Training School for Nurses and the Women's Medical College. In 1893 she became president and head worker of the Henry Street Settlement, New York (also known as the Nurses' Settlement). The position of school nurse in New York was originated by Miss Wald, who is also to be credited with the idea of a Federal Children's Bureau, which has been realized. She became president of the Social Halls Association, served on the New York State Commission of Immigration in 1909, and lectured at Teachers College (Columbia), the New York School of Philanthropy, and the Boston School for Social Workers. Mount Holyoke College gave her the degree of LL.D. in 1912 and the National Institute of Social Sciences awarded her its gold medal. She published *The House on Henry Street* (1915), a history of the settlement.

WALDAU, väl'dou, MAX. See HAUENSCHILD, R. G. S VON.

WALDECK, väl'dĕk, or WALDECK-PYRMONT A principality of the German Empire, composed of two separate parts· the one, the former county of Waldeck, containing 408 square miles; the other, the former principality of Pyrmont, containing 25 square miles (Map: Germany, C 3). The main division is a country of low mountains, with no great fertility. Its western portion, containing slate formations, is highest, reaching an elevation of 2775 feet. The streams belong to the Weser basin The climate is somewhat raw Siderite is mined. The town of Bad Pyrmont is a well-known spa, attracting some 25,000 visitors annually. Agriculture and stock raising are the main occupations. Forests occupy over one-third the total area. The manufactures and commerce are small. After the Austro-Prussian War of 1866 the reigning prince assigned his main rights as sovereign to the King of Prussia, which arrangement can be terminated on two years' notice The Prussian King names all public officials and Prussia controls the finances. There is a Landtag of 15 members. The principality is represented by one member in the Bundesrat and by one in the Reichstag. Arolsen (pop., 1910, 2793) is the capital. Pop., 1900, 57,918; 1910, 61,723, almost all Protestants.

The Waldeck house sprang from the mediæval counts of Schwalenberg. The affiliated Pyrmont lines became extinct in 1494. Waldeck joined the Confederation of the Rhine in 1807 against its will. It was an ally of Prussia in the war of 1866 and became a member of the North German Confederation in 1867 and of the German Empire in 1871.

WALDECK, GEORG FRIEDRICH, COUNT (later PRINCE) (1620–92). A German soldier and statesman. He was born at Arolsen, and was the second son of Wolrad IV of the Wildungen line. It was his ambition to form a league of Protestant countries about Brandenburg, and in 1656 he was active in bringing about the League of Marienburg with Sweden against Poland. In 1664, as a field marshal, he distinguished himself at St. Gotthard against the Turks; in 1682 for services against the French he received the title of Prince; and in 1683 he helped to drive the Turkish army from before Vienna. In 1689 he was put in command of the allied forces in the Netherlands. In the same year he gained a success at Walcourt over the French under Marshal d'Humières, but in 1690 he was badly defeated by Marshal Luxembourg at Fleurus. For his life, consult Rauchbar (Arolsen, 2 vols., 1867–72) and Erdmannsdörfer (Berlin, 1869).

WALDECK-ROUSSEAU, väl'dĕk'-rōō'sō', PIERRE MARIE RENÉ (1846–1904). A French statesman, born at Nantes. He studied law, in 1879 was elected Deputy for Rennes; and was Minister of the Interior in Gambetta's *grand ministère* of 1881, and in the Cabinet of Jules Ferry of 1883–85. In 1894 he was elected to the Senate for the Department of the Loire, and in the following January he was supported by the Right for the Presidency of France against MM. Faure and Brisson. In the confused politics of the years that followed he was regarded as a leader of the Moderate Republicans. After the fall of the Dupuy Cabinet in June, 1899, he organized the famous radical *bloc* consisting of all stripes of republicans, as at one extreme was M Millerand, the socialist leader, and at the other was General Galliffet, notable for his severity in suppressing the Commune of 1871. All, however, were united upon the platform of sustaining the Republic against the royalists and clericals. The Premier himself took the portfolio of the Interior, and set himself vigorously to the work of establishing order throughout the Republic. He permitted the Dreyfus case to be reopened, and in December, 1900, carried through a general amnesty law for all connected with the case. The most important law passed during his Premiership was, however, the Association Bill of 1901. (See FRANCE, section on *Religion.*) Throughout his incumbency the Premier showed great ability in gaining support of his measures. When the general election of 1902 came, he entered the contest with great vigor; and, thanks to his admirable personality, and despite the bitterest opposition, he gained a great victory for Republican principles. Feeling his task completed, he resigned in June, 1902, with the prestige of having held office longer than any other Premier since the establishment of the Third Republic. His publications include *Discours parlementaires* (1889); *Discours prononcés dans la Loire* (1896); *Questions sociales* (1900); *Associations et congrégations* (1901); *La défense républicaine* (1902); *Politique française et étrangère* (1903); *Action républicaine et sociale* (1903). His collected speeches were published as *Pour la République* (1905), and *L'Etat et la liberté* (2 vols., 1906). Consult J. Ernest-Charles, *Waldeck-Rousseau* (Paris, 1902).

WALDEN, wŏl'den. A village in Orange Co., N. Y., 12 miles west-northwest of Newburgh; on both sides of the Wallkill River, and on the West Shore Railroad (Map: New York, A 1). Almost half of the country's supply of pocket knives are said to be made here. Hot-air engines, table cutlery, paper bags, overalls, and shirts are also manufactured. An electric car line connects with Newburgh. Pop., 1900, 3147; 1910, 4004; 1915 (State census), 5036.

WALDEN, wŏl'den. See THOREAU, HENRY DAVID.

WALDEN. See NETTER, THOMAS.

WALDEN, wŏl'den, JOHN MORGAN (1831–1914). An American Methodist Episcopal bishop. He was born at Lebanon, Ohio, and graduated at Farmers' (now Belmont) College, near Cincinnati, in 1852. He began his career as a journalist, first in Illinois and then in Kansas, and was a member of the Kansas Legislature (1857), and of the Leavenworth Constitutional Convention (1858). He entered the Cincinnati Conference in 1858, and was one of the publishing agents of the Methodist Book Concern, at Cincinnati, Ohio (1868–84). He was elected Bishop in 1884. He was a member of the Ecumenical Methodist Conference in 1881, in 1891, and in 1911 Consult the biography by D. H. Moore (New York, 1915)

WALDEN, väl'dĕn, PAUL (1863–). A Russian chemist. He was born in Livland, and was educated at the Polytechnic School in Riga and at the universities of Leipzig (Ph.D, 1891), Odessa, and St. Petersburg (Dr.Chem., 1899). He taught at Riga and at Odessa, in 1902 returning to the former city as business director of the higher schools, and becoming a professor and dean in the Riga Polytechnic in 1906. In 1908 he was called to succeed Mendeléev (q.v) in the chair of chemistry in the University of St. Petersburg, and in 1910 was appointed successor to Beilstein (q v.) as professor and director of the chemical laboratory of the Royal Academy of Sciences Walden was chosen president of the Ninth International Congress of Applied Chemistry. He devoted much time to the study of optical rotary power and inversion; a form of the latter which he discovered has become known to chemists throughout the world as the "Walden Inversion." He also investigated surface tension, the electrical conductivity of aqueous solutions, and the dissociation constants of liquids. In addition, he became well known as a popular lecturer on natural science. His principal works are: *Die Affinitatsgrossen einiger organische Sauren* (1891); *Versuch zur Untersuchung der osmotischen Erscheinungen* (1891); *Louis Pasteur* (1896); *Material zur Studie der optischen Isomerie* (1898); *Wilhelm Ostwald* (1903); *D Mendeléef* (1909); *Lösungstheorien* (1910). He also made translations into Russian of Ostwald's *Wissenschaftliche Grundlagen der Analytischen Chemie* (1896), Fischer's *Anleitung zur Darstellung organische Praparaten*, and other German works.

WALDENBURG, väl'den-bōōrk. A town of Silesia, Prussia, 42 miles southwest of Breslau (Map: Germany, G 3). It has porcelain, pottery, and glass works, and coal mines. Pop., 1910, 19,681.

WALDENSES, wŏl-dĕn'sēz. The origin of the Waldenses has been a cause of much disputation According to many, they are a branch of the primitive Church which has always been independent of the Roman Catholic church since the third century: according to others, and especially their enemies, they date from the twelfth century and took their name and doctrines from Pierre Valdo, the merchant of Lyons. The later historians, however, such as Comba (1903), Yalla and Gay, discard both these opinions and show that the Waldensian movement, which later became identified with the Waldensian people and church, is the result of the blending together or the fusion of four distinct reform movements, brought about by four men: Pierre de Bruys at Toulouse (1100), Henry de Cluny at Maus (1116), Arnaldo at Brescia (1135), Pierre Valdo at Lyons (1173).

The teachings of these four men were very much alike. However, Pierre de Bruys insisted especially on simplicity and purity in the worship of God, Henry of Cluny or Lausanne on purity of life, Arnaldo on the independence of the church from the state and its spiritual mission, Pierre Valdo on poverty. The followers of these four men were respectively called Petrobusiani, Henriciani, Arnalisti, Leonisti or "Poor Men of Lyons."

The name Vallenses occurs for the first time in 1180 and the name Valdenses, later, to indicate all heretics, after the four movements had been blended together. The life and work of Pierre Valdo are most remarkable. He was a wealthy merchant of Lyons, France, in the latter half of the twelfth century Moved, according to one story, by the death of a friend in 1170, he determined to lead a life of poverty and to devote himself to the cause of religion. He divided his property with his wife, placed his two daughters in the monastery of Fontévrault, and gave all his money to the poor. Followers soon flocked to him, and were known sometimes by his name, sometimes as the "Poor Men of Lyons" Waldo and his followers had no intention of separating from the Church, but their fundamental principles, that, first, all Christians, lay or clerical, ought freely to interpret the Scriptures, and, second, that laymen had a right to teach, brought them under the condemnation of the Church. The Archbishop of Lyons forbade them to teach, and they appealed to the Pope. They were convicted of error at the Lateran Council in 1179. Then they appealed for permission to found an order, but this was denied. As they continued their preaching, they were anathematized by the Council of Verona in 1184, and again at Narbonne in 1190 Many fled from Lyons into Dauphiné and Piedmont Their missionaries traveled far and wide making converts. Gradually the community took form. It consisted really of two parts: the "fraternity" proper, made up of men and women who had taken the three monastic vows of poverty, chastity, and obedience, and for whom it was not lawful to lie, to take an oath, or to shed blood; and, second, "the faithful," who followed the teachings of Waldo, but were not obliged to take the vows. It is impossible now to determine exactly their organization, as it differed from place to place; but they had bishops, priests, and deacons. In the beginning their beliefs were nearly the same as those held by the orthodox Christians of the time The councils and inquisitors frequently distinguished between heretics and the followers of Waldo. Nevertheless they suffered with the Albigenses, from whom they differed widely in doctrine, in the Albigensian crusade. (See ALBIGENSES.) As a result few were left in France. Their headquarters in the thirteenth century were in the upper valleys of Piedmont. There they were known as the "Poor of Piedmont," "the Leonisti," from their origin at Lyons, or as the "Insabates," from the shoes fashioned like sandals which they wore. Many other names were given to them at different times and in different places, of which the most familiar is the French name Vaudois.

In Piedmont they suffered persecution in 1220. In 1231 Pope Gregory IX excommunicated them, but they increased steadily in numbers. They suffered much from the Inquisition in many parts of Europe. In the fourteenth and fifteenth centuries many went to Calabria under the protection of the Neapolitan ruler and established several colonies

In going about the country the Barbes adopted disguises, usually as merchants, which made them inconspicuous In the first stage of the movement learned Inquisitors bore almost uniform testimony to their excellent moral lives; but in 1487 attention was again directed especially to them by Innocent VIII, who preached a crusade against them as heretics. The Waldenses in Piedmont made a heroic resistance, but in vain The excessive cruelty of the Inquisitors led Louis XII of France, the ruler of part of Piedmont, to interpose, and he obtained from Pope Alexander VI a bull absolving the Waldenses. In 1532 and 1533 they joined the reform party. This brought on them a fresh persecution by the Inquisition. In 1545 the Parliament of Aix ordered lords of lands on which the Waldenses lived to oblige their vassals to conform to the Established church or to leave their lands. As they refused to conform, frightful massacres took place at Cabrières and Mérindol. These horrors brought about a reaction, and one of the chief persecutors was condemned to death in 1557. For some time pacific means were employed to convert them, but without success Later they were forbidden to open schools, condemned to exile and violence, and massacres followed. In 1655 the Waldenses in Piedmont were ordered to conform to the Catholic faith within 20 days under penalty of death and confiscation of their property. As they remained firm, persistent attacks were made upon them, and these attacks were met by a valiant but useless defense. This persecution aroused the indignation of England, and led Cromwell to send an embassy of protest to Turin, and Milton to write his well-known sonnet on the Waldenses. The trial fortunately lasted for only a short time, as within a few months the Duke of Savoy by the Treaty of Pignerol allowed them to follow their religious beliefs in the upper valleys of his dominions. These enjoyed relative religious immunity until the revocation of the Edict of Nantes in 1685. After that the decree went forth that their churches should be destroyed and that their ministers should be banished. At about the same period persecutions began again in Piedmont. The Waldenses made a stubborn resistance, but 12,000 men, women, and children were taken prisoners. These were released within a few months, largely through the intervention of the Swiss cantons, and were exiled. Many of them went to Switzerland as a land of refuge In 1689 they resolved to make an attempt to reconquer their own valley homes in Piedmont. At first they were successful, but a great force was sent against them and their position seemed desperate. The political issues of Europe led to a coalition against Louis XIV in 1690, and their aid was sought to defend the frontiers of Piedmont against his troops. They received in compensation official permission to return to their villages in 1694. The peace of 1697 was disastrous to them, as in 1698 they were ordered to go into exile. In 1740 they secured some indulgence, but there was little change in their position, although there was also little persecution, up to the time of the French Revolution. In 1799 liberty of conscience was proclaimed. After the fall of Napoleon in 1814 there was a reaction under Victor Emmanuel I. Finally, in 1848, under Charles Albert, the Waldenses acquired civil and religious liberty. In 1855 they founded a school of theology in Torre Pellice, which was removed to Florence in 1860.

In 1916 the Waldenses had 60 organized churches throughout Italy and 156 stations with 98 pastors. The Central Board, administering the affairs of the church, called the Venerabile Tavola Valdese, is composed of nine members, whose president is called moderator, elected for one year. The General Synod, which is the supreme authority, meets every year. The head-

quarters of the church are at Torre Pellice (Waldensian valleys).

Besides the churches in Italy, the Waldenses had missionaries in Abyssinia, Madagascar, Basutoland, and Barotseland, also flourishing agricultural settlements in Uruguay and Argentina with 8 organized churches and 20 scattered groups, with a total population of 7000 people. In North America they had one church in New York City and agricultural settlements at Wolf Ridge, Tex.; Valdese, N. C; Monett, Mo; Provo City, Utah; and Santa Ana, Cal. The headquarters of the Waldensian church in the United States are in New York City.

Much has been written about their literature. There are extant versions of the Scriptures, the *Sentences*, as the extracts from the Fathers were called, various forms of services, and especially a considerable number of poems. The best known of these poems is *La Nobla Leicon*, whose date has now been fixed at the middle of the fourteenth century. The best editions of their poems are by Apfelstedt, in the *Zeitschrift fur romanische Philologie*, vol. iv (Halle, 1880), and in the *Archiv fur das Studium der neueren Sprachen*, vol. lxiii (Brunswick, 1880). For their history, consult: Léger, *Histoire générale des églises évangéliques des vallées de Piémont, ou Vaudoises* (Leyden, 1669); Dieckhoff, *Die Waldenser im Mittelalter* (Göttingen, 1851); Herzog, *Die romanischen Waldenser* (Halle, 1853); Montet, *Histoire littéraire des Vaudois du Piémont* (Paris, 1885); Muston, *Israel of the Alps: History of the Waldenses of Piedmont* (Eng. trans., London, 1863); Melia, *Origin, Persecution, and Doctrines of the Waldenses* (ib., 1870); Preger, *Die Verfassung der französischen Waldenser in der alteren Zeit* (Munich, 1890); S. V. Bompiani, *Short History of the Italian Waldenses* (New York, 1897); Emilio Comba, *Storia dei Valdesi* (new ed., 1901; Eng. trans. of earlier ed., London, 1888; Fr. trans., Paris, 1903); Giovanni Jalla, *Compendio di storia Valdese per le scuole* (Florence, 1902); J. Gibson, *The Waldenses* (Edinburgh, 1903); H. C. Lea, *History of the Inquisition in the Middle Ages* (new ed., New York, 1906); T. de Cauzons, *Les Vaudois et l'inquisition* (2 vols., Paris, 1907); Teofelo Gay, *Histoire des Vaudois* (Florence, 1912); also *Bulletin de la Société d'Histoire Vaudoise* (Turin), *passim*. For their doctrinal belief, consult Philip Schaff, *Creeds of Christendom* (New York, 1877–78).

WALDENSIS. See Netter, Thomas.

WALDERSEE, väl'dĕr-zā, Alfred, Count von (1832–1904). A German soldier, born at Potsdam. He entered the army in 1850, served in the war of 1866, and at the beginning of the Franco-Prussian War was an aid-de-camp to the King of Prussia. He was at the battle of Gravelotte, and became chief of staff to the Grand Duke of Mecklenburg. For services in the war he was made a colonel. When peace came he was appointed chargé d'affaires at Paris; in 1882 became quartermaster-general of the Prussian staff; and in 1888 succeeded Moltke as chief of staff. In 1900 he became field marshal. In August of that year he took command of the German forces in China, and was made commander in chief of the allied forces.

WALDEYER, väl'dī-ĕr, Wilhelm (1836–1906). A German anatomist, born at Hehlen, in Brunswick. He studied at Göttingen, Greifswald, and Berlin, taught at Breslau, in 1872 became professor and director of anatomy at Strassburg, and in 1883 went to Berlin as professor and director of the anatomical institute of the university. Here he remained till his death. His specialties were histology, embryology, and comparative anatomy. Best known are his studies on cancer and his monographs on the construction of teeth, cornea, sclera, and conjunctiva. His works include: *Eierstock und Ei* (1870); *Atlas der Haare* (1884); *Das Gorilla-Rückenmark* (1889); *Lage der weiblichen Beckenorgane* (1892); *Das Becken* (1899); "Die Geschlechtszellen," in Hartwig's *Handbuch der Entwickelungsgeschichte* (1903).

WALDIS, väl'dĭs, Burkard (c 1490–c.1557). A German fabulist, born at Allendorf, in Hesse. He became a monk, but afterward turned Protestant, and suffered persecution. After many vicissitudes he became pastor in Abterode (1544). His first important literary production, the drama *Die Parabel vom verlornen Sohn*, was performed at Riga in 1527. He is remembered for his *Esopus ganz neu gemacht und in Reimen gefasst* (1548, and many later editions; a complete one by Von Tittmann, 1882). Among other works was a paraphrase of the Psalter in verse, composed in prison, and published in 1553. Consult Milchsack, *Burkard Waldis* (Halle, 1881).

WALDMÜLLER, vält'mŭl-lĕr, Ferdinand Georg (1793–1865). An Austrian landscape, portrait, and genre painter. He was born in Vienna, studied at the Academy there under Maurer and Lampi, and after traveling in Italy and Germany settled in his native city, where he became professor at the Academy. He owed his popularity during his lifetime to his genre scenes of peasant life in Nether Austria, such as "Soup Day at the Convent" (Vienna Museum) and "After School" (Berlin Gallery). To-day, however, he is better known as an ironically truthful portraitist and as a pioneer of modern landscape painting. His "Ruins at Schonbrunn" is in the Vienna Gallery, which also contains fine examples of his portraiture.

WALDMÜLLER, Robert. See Duboc, Eduard.

WALDO, Peter. See Waldenses.

WALDO, Samuel Lovett (1783–1861). An American portrait painter. He was born at Windham, Conn., and after painting portraits in Charleston, S. C., went to London in 1806 to become a pupil of Benjamin West. On his return in 1809 he opened a studio in New York, and rapidly acquired popularity as a portrait painter. His sitters included Peter Remsen and David Grim (both in New York Historical Society), and Andrew Jackson (Metropolitan Museum, New York). He painted thinly, but with some skill and technical ability. About 1812 he formed a partnership with his pupil William Jewett, which lasted 18 years. Among the numerous portraits which they painted jointly is that of Rev. Dr. Gardner Spring (Metropolitan Museum).

WALDOBORO, wŏl'dō-bŭr-ō. A town in Lincoln Co., Me., 69 miles northeast of Portland, on the Medomak River and on the Maine Central Railroad (Map: Maine, C 4). Cutting paving stone and poultry raising are the chief industries. Pop., 1900, 3145; 1910, 2656.

WALDRON, wąl'dron, George. See Barrington, George.

WALDSCHMIDT, vält'shmĭt, Maximilian. See Schmidt, Maximilian.

WALDSEEMÜLLER, or **WALTZEMÜLLER,** vält'zā-mul'lĕr, MARTIN (c 1470–c.1521). A German geographer and the most distinguished cartographer of his time, born at Freiburg. For several years after 1505 he was professor of geography in the College of Saint-Dié in Lorraine. In 1506 he and some compatriots matured a plan for a new edition of the work of Ptolemy, revised and amended so as to include the results of recent discovery. In the following year Waldseemüller published a large map of the world in 12 sheets and finished a small treatise which he intended as an introduction to the more elaborate work; and this treatise, together with a Latin translation of the famous second letter from Americus Vespucius (q.v.) to Soderini, and some verses in praise of Vespucius, was published under the title of *Cosmographiæ Introductio* on the college press in the same year. The work is famous because in it Waldseemuller said: "But now the parts have been more extensively explored and another fourth part has been discovered by Americus Vespucius (as will appear from what follows), wherefore I do not see what is rightly to hinder us from calling it Amerige or America, i.e., the land of Americus, after its discoverer Americus" However, the new edition of Ptolemy was finally published in 1513. It contained a map called Tabula Terræ Novæ, which had been made under the supervision of Waldseemuller prior to 1508. On this map the "Fourth Part" is not called America, but Terra Incognita; while to the left, referring to the Pearl Coast and perhaps to Honduras, is the inscription: "This land with the adjacent islands was discovered by Columbus of Genoa by order of the King of Castile." Of the first edition of the *Cosmographiæ Introductio* but one copy is known to be in existence, and it is in the New York Public Library. Of the three other editions published the same year about 20 copies are preserved. It was published in facsimile, edited by Wieser (Strassburg, 1908). Consult John Fiske, *The Discovery of America* (2 vols., Boston, 1902).

WALDSTEIN, wäld'stīn, SIR CHARLES (1856–1927). A British archæologist. Born in New York City, he studied at Columbia University in 1871–73, and in 1875 received the degree of Ph.D. at Heidelberg. In 1876 he studied at Leipzig and in the British Museum, where he lectured in 1878. He then traveled in Italy and Greece. From 1880 he was identified with Cambridge University, being reader in classical archæology from 1883 to 1907, director of the Fitzwilliam Museum (1883–89), Slade professor of fine art (1895–1901; 1904–11), and lecturer at King's College. In addition he served as director of the American School of Classical Studies at Athens (1889–93). While in this office he discovered that the so-called "Apollos" are simply statues of athletes. In 1883 he lectured before the Royal Institution and in 1886 at Columbia University In 1912 he was knighted. Among his works are: *The Balance of Emotion and Intellect* (1878); *Essays on the Art of Phidias* (1885); *Excavations at the Heraion of Argos* (1892); *The Work of John Ruskin* (1893); *The Argive Heræum* (1902); *Herculaneum, Past, Present, and Future* (1908), with L. Shoobridge; *Greek Sculpture and Modern Art* (1914).

WALDTEUFEL, vält'toi'fel, EMILE (1837–1915). A French composer, born at Strassburg. At the Paris Conservatoire he studied for some time under Marmontel and Laurent, but left before completing the regular course. His first published waltzes, *Joies et Peines* and *Manola,* met with such success that he devoted himself entirely to the cultivation of the dance forms, in which he produced several hundred works. In 1865 he was appointed chamber pianist to the Empress Eugénie and musical director of the Imperial court balls

WALES. An Alaskan village at Cape Prince of Wales, Bering Strait. Pop., 1910, 337, practically all Eskimo (Map: Alaska, D 3) It has a government school, a coöperative store, and a Congregationalist central mission. On Shisharef Inlet near by is a village containing a native school and some herds of reindeer. The herds of reindeer at and near Wales number 3100 head, the largest aggregation of animals in Alaska except at Bethel.

WALES (AS *Walas, Wealas,* foreigners; connected with OHG *walh,* foreign, Celtic *Volcæ,* a tribe of Gaul). An historical division of the United Kingdom of Great Britain and Ireland, administratively a part of England. It is a large peninsula projecting westward on the island of Great Britain. Wales extends 136 miles from north to south and has a breadth varying from 36 to 96 miles. Area, 7446 square miles. The northwestern corner is cut off by Menai Strait to form the island of Anglesey (q.v.) In Wales the proportion of hilly and mountainous country is much greater than in England, and the area of arable land is less than three-fifths. The ranges are, however, short and there are many openings allowing an easy passage for railroads. Snowdon, the highest point of Wales and of the British Isles, is 3590 feet. Wales is geologically more ancient than the greater part of England, consisting almost exclusively of the older Paleozoic rocks with igneous intrusions. The mineral deposits are extensive and valuable, including coal, iron, copper, zinc, tin, lead, and gold. Of these by far the most important is coal, amounting in value to about 85 per cent of the mineral output of Wales and in quantity to about 20 per cent of the coal supply of the United Kingdom. There are two coal fields, the north, in Denbigh and Flint, and the south, more than half in Glamorgan and the rest in Carmarthen, Pembroke, Brecknock, and the English county Monmouth. The north fields were worked as early as the sixteenth century and the development of the south fields began about the middle of the eighteenth. The thickness of the coal measures is estimated at about 7000 feet. Cardiff (q.v.) has become the largest coal-exporting port in the world, its export in 1913 being 20,095,051 tons. In 1913 Wales yielded mineral products to the value of $112,182,220, or about one-fifth of the total amount produced by Great Britain and Ireland.

For agriculture, manufactures (the most important of which is iron), and other topics concerning Wales not treated here, see UNITED KINGDOM.

The increase in population between 1901 and 1911 was 18.8 as against 11.3 per cent for the United Kingdom. The county of Glamorgan contains all the cities of Wales that exceeded a population of 50,000 in 1911; Cardiff, with 182,280, having increased 10.92 per cent in the decade ending with that year; Swansea, with 114,673; and Merthyr Tydfil, with 80,999. This is due to the great mining in-

dustry Wales is divided into 12 administrative counties, as shown in the following table

The greater portion of the population belong to the Calvinistic, Methodist, or other free Protestant bodies. In 1914 an act was passed by which the Protestant Episcopal church in Wales was disestablished, but the actual enforcement was postponed till the end of the European War.

COUNTY	Area, square miles	Pop in 1901	Pop in 1911
Anglesey	276	50,606	50,928
Brecknock .	733	54,213	59,287
Cardigan	692	61,078	59,879
Carmarthen .	918	135,328	160,416
Carnarvon .	572	125,649	125,043
Denbigh	666	131,582	144,783
Flint .	255	81,485	92,705
Glamorgan	793	601,061	742,998
Merioneth	659	48,852	45,565
Montgomery	797	54,901	53,146
Pembroke	614	87,894	89,960
Radnor	471	23,281	22,590
Totals ..	7,446	1,455,930	1,647,290

Wales has the same educational system as England (q.v.). (See also GREAT BRITAIN) Elected school boards have charge of elementary education in districts not adequately provided for by voluntary schools, the necessitous voluntary schools receiving public aid. Attendance is compulsory. Non-sectarian religious instruction is offered but is not compulsory in board schools. Sectarian instruction may be given in the voluntary schools. Secondary education is controlled by the county councils, and in towns of over 10,000 by the municipality. The University of Wales, consisting of the three colleges at Aberystwith, Bangor, and Cardiff, was established in 1903.

The Welsh are a Celtic people. Their average height is 1.695 metres; the cephalic index, 78.0. The Welsh are brunettes, with black hair and hazel eyes. The earliest inhabitants of Wales, as of the rest of Britain, are supposed to have been of non-Caucasic origin. These were succeeded by Celts, possibly first of the Gaelic division, although in the earliest historic times Wales, like Britain, was occupied by Cymric or Brythonic Celts. After the Saxon invasion Wales was, as it still remains, the ethnic centre of this race, although later admixtures of both Irish and English have probably modified the type.

History. At the time of the coming of the Romans, 55 B.C., the tribes of Wales, representing a mixture of the primitive Iberians with the later invading Celts, were the Decongi (Decangi) in the north, the Ordovices in the centre, the Silures in the southeast, and the Demetæ (Dimetæ) in the southwest, all bearing the general name of Cymry. After a long struggle the subjugation of these tribes was accomplished under Vespasian. The Celtic inhabitants of Britain, fleeing before the wave of Anglo-Saxon invasion, took refuge in the Welsh mountains, where, in time, they were merged with their native kinsmen and maintained their independence against the Teuton conquerors. The country was divided into several states, of which Gwynedd, Gwent, Dyved, and Powys were the most important. Of these the first two, because of their situation on the eastern frontier of Wales, were engaged in constant hostilities with the Anglo-Saxon kingdoms, especially Northumbria and Mercia. Constant warfare, too, prevailed among the Welsh principalities themselves. In 1062–64 Harold, the son of Godwin, overran Wales with an English army after a struggle with Llewellyn ap Griffith, King of Gwynedd William the Conqueror succeeded in forcing the recognition of his sovereignty from the Welsh princes, but this did not prevent them from raiding the English border, for protection of which the early Norman kings erected a number of feudal lordships with very extensive powers, the so-called lords of the marches. The marchers were a turbulent class and a source of trouble to the kings, but they served their purpose in holding the Welsh back. In 1136 the Welsh won a great victory over Henry I, but were again reduced to homage by Henry II. Llewellyn, Prince of North Wales, sided with Simon de Montfort against Henry III, but later submitted to the King. In 1273, however, he refused to pay homage to the new King, Edward I, who in 1276 invaded Wales and at Rhuddian compelled Llewellyn to submit to humiliating terms, including the surrender of the eastern portion of his lands and the annual acknowledgment of fealty. Llewellyn rose in rebellion in 1282, but perished, and his brother David, who carried on the struggle, was captured in the following year and beheaded. By 1284 the English conquest of the country was complete, and the process of introducing English law and administration was begun. In 1301 Edward I conferred on his second son, Edward, born at Carnarvon, in Wales, the title of Prince of Wales (see WALES, PRINCE OF), and this sufficiently satisfied the pride of the Welsh to keep them loyal for a hundred years. The national spirit did not die out, however, and was nourished by the songs of the bards, whom the English government regarded with great disfavor. Upon the seizure of the English throne by Henry IV a revolt broke out in Wales, which, under the leadership of Owen Glendower (q.v.), assumed, in 1402, formidable proportions. Henry IV repeatedly invaded the country, but the revolt was not suppressed till the death of Glendower, about 1415. The Welsh submitted to Henry IV, whom they regarded as their countryman. Glendower's was the last national uprising. In 1536 Wales was incorporated with England, its inhabitants receiving all the rights and privileges of English subjects. A national revival of recent years has taken the form of a patriotic cultivation of the ancient Cymric tongue and literature. See WELSH LANGUAGE AND LITERATURE.

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WALES, PHILIP SKINNER (1837–1906). An American naval surgeon. He was born at Annapolis, and educated for his profession in the universities of Maryland and Pennsylvania. He was commissioned full surgeon in the navy in

1861 and served through the Civil War at the Naval Hospital and on board the United States ship *Fort Jackson* of the North Atlantic and Western Gulf squadrons He became chief of the Bureau of Medicine and Surgery in 1880, and Surgeon-General and Medical Director in 1881 He was one of the first in attendance on President Garfield when he was shot by Guiteau His career was interrupted in 1887 by the discovery of frauds in his department, and although acquitted of actual responsibility, he was suspended from office for five years, and afterward resided abroad

WALES, PRINCE OF The title borne by the eldest son of the sovereign of Great Britain and Ireland It was first conferred on Prince Edward, afterward Edward II, in 1301 The idea of making Wales an appanage for the heir apparent seems due to Edward III, who in 1343 invested his son, the Black Prince, with the principality, and from that time the title has been borne by the eldest son of the reigning King The Principality of Wales has usually been bestowed by patent investiture, though in a few instances the heir to the throne has become Prince of Wales simply by being so declared The Earldom of Chester was made a principality for the King's eldest son in 1393, and has since the accession of Henry IV been annexed to the Principality of Wales On the death of a Prince of Wales in his father's lifetime, the title has been conferred on the heir apparent As heir of the crown of Scotland, the eldest son of the sovereign is Prince and High Steward of Scotland, Duke of Rothesay, Earl of Carrick, Baron of Renfrew, and Lord of the Isles As heir to the crown of Ireland the Prince of Wales bears the title of Earl of Dublin, created in 1849

WALES, UNIVERSITY OF An institution of higher education, established in 1893 by the union of the three colleges of Aberystwyth, Bangor, and Cardiff These colleges had been founded, originally, in 1872, 1883, and 1885, and previous to their unification gave no degrees, though their work was accepted as partially equivalent for the degrees in English, Scotch, and Irish universities Aberystwyth was founded and is largely patronized by the dissenting churches The two others are free and give no theological work Instruction for women is provided The administration of the university is in the hands of a council composed of representatives from various county political and educational boards of Wales, and of a senate consisting of members of the instructing staff The senate recommends to the council, with whom the chief control lies There was a combined faculty in 1914–15, a war year, of 180 and an attendance of 1080 The normal attendance is about 1400 Consult Davies and Jones, *The University of Wales and its Constituent Colleges* (London, 1905)

WALEWSKI, vȧ'lĕf'skē', ALEXANDRE FLORIAN JOSEPH COLONNA, Count and Duke (1810–68) A French statesman He was the son of Napoleon I and the Polish Countess Walewska, and was born at Walewice, Poland When the revolt of 1830 broke out in Poland he joined the Polish army, and after the capitulation of Warsaw (September, 1831) he went to France He held a captaincy in the French army, but soon gave it up for literature and politics He went to Egypt on a diplomatic mission, held appointments under the Guizot Ministry, was chargé d'affaires in Argentina in 1848, then was envoy at Florence and at Naples, and in 1854 at London He became Minister of Foreign Affairs in 1855, and as French plenipotentiary presided over the Congress of Paris in the following year He was appointed Minister of State in 1860, and retired in 1863 He was made a duke in 1866 and was president of the Legislative Assembly in 1866–67 His published writings include *Un mot sur la question d'Afrique* (1837), *L'Alliance anglaise* (1838), and a drama, *L'Ecole du monde* (1840)

WALFISH (wôl'fĭsh) **BAY** A possession of Great Britain on the west coast of Africa, forming a part of the Cape Province of South Africa, but situated as an enclave in German Southwest Africa, 400 miles north of the mouth of the Orange River It is named from the bay on which it borders (Map Cape of Good Hope, A 4) It consists of a small peninsula, and a sandy stretch of territory on the mainland Area, 430 square miles It has a harbor, which is a free port, and is the best on the coast of Damaraland and Namaqualand Pop, 1911, 3076, of which 1638 were whites The chief settlements are Sandfontein and Scheppmansdorf The territory was acquired by Great Britain in 1878

WALFORD, wȧl'fērd, MRS LUCY BETHIA (1845–1915) A British novelist, the youngest daughter of John Colquhoun, born at Portobello, near Edinburgh, Scotland In 1869 she married Alfred Saunder Walford of Cranbrooke Hall, in Essex She began her long series of novels with *Mr Smith* (1874) Among others are *A Stiffnecked Generation* (1888), *The Mischief of Monica* (1891), *The Matchmaker* (1893), *Iva Kildare* (1897), *The Archdeacon* (1899), *One of Ourselves* (1900), and *Charlotte* (1901), *The Enlightenment of Olivia* (1907), *Leonore Stubbs* (1908), *David and Jonathan on the Riviera* (1914) Her *Memories of Victorian London* appeared in 1912 Consult her *Recollections of a Scottish Novelist* (New York, 1910)

WALHALLA See VALHALLA

WALIE, wā'lĭ See IBEX

WALKE, wąk, HENRY (1808–96) An American naval officer, born in Princess Anne Co, Va He entered the navy as a midshipman in 1827, was commissioned lieutenant in 1839, and served in the bomb brig *Vesuvius* in the Mexican War In November, 1861, he commanded the gunboats *Taylor* and *Lexington* at the battle of Belmont, Missouri, and later commanded the *Carondelet* at the bombardment of Fort Henry and Fort Donelson With the same vessel he took part in the bombardment above Island No 10 on March 17, 1862, on April 4th ran past the batteries (see ISLAND NUMBER TEN), captured a battery opposite Point Pleasant two days later, in command of the *Carondelet* and *Pittsburg* captured three batteries below New Madrid, and on April 7th covered the crossing of Pope's army In the following May he participated in the battle of Fort Pillow, a Confederate victory, and in June in the battle of Memphis, in which the Federal fleet was successful In the following month he was commissioned captain He participated in command of the *Lafayette* in the operations against Vicksburg and Grand Gulf, and accompanied Porter's first expedition up the Red River In 1864 he was sent with the *Sacramento* to Europe, relieved the *Kearsarge*, and blockaded the *Rappahannock* in the port of

Calais. He was commissioned commodore in 1866 and rear admiral in 1870, and retired in 1871. He published *Naval Scenes in the Civil War* (1877).

WALKEM, wak'em, GEORGE ANTHONY (1834–1908). A Canadian political leader and jurist. He was born at Newry, Ireland, came to Canada in his youth, and was educated at McGill University. He was called to the bar of Lower Canada in 1859, of Upper Canada in 1861, and of British Columbia in 1864 He was a member of the Legislative Council in 1864–70, took an active part in effecting the entrance of British Columbia into the Dominion of Canada as a province in 1870, and was elected a member of the Provincial Legislature Later he was a member of the Cabinet (1872–74), Premier (1874–76), leader of the opposition (1876–78), again Premier (1878–82), and in the latter year was appointed a puisne judge of the Supreme Court. During his second premiership he did much to further the construction of the Canadian Pacific Railway in British Columbia.

WALKER, wą'kēr, AMASA (1799–1875). An American economist, born at Woodstock, Conn. From 1820 to 1840 he was engaged in business, retiring in 1840 from commercial life. In 1842–48 he lectured on political economy at Oberlin College; in 1853–60 was examiner on political economy at Harvard; and in 1859–69 lecturer on political economy at Amherst. In 1843 he was delegate to the First International Peace Congress at London, and in 1849 delegate to the Peace Congress at Paris. He was elected to several political offices, among them that of Secretary of State of Massachusetts (1851–53), and Representative in Congress (1862–63). He was a frequent contributor to periodical literature, especially on financial subjects, on which his authority was regarded as of the highest. His principal work was *Science of Wealth* (1866), a manual of political economy which became very popular. For his son, see WALKER, FRANCIS AMASA.

WALKER, SIR BYRON EDMUND (1848–1924). A Canadian financier. He was born in Haldimand Co., Ontario. Entering the Canadian Bank of Commerce in 1868, he was appointed general manager in 1886, a director in 1906, and president in 1907. He was elected president of the Canadian Bankers' Association, president of the Canadian Institute (1898–99), and chairman of the board of governors of Toronto University in 1910, in which year he was knighted. He published: *The Canadian System of Banking* (1890); *Banking in Canada* (1893); *A Canadian View of the Financial Situation in the United States* (1895); *Why Canada is Against Bi-metallism* (1897); *Canadian Surveys and Museums* (1900).

WALKER, CHARLES HOWARD (1857–). An American architect, born in Boston. He studied in the Massachusetts Institute of Technology, and was a member of the Archæological Institute of America expedition to Assos in Asia Minor in 1881. After two years of travel in Europe he established himself in the practice of architecture in Boston and from 1889 to 1900 was a member of the firm of Walker and Kimball, to which firm was committed the chief work of design of the Omaha Exhibition in 1898. Walker also served on the board of architects of the Louisiana Purchase Exhibition (q.v.) in 1902–04. From 1902 to 1913 he was director Fine Arts, Boston, he served on the National Fine Arts Commission appointed by President Roosevelt in 1909; was president of Metropolitan Improvement League of Boston (1909–13) and from 1887 was instructor and professor of the history of ornament in the Massachusetts Institute of Technology He became editor of the (Boston) *Architectural Review*, and published *Parish Churches of England* (1915).

WALKER, FRANCIS AMASA (1840–97). An American economist, born in Boston, the son of Amasa Walker (q.v.). He graduated at Amherst in 1860 and began to study law In the Civil War he rose to be lieutenant colonel and brevet brigadier general. From 1865 to 1868 he taught Latin and Greek at Williston Seminary; in 1868 he was on the staff of the Springfield *Republican*. In 1869 he was placed in charge of the Bureau of Statistics of the Treasury Department, in 1870 became superintendent of the Ninth Census, and in 1872 was appointed Commissioner of Indian Affairs. In 1873–81 he occupied the chair of political economy and history at the Sheffield Scientific School of Yale and in 1877–79 he was lecturer at Johns Hopkins University. In 1878 he represented the United States at the Monetary Conference in Paris. He was appointed superintendent of the Tenth United States Census in 1880, and from 1881 till his death was president of the Massachusetts Institute of Technology. The Walker Memorial, a students' clubhouse and one of the new Technology buildings on the Charles, was dedicated in 1916. From 1882 to 1897 he served as president of the American Statistical Association, and in 1885–92 as president of the American Economic Association. A prolific writer, especially on economic topics, Walker was one of the foremost advocates of international bimetallism. In economic theory he is regarded as an original and powerful thinker, and his treatment of wages and profits has had a profound influence upon economic theory. Indeed, the development of interest in economics in America is in a large measure the result of his work. His principal writings are *The Indian Question* (1874); *The Wages Question* (1876); *Money* (1878); *Money in its Relation to Trade and Industry* (1879); *Political Economy* (1883); *Land and its Rent* (1883); *History of the Second Army Corps* (1886); *Political Economy* (3d ed., 1888); *Life of General Hancock* (1894); *The Making of the Nation* (1895); and *International Bimetallism* (1896). Consult C. D. Wright, *Francis Amasa Walker*, with bibliography (Boston, 1897); G. F. Hoar and C. D. Wright, *Francis Amasa Walker* (Washington, 1898).

WALKER, FREDERICK (1840–75). An English figure and landscape painter and illustrator He was born in Marylebone, London, and his earliest studies consisted in drawing the Elgin marbles in the British Museum, the influence of which may be seen in all of his works. In 1858 he joined the Royal Academy schools and later was employed by Whymper, a line engraver, with whom he remained two years. He soon became well known as an illustrator, especially for the works of Thackeray, whose friendship he formed at this time, but he finally relinquished engraving in 1865. His few oil paintings include: "The Wayfarers" (1866) "Vagrants" (1868, National Gallery); and "Harbor of Refuge" (1872, Tate Gallery). But i

prized, that the full charm of his painting appears—the sureness and delicacy of drawing, bloom of color, and poetic grace of form and movement. "Philip in Church" (1863), "A Rainy Day at Bisham," "The Violet Field," and a version of "The Harbor of Refuge," are good examples. Walker was an associate of the Royal Academy (1871), and received a gold medal at Paris in 1863. He is supposed to be the prototype of Little Billee in Du Maurier's *Trilby*.

WALKER, GEORGE (?1618–90). An Irish clergyman, distinguished for the part he took in the heroic defense of Londonderry against the army of James II in 1689. He was born in the county of Tyrone, of English parents, was educated at the University of Glasgow, and, entering the Church, became rector of Donaghmore. When the army of James II entered Ulster and took possession of Kilmore and Coleraine, Walker sought refuge in Londonderry. The town was not fortified sufficiently to oppose regular troops, and Lundy, the governor, prepared to surrender to the enemy. Some of his officers protested against this course, and the citizens determined not to yield, Walker encouraging them to fight to the last. The siege began in April and lasted till the end of July. The inhabitants were reduced to the greatest extremities by hunger, but they were sustained to the last by the inspiring sermons preached to them by Walker in the cathedral, and the example he and Captain Campbell set in heading sallying parties. After the raising of the siege Walker was made Bishop of Derry by the King. Walker was present at the crossing of the river at the battle of the Boyne, and was killed. He published *A True Account of the Siege of Londonderry* (1689; new ed. by Philip Dwyer, 1893).

WALKER, HENRY OLIVER (1843–). An American figure and mural painter. He was born in Boston and studied in Paris under Bonnat. Upon his return to America he settled in New York, exhibiting ideal figure compositions of poetic beauty and refined feeling. Good examples are "Eros et Musa" and "Musa Regina" (National Gallery, Washington); "Morning Vision" (Metropolitan Museum, New York). But he is chiefly known for mural decorations, the most important including a series of lunettes in the Library of Congress, Washington; "Wisdom Attended by Learning" (Appellate Court, New York); and panels in the Massachusetts State House, Boston, and the Essex County Courthouse, Newark, N. J. He was elected a member of the National Academy of Design in 1902 and of the National Institute of Arts and Letters, and received a gold medal at Charleston in 1902.

WALKER, HORATIO (1858–). A Canadian animal, figure, and landscape painter, chiefly identified with the American school. He was born in Listowel, Ontario, and after studying miniature painting with J. A. Fraser in Toronto he went to New York in 1885. Although influenced by the Barbizon painters, he was practically self-taught. His favorite subjects are taken from the lives of the descendants of the Canadian-French colonists, who retain in an uncommon degree the characteristics and habits of their fathers. His work is characterized by a largeness of composition, a solidity of treatment, and a powerfulness that are responsible for comparison with Troyon (q.v.), while the sentiment with which he portrays his peasants has something of the elemental feeling of Millet. His technique is brilliant, the color rich and glowing, with fine tonal and atmospheric effects. Good examples are: "The Harrower" (two paintings), (Metropolitan Museum, New York), "Oxen Drinking," "Ave Maria" (Corcoran Gallery, Washington); "Sheepyard, Moonlight" (National Gallery, Washington); "Sheepshearing" (Albright Art Gallery, Buffalo), "The Woodcutter" and "Milking" (St. Louis Museum). Walker was elected to the National Academy of Design in 1891, to the National Institute of Arts and Letters, and to the Royal Institute of Painters in Water Color, England. His numerous awards include gold medals at New York (1887), Chicago (1893), Buffalo (1901), Charleston (1902), St. Louis (1904), Pennsylvania Academy of Fine Arts, Philadelphia (1906), and the Panama-Pacific Exposition, San Francisco (1915).

WALKER, SIR HOVENDEN (c1656–1728). A British naval officer, born in Queen's County, Ireland. He seems to have entered the royal navy at an early age. In 1702, as acting commodore, he commanded a squadron that sailed to the West Indies and took part in the attack on Guadeloupe. In 1706 in the *Cumberland* he assisted Sir John Leake in the relief of Barcelona. In 1707–08 he was captain-resident at Plymouth. In 1710 he was promoted to be rear admiral of the white and was knighted, and in April was appointed to command the "secret" expedition against Quebec, which proved a failure. In 1711 Walker was appointed commander in chief in Jamaica. After the accession of George I Walker's name was removed from the list of admirals, ostensibly because of the failure of the Quebec expedition, but probably because of suspected Jacobitism. He subsequently spent several years in South Carolina as a planter, but before his death returned to his family estates in Ireland. He published *A Journal, or Full Account of the Late Expedition to Canada* (1720).

WALKER, JAMES (1794–1874). An American educator. He was born at Burlington, Mass., graduated at Harvard College in 1814, studied divinity, and was settled over the Unitarian church in Charlestown (1818–39). He was professor of moral and intellectual philosophy in Harvard College (1839–53), and its president (1853–60). In 1831–39 he served as editor of the *Christian Examiner*. He published for undergraduate use editions of Stewart's *Philosophy of the Active and Moral Powers* (1849) and Reid *On the Intellectual Powers* (1850); *Sermons* (1861); *Memoir of Daniel Appleton White* (1863); and *Memoir of Josiah Quincy* (1867). A *Memorial* appeared at Cambridge in 1875.

WALKER, JAMES BARR (1805–87). An American religious writer. He was born in Philadelphia; studied law at Ravenna, Ohio; and graduated at Western Reserve College, Hudson, Ohio, in 1831. After being editor of several religious papers he studied theology and was licensed as a Congregational preacher in 1841. He established a private orphan asylum at Mansfield, Ohio, and was lecturer at Oberlin College and Chicago Theological Seminary on harmony between science and revealed religion. He published *Philosophy of Skepticism and Ultraism* (1857); *Philosophy of the Divine Operations in Human Redemption* (1862); *Poems* (1862); *The Living Questions of the Age* (1869); *Doctrine of the Holy Spirit* (1870).

WALKER, JOHN (1732–1807). An English lexicographer and actor, born at Colney Hatch, Middlesex. He played at first in provincial companies and afterward under the management of Garrick at Drury Lane. In 1758 he joined the company of Barry and Woodward to open the Crow Street Theatre, Dublin His chief rôles were tragic, especially noteworthy being his Cato and Brutus. In 1762 he again appeared in London at the Covent Garden Theatre, but five years later he returned to Dublin In 1768 he left the stage, and the following year he opened a school at Kensington Gravel-pits in partnership with James Usher, through whose influence he left the Presbyterian for the Roman Catholic church. The school failed after two years, however, and Walker then began to lecture on elocution, and made several tours. His most permanent work was his *Critical Pronouncing Dictionary and Expositor of the English Language* (1791, of which more than 40 editions have been issued). This long remained the standard and is still of interest as giving the pronunciations in vogue at the beginning of the nineteenth century. His other works include *Rhyming Dictionary of the English Language* (1775; revised by J. Longmuir, 1890 and 1904); *Elements of Elocution* (2 vols., 1781; 8th ed, 1838); *Hints for Improvement in the Art of Reading* (1783); *Rhetorical Grammar* (1785; 7th ed, 1823); *Melody of Speaking Delineated* (1789); *Key to the Classical Pronunciation of Greek and Latin Proper Names* (1798; 9th ed., 1833); *Teacher's Assistant in English Composition* (1801–02), reprinted as *English Themes and Essays* (11th ed, 1853); and *Outlines of English Grammar* (1805; 2d ed, 1810).

WALKER, JOHN GRIMES (1835–1907). A United States naval officer, born in Hillsboro, N. H. He graduated at Annapolis in 1856, was promoted lieutenant in 1858, and was instructor in mathematics in the Naval Academy in 1859–60. He served on the *Winona* in Farragut's expedition against New Orleans, was promoted lieutenant commander in July, 1862, and in command of the iron-clad river steamer *Baron de Kalb* participated in the operations against Vicksburg. After the fall of that city he led the expedition up the Yazoo River, and while engaging Confederate batteries his vessel was sunk by a torpedo. He was then transferred to the Atlantic coast, and as commander of the *Shawmut* assisted in the capture of Wilmington in 1865. He was promoted commander in 1866, captain in 1877, and in 1873–78 was secretary of the Lighthouse Board. He became chief of the Bureau of Navigation in 1881 and in 1889 became a commodore. From 1889 till 1893 he commanded the White Squadron, in 1894 was put in command of the Pacific Squadron and was sent to protect American interests in the Sandwich Islands, in the same year was commissioned rear admiral, and in 1897 was retired. In the latter year he was appointed president of the Nicaragua Canal Commission and in 1899 president of the Isthmian Canal Commission.

WALKER, LEROY POPE (1817–84). A Confederate Secretary of War, born at Huntsville, Ala., and educated at the universities of Alabama and Virginia. He was admitted to the bar, was several times a member of the State Legislature, being Speaker of the House in 1847–50, and was judge of the Fourth Circuit Court in 1850–53. In February, 1861, he was made Secretary of War in the Confederate cabinet, but resigned in September. After the fall of Fort Sumter he made a speech in which he is said to have declared that before the war closed the Confederate flag would be flying in triumph over Independence Hall, Philadelphia, and over Faneuil Hall, Boston. This reported official utterance, whether true or not, was taken as a note of defiance and did much to rouse the North. After he resigned he was made a brigadier general, and was for a time in command of Mobile, but in 1862 he retired from the army, and during the remainder of the war served as judge of a military court.

WALKER, MARY E(DWARDS) (1832–1919). An American physician and dress reformer, born at Oswego, N Y. She graduated at the Syracuse Medical College in 1855, and practiced at Columbus, Ohio, and later at Rome, N. Y. When the Civil War broke out she became an assistant army surgeon, being the first woman to hold such a commission, for her bravery and services on the field a medal of honor, which she always wore, was awarded to her by Congress. An enthusiastic advocate of woman suffrage, she did much to advance the cause in the United States and in England and claimed to have been the first woman to attempt to vote at the polls. Dr. Walker zealously urged dress reform for women, and during her later life wore male attire habitually. She finally retired to her estate near Oswego, where she founded a hospital for consumptives.

WALKER, ROBERT JAMES (1801–69). An American political leader and financier, born at Northumberland, Pa. He graduated at the University of Pennsylvania in 1819, and began the practice of law at Pittsburg in 1822. In 1826 he removed to Mississippi and became prominent as a lawyer and land speculator. He was active in his opposition to nullification and secession in 1832–33, and through his influence the Legislature passed an act declaring nullification treasonable. In 1835 he was elected United States Senator as a Unionist Democrat, and at once became known as one of the foremost anti-slavery advocates in his party. He is said to have secured great influence over President Tyler, and is credited by some with having been largely instrumental in causing his return to the Democratic party. While in the Senate he opposed the Bank of the United States and the distribution of the surplus, advocated gradual emancipation, and introduced the resolution for Texan independence. From 1845 to 1849 he was Secretary of the Treasury. The tariff bill of 1846, providing for a strictly revenue basis, was adopted almost as it came from his hands, and is known as the "Walker Tariff." In 1853 he declined the post of commissioner to China, and in 1857, against his will, was appointed Governor of Kansas Territory. He resigned in 1858, declaring that he would not help to force slavery upon the Territory. At the beginning of the Civil War he took strong ground in favor of the Union, negotiated a loan in Europe for the United States in 1863–64, and was instrumental in preventing the success of the second Confederate loan. On his return he published a number of articles opposing the impeachment of President Johnson, advocating the Alaska treaty, and favoring the construction of the Pacific Railroad.

WALKER, SEARS COOK (1805–53). An

American astronomer, born in Wilmington, Mass He graduated at Harvard College (1825), and for some time taught school near Boston. In 1828 he removed to Philadelphia, where he taught till 1835, and afterward became actuary of an insurance company. In 1837 he prepared a plan for an observatory in connection with the Philadelphia high school In 1845 he was appointed to the Naval Observatory, took charge of the longitude work of the United States Coast Survey (1847), and remained in this department of the United States government He improved the electric chronograph (q.v.) and made an investigation of the orbit of Neptune

WALKER, THOMAS LEONARD (1867–). A Canadian geologist He was born in Peel County, Ontario, and graduated at Queen's University, Kingston, in 1890, and at Leipzig (Ph.D) in 1895 He was an assistant on the staff of the Canadian geological survey (1890–93), assistant superintendent of the geological survey of India (1897–1902); lecturer in geology at the Presidency College, Calcutta (1898); and in 1902 was appointed professor of mineralogy in Toronto University. While in India he made a scientific expedition across the Himalaya into Tibet. He contributed frequently to scientific periodicals.

WALKER, TIMOTHY (1806–56). An American lawyer, born at Wilmington, Mass. He graduated from Harvard in 1826; taught mathematics for three years; studied in the Harvard Law School (1829–30); and three years later, in association with Judge John C. Wright, he established the Cincinnati Law School, in which he was a professor of law until 1844. He was presiding judge of the Hamilton County Court of Common Pleas (1842–43). He edited the *Western Law Journal* for several years His lectures on law and his chief work, *An Introduction to American Law*, have always been popular with law students. He died at Cincinnati in 1856.

WALKER, WILLIAM (1824–60). An American adventurer and filibuster, born in Nashville, Tenn. He graduated at the University of Nashville in 1838 and was admitted to the bar, after which he studied medicine at Edinburgh and Heidelberg, and later engaged in newspaper work in New Orleans and San Francisco. In the summer of 1853 he organized an expedition for the conquest of the Mexican State of Sonora He eluded the United States authorities, landed with an armed force at La Paz, in Lower California, in November, captured several towns, proclaimed himself President, and began a march inland. His provisions and ammunition ran short, and to escape falling into the hands of a Mexican force sent against him he crossed into the United States, and surrendered to United States officials at San Diego. He was tried at San Francisco for violation of neutrality, but was acquitted. He next planned an expedition to Nicaragua, then in a state of civil war. He landed at Realejo June 11, 1855, and succeeded in capturing Granada and making an arrangement with General Corral, the President, by which Walker was appointed Secretary of War and commander in chief. The two leaders soon quarreled and Walker had Corral tried for conspiracy and shot. Walker was then in complete control of Nicaragua, of which, after a short and successful war with Costa Rica, he had himself proclaimed President. His rule soon became arbitrary, however, and provoked an insurrection, resulting in his expulsion from Granada. To save himself he surrendered, May 1, 1857, to Commander C H. Davis of the United States sloop *St. Mary's*, by whom he was conveyed to New Orleans, and put under bonds there to keep the peace In November, 1857, he was again in Nicaragua with a strong force of Americans and natives, but was again driven from the country Late in 1858 he started with a force of adventurers for Honduras, but a shipwreck caused him to abandon the expedition In June, 1860, he made a second attempt, landed at Ruatan on August 15, and captured Truxillo (Trujillo), but was compelled to flee, and subsequently surrendered himself to the captain of the British sloop of war *Icarus*, by whom he was handed over to the Honduran government. He was condemned by court-martial at Truxillo and shot there on Sept. 12, 1860 He wrote *The War in Nicaragua* (1860) Consult also Doubleday, *Reminiscences of the Filibuster War in Nicaragua* (1886), and W. O. Scroggs, *Filibusters and Financiers* (1916).

WALKER, WILLIAM DAVID (1839–). An American Protestant Episcopal bishop, born in New York City. He graduated from Columbia in 1859, and from the General Theological Seminary in 1862, and was vicar of Calvary Chapel, New York City, in 1862–83 Thenceforth he served as Missionary Bishop of North Dakota until 1896, when he was appointed Bishop of Western New York. While in North Dakota he originated the cathedral car, by means of which it was possible to conduct the services of the church at places that could not otherwise be reached. In 1887 he was appointed by the President a member of the United States Board of Indian Commissioners. He served as select preacher to the University of Cambridge and received honorary degrees from Oxford and Columbia universities

WALKER, WILLIAM HULTZ (1869–). An American chemist. He was born in Pittsburgh, Pa., and graduated in 1890 at Pennsylvania State College and took his Ph.D. at Göttingen (1892). In 1894 he accepted the chair of industrial chemistry at the Massachusetts Institute of Technology, where from 1908 he was also director of the research laboratory of applied chemistry. Walker was a vice president of the International Congress of Applied Chemistry in 1893 and president of the American Electrochemical Society in 1910. The New York Section of the American Chemical Society conferred on him its Nichols medal in 1908. As an authority on industrial chemistry he takes high rank; indeed, he contributed largely to the development of that science in the United States

WALKER, WILLIAM SIDNEY (1795–1846). A British Shakespearean critic, born at Pembroke, Wales. He graduated at Trinity College, Cambridge, in 1819, and was a fellow of Trinity in 1820–29. During his later years he was at times insane He published numerous poems and other literary productions, but his great work consisted in his studies of Shakespeare's plays. Part of the results of these studies were published posthumously under the title *Shakespeare's Versification* (1854; 3d ed., 1859). There followed *A Critical Examination of the Text of Shakespeare* (3 vols., 1860). The works are poorly arranged, but they have been invaluable to later commentators, especially as regards points of prosody and syntax.

WALKER, WILLISTON (1860–1922) An American Church historian, born at Portland, Me. He graduated at Amherst in 1883, and at the Hartford Theological Seminary in 1886; then studied at Leipzig (Ph D, 1888), and was professor of Church history at Hartford Seminary from 1889 to 1901, when he accepted a similar chair at Yale University. Walker became a contributor to the NEW INTERNATIONAL ENCYCLOPÆDIA His publications include: *On the Increase of Royal Power under Philip Augustus* (1888); *The Creeds and Platforms of Congregationalism* (1893); *A History of the Congregational Churches in the United States* (1894); *The Reformation* (1900); *Ten New England Leaders* (1901); *John Calvin* (1906); *Great Men of the Christian Church* (1908); *French Trans-Geneva* (1909).

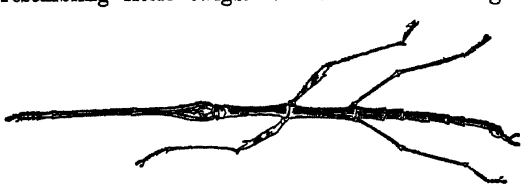
WALKERVILLE. A town in Essex County, Ontario, Canada, on Detroit River, opposite Detroit, Mich., and on the Grand Trunk, Michigan Central, and Canadian Pacific railways (Map: Detroit, F 8). It has important industries, including large distilling plants. Pop., 1901, 1579; 1911, 3302.

WALKING FERN. A small evergreen fern (*Camptosorus rhizophyllus*) which grows in tufts and whose heart-shaped and very tapering leaves often take root at the apex and thus form new plants, hence the popular name. It is a native of eastern North America, but is rather rare. See Colored Plate of FERNS.

WALKING FISH. One of the curious eel-like fishes of the snake-head family (Ophiocephalidæ), numerously represented in the fresh waters of the East Indies and China. They are elongated, reaching in some cases a length of 4 feet, and have a snakelike head covered with shieldlike scales. Their respiratory apparatus is double, as they must be able to breathe air direct, and their habit of occasionally going out upon land has given them the name "walking fish" in India. They are common in tanks and ponds, where they lie at the margin with the head out of water. They breed twice a year, preparing a nest for the eggs, which the male guards, and survive droughts by burying themselves in the mud. Consult Day, *Fauna of India: Fishes* (London, 1889).

WALKING LEAF. See LEAF INSECT; WALKING STICK.

WALKING STICK. An insect of the orthopterous family Phasmidæ, especially one of those forms destitute of wings, in which the body is long, slender, and cylindrical like a small stick, the legs being slender and delicate, and resembling little twigs. Some of the walking



WALKING-STICK INSECT.

sticks proper, which are more abundant in the tropics than elsewhere, reach a length of 9 inches or more. From their resemblance to twigs and leaves, the terms walking leaf and leaf insect (q.v.) are often applied to them. Some slender species look like stems of grass; others resemble bark covered with lichens; others [illegible] is carried to an extreme—the legs and antennæ, and even their attitudes, enhance the resemblance to vegetable structures. The eggs are strangely shaped and resemble plant seeds, each being surrounded by a capsule. They are dropped loosely on the ground, remaining during winter. The adults are voracious, and are plant feeders throughout their entire growth. A North American species (*Diapheromera femorata*) feeds on the leaves of several trees (especially upon walnuts), and when numerous may cause defoliation. If a leg be cut off beyond the femur and trochanter joint, the parts remaining outside the joint are dropped before the next molt and are afterward renewed either as a straight, short stump or as a miniature leg nearly resembling the normal one. A leg cut off nearer the body is not replaced. Phasmidæ have been found in the fossilized amber, in the Tertiary strata in North America, and in the Carboniferous rocks there occur remains of gigantic insects possibly connected with this group

WALKLEY, wâk'lĭ, ARTHUR BINGHAM (1855–1926). An English dramatic critic, born in Bristol, and educated at Balliol and Corpus Christi colleges, Oxford. He held important positions in the British postal service, but it was by his dramatic criticism that he became known over the English-speaking world to all interested in contemporary British dramatic and theatrical activities He proved himself a sound and scholarly critic in his notices for the London *Times* and in contributions to various journals and reviews. In book form appeared *Playhouse Impressions* (1892); *Frames of Mind* (1894); *Dramatic Criticism* (1903); *Drama and Life* (1907).

WALKÜRE, väl'kü-re, DIE. The second division of Richard Wagner's music drama *Der Ring des Nibelungen* (see RING OF THE NIBELUNGEN). It was first produced in Munich, June 26, 1870; in the United States, April 2, 1877 (New York).

WALKYRIES, väl-kĭr'ĭz. See VALKYRIES.

WALL. A vertical structure forming a partition, inclosure or dividing member, or a solid barrier for defense; especially and more generally such a structure built of masonry of stone, brick, or concrete; but the term is also applied, irrespective of material, to the vertical inclosing structure of a wooden house, to its internal partitions of studding, lath and plaster, which form the walls of its rooms; and in anatomy and biology to the partitions and inclosing membranes of the organs of animals and human beings.

In architecture the term connotes either the structure itself or one of its surfaces. Thus the inner face of the outer wall of a building may be the east wall of the drawing room, or south wall of the front chamber, etc. The inclosing wall of a building is its exterior wall; the interior dividing walls are called partitions. The wall dividing two houses in a city block and thus common to both is a party wall, the wall at right angles to the ridge or pitch of the roof is in some cities called a gable wall irrespective of the form of the roof. Retaining walls are massive walls of masonry erected to hold back the earth of an embankment or terrace. A bearing wall is one which supports the beams of a floor or roof. In former times, i.e., previous to 1889, the walls of a building were depended upon to carry the floors and roof, and were built from the foundations up. In modern steel skeleton construction (q.v.) the

walls of each story are separately supported on steel lintels carried by the posts of the skeleton, and are thus mere screens of brick or stone, about 12 inches thick

Walls for defense, with gates and towers at intervals, were in ancient days the chief reliance of cities for protection against invasion. Such walls were high and massive, sometimes forming a double or triple circuit with an exterior moat. Those of Troy, Thebes, and Babylon were the most famous in classical antiquity; those of Constantinople, of Avignon, Carcassonne, and Aigues Mortes in France, of Gothenburg in Germany, and of Lucerne in Switzerland, are the finest of mediæval examples now extant. The most colossal of all such walls is the Great Wall of China. See BRICKWORK; BUILDING, CHINESE WALL, MASONRY; MILITARY ARCHITECTURE.

WALLABY, wŏl'a-bĭ (Australian name). A local name for the small kangaroos of Australia, especially of the genus *Petrogale* (rock kangaroos) and the genus *Macropus* (formerly *Halmaturus*). Some are of large size, but the true wallabies are small. One of the most striking is the black-gloved wallaby (*Macropus irma*), of which Gould said that if its fore feet and the tips of its ears had been carefully dipped in ink they could not be any blacker. The name is not restricted to these genera, however; there are the nail-tailed wallaby, genus *Onythogala*, the hare wallabies (*Lagoschestes*), the banded wallaby (*Lagostrophus*), etc. See Plate of KANGAROOS.

WALLACE. A city and the county seat of Shoshone Co., Idaho, 130 miles (direct) east of Spokane, Wash., on the Northern Pacific and the Oregon-Washington Railroad and Navigation Company lines (Map: Idaho, C 2). It is the centre of the Cour d'Alene mining district. Wallace was incorporated in 1892. Pop., 1900, 2265; 1910, 3000.

WALLACE, ALFRED RUSSEL (1823–1913). An English naturalist and philosopher. He was born at Usk, Monmouthshire, and fitted himself for work as a surveyor and engineer. He then became English master in the Collegiate School at Leicester. Interested in botany and insects, he was greatly aroused by Darwin's *Journal*, and other books. Early in 1848 he sailed with H. W. Bates (q.v.) for Pará. In 1850 Bates and Wallace parted company, finding it more convenient to explore separate districts and collect independently. Wallace took the tributaries of the Amazon. He returned to England in 1852, but his collection and notes were lost by shipwreck. *Travels on the Amazon and Rio Negro* (1853; new ed., 1911) is a popular account of these experiences. In 1854 Wallace went to the Malayan Archipelago, where he traveled and collected for eight years from Malacca to New Guinea. He studied the ethnological relations, collected the vocabularies of 75 native dialects, and made numerous measurements of the aboriginal crania, besides studying the habits of the orang-utan and the birds of paradise.

Wallace during his residence at Sarawak wrote in February, 1855, an essay *On the Law Which Has Regulated the Introduction of New Species*, which was published in September, 1855, though he remarks that 10 years previous the idea of such a law suggested itself to him. But beyond vaguely stating that in the method of peopling of the earth the process was gradual, and that no new creation was formed widely differing from anything before existing, the essay only shows that its author was keenly alive to a search for the causes of evolution. But light was shed upon the subject by Malthus's *Essay on Population;* and it was by reading this suggestion that Wallace, like Darwin, hit upon the doctrine of natural selection (q.v.). In February, 1858, while at Ternate, he wrote his famous essay *On the Tendency of Varieties to Depart Indefinitely from the Original Type.* It led to the publication of Darwin's preliminary essay, and the two papers were published in the *Proceedings* of the Linnean Society of London for August, 1858. In this Wallace discusses the nature of varieties, the struggle for existence, perpetuation of species, useful and useless variations, and the partial reversion of domesticated varieties, although he does not use the term "natural selection," which we owe to Darwin. Wallace did no work in the anatomy, embryology, and morphology of animals, but his contributions to bionomics, or the relations of animal life to the world around it, were important.

To Wallace we are indebted for a comprehensive and epoch-making work in zoögeography. Strongly inclined to speculation, he gave in his *Tropical Nature* (1878) and *Island Life* (1880; 3d ed., rev., 1911) many valuable suggestions regarding the effect of geological and climatic changes on animal life. He was apparently for a while a believer in miracles and spirit manifestations. This tendency led him to deny that man's moral and spiritual nature has, like his physical being, been evolved by a natural process. His reputation will mainly rest on his discovery of natural selection. His native amiability and high mindedness of character were shown by his rare self-abnegation of any claim for the discovery of natural selection, and by his uninterrupted friendship with Darwin. Darwin and he differed, however, on the subject of psychic phenomena, which greatly interested Wallace. During the latter part of his life Wallace lived in a rural part of England enjoying a moderate pension from the government, bestowed in recognition of his work in natural history. He died on Nov. 7, 1913.

Wallace's most important works, are, besides the 1858 essay, his epoch-making paper "On the Phenomenon of Variation and Geographical Distribution as Illustrated by the Papilionidæ of the Malayan Region," published in the *Transactions of the Linnean Society of London* (1865); *Contributions to the Theory of Natural Selection* (1870); *The Malay Archipelago* (2 vols., 1869); *The Geographical Distribution of Animals* (2 vols., 1876); *Tropical Nature* (1878); *Darwinism* (1889). Other works are: *Miracles and Modern Spiritualism* (1875); *Land Nationalization: Its Necessity and Its Aims* (1882; 3d ed., 1902); *Australia and New Zealand* (1893); *Studies, Scientific and Social* (1900); *Man's Place in the Universe* (1903; 4th ed., 1904); *My Life: A Record of Events and Opinions* (2 vols., 1905; new ed., 1 vol., 1908); *Is Mars Habitable?* (1907); *The World of Life* (1911); *Social Environment and Moral Progress* (1913); *The Revolt of Democracy* (1914). Consult James Marchant, *Alfred Russel Wallace: Letters and Reminiscences* (2 vols., London, 1916).

WALLACE, CHARLES WILLIAM (1865–) An American Shakespearean scholar, born at Hopkins, Mo. He taught in normal schools in Iowa and Nebraska and graduated in 1898 from

the University of Nebraska, in connection with which a year earlier he had founded a preparatory school. Of the latter he was principal and director until 1900, and thereafter was a member of the English department of the University, becoming associate professor in 1907. He studied at several German universities (Freiburg, Ph.D., 1906) and carried on extensive researches in European archives. Important documents relating to theatrical conditions in Shakespeare's time, discovered by him especially in the Public Record Office in London, aroused great interest among scholars. These documents formed the basis of Wallace's books. *The Children of the Chapel at Blackfriars, 1579–1603* (1908); *Three London Theatres of Shakespeare's Time* (1909); *Shakespeare and his London Associates as Revealed in Recently Discovered Documents* (1910); *The Evolution of the English Drama up to Shakespeare* (1912), *The First London Theatre, Materials for a History* (1913).

WALLACE, Sir Donald Mackenzie (1841–1919). A British journalist and author, born at Boghead, Dumbartonshire, Scotland, and educated at the universities of Berlin and Heidelberg, and at the Ecole de Droit, Paris. After long residence and much travel abroad (1863–84), especially in France, Germany, Russia, and Turkey, he served as private secretary to two viceroys of India—the Marquis of Dufferin and then to the Marquis of Lansdowne. On his return to London, the direction of the foreign department of the *Times* was in his hands from 1891 to 1899. Wallace edited the tenth edition of the *Encyclopædia Britannica* He was made K.C.I.E. in 1887, and K.C.V.O. in 1901, and became a member of the Institut de Droit International. From his pen came: *Russia* (1877; revised and enlarged eds., 1905 and 1912); *Egypt and the Egyptian Question* (1883); *The Web of Empire* (1902).

WALLACE, Horace Binney (1817–51). An American jurist He was born in Philadelphia, was educated at the University of Pennsylvania and at Princeton, where he graduated in 1835; studied both medicine and law, but never engaged in active practice. With Judge Hare he edited *American Leading Cases; Smith's Leading Cases; White and Tudor's Leading Cases in Equity; British Crown Cases Reserved;* he published a novel, *Stanley, or Recollections of a Man of the World,* and several works of travel. In 1851 he became afflicted with a brain disease and committed suicide.

WALLACE, John Findley (1852–1921). An American civil engineer, born at Fall River, Mass. He graduated C.E. from the University of Wooster in 1882, but had earlier been employed in government improvements on the Mississippi River and in railroad work. From 1891 he served with the Illinois Central, of which he was general manager in 1901–04. Wallace was the first American chief engineer of the Panama Canal (1904), and served as Isthmian Canal commissioner, and as vice president and general manager of the Panama Railroad and Steamship Company (1905). After 1906 he was identified with important corporations. He designed and constructed the World's Fair terminals at Chicago in 1892, and the new passenger terminal in the same city for the Chicago and Northwestern Railroad. He served as president of the American Society of Civil Engineers (1900) and of the American Railway Engineering Association.

WALLACE, John William (1815–84). An American lawyer, law reporter, and author, the son of John Bradford Wallace, a prominent lawyer of Philadelphia. He was born in Philadelphia, Pa, graduated at the University of Pennsylvania in 1833, and studied law in his father's office and at the Inner Temple in London In 1844 he became standing master in chancery in the Pennsylvania Supreme Court, was reporter of the Third Circuit of the United States Circuit Court from 1842 to 1853, and from 1863 to 1876 was reporter of the United States Supreme Court. From 1860 to 1884 he was president of the Pennsylvania Historical Society. He published: *Reporters, Chronologically Arranged, with Occasional Remarks upon Their Respective Merits* (1843), *Cases, Argued and Abridged, in the United States Supreme Court* (23 vols, 1864–76); and *An Old Philadelphian, Colonel William Bradford of 1776* (1884); and edited *British Crown Cases Reserved* (1839–53).

WALLACE, Lewis (1827–1905). An American soldier and novelist, known as Lew Wallace. He was born in Brookville, Ind. He studied law in Indiana, served in the Mexican War, and then practiced law until the Civil War. He served as colonel of a regiment of Indiana volunteers in West Virginia in 1861, and on Sept 3, 1861, was promoted to the rank of brigadier general of volunteers. He distinguished himself at Shiloh and at Corinth, and in 1863 superintended the construction of defenses at Cincinnati, saving the city from capture by Gen. E. K. Smith. Subsequently he commanded the Middle Department and the Eighth Army Corps, and in 1864, although defeated by a superior force, delayed the advance of Gen. Jubal A. Early (q.v.) at Monocacy. He was president of two courts of inquiry (see Buell, D. C.; Andersonville, Ga.) and was a member of the court which tried the Lincoln conspirators. On retiring from the army in 1865 General Wallace resumed the practice of law in Indiana, and was Governor of New Mexico (1878–81) and United States Minister to Turkey (1881–85). Among his novels *The Fair God* (1873) and *The Prince of India* (1893) were fairly successful, while *Ben Hur* (1880), a story of Palestine and Rome in the time of Christ, achieved a remarkable success and was dramatized (1899). His autobiography was published in 1906.

WALLACE, Sir Richard (1818–90). An English art collector and philanthropist He was born in London, and was probably the natural son of Maria, Marchioness of Hertford, though during his lifetime he was reputed to be her grandson. He was educated chiefly in Paris, where the greater part of his life was passed. He was known as an art connoisseur and was much beloved on account of his many benefactions during the Franco-Prussian War. In 1870 he inherited the property and the priceless art collection of the fourth Marquis of Hertford, and on the death of Sir Richard's wife in 1897, this collection was bequeathed to the British nation, and housed in Hertford House, London, as the Wallace collection.

WALLACE, Robert (1853–). A Scottish agriculturist, born in Glencairn, Dumfriesshire, and educated at Edinburgh University. He was professor of agriculture at the Royal Agricultural College, Cirencester, from 1882 to 1885, and thereafter professor of agriculture and rural economy in the University of Edinburgh,

serving also from 1900 as Garton lecturer on colonial and Indian agriculture He traveled extensively, frequently in an official or advisory capacity, and studying the agriculture of various countries. The results of these studies are embodied in reports and in volumes of travels. Wallace, who came to be recognized as an expert in his field, was active in promoting agricultural education in Scotland. His principal writings are: *Farm Live Stock of Great Britain* (1885; 4th ed., 1907); *Indian Agriculture* (1888); *The Agriculture and Rural Economy of Australia and New Zealand* (1891); *Farming Industries of Cape Colony* (1896); *British Breeds of Live Stock* (1910; 1913).

WALLACE, Sir William (c.1270–1305). A Scottish patriot. He was the second son of Sir Malcolm Wallace, a small landed proprietor His biographer, Blind Harry, who lived 200 years later, had access to sources now lost and gives a very full account of the hero; but unfortunately his statements are in some cases self-contradictory, and in many cases improbable. According to this writer Wallace in his youth performed prodigious feats of valor in killing Englishmen. His first authentic appearance was in May, 1297. John de Warenne was then ruling Scotland, as the representative of Edward I of England, and English sheriffs were placed over many of the shires At the head of a band of about 30 men Wallace burned Lanark and killed the English sheriff. Many of the Scotch joined his band, which he quickly formed into a well-disciplined army. He plundered Scone, drove out English priests and friars who held Scottish benefices, and after ravaging much of the country laid siege to Dundee. An English army of over 50,000 was sent against him. At Stirling Bridge, Sept. 11, 1297, Wallace, who had a considerably smaller army, won a great victory. Edinburgh and Stirling soon fell into his power; Roxburgh, Haddington, and other towns were burned. His success was so complete that before October 18 he was invading England. He harried Northumberland, Westmoreland, and Cumberland and returned to Scotland about the end of the year. For a few months he was generally recognized as guardian of the realm. In the meantime Edward I was preparing to reconquer Scotland. On July 22, 1298, he inflicted a crushing defeat upon Wallace at the battle of Falkirk (q.v.). At least 10,000 Scots were killed and Wallace was forced to retreat. From this time we have little knowledge of his actions. He resigned the office of guardian, went to France to seek aid, and may have gone to Rome, but the last is uncertain, as his movements from 1299 to 1303 cannot be traced. In the summer of 1304 it is certain that he was again fighting against Edward; he was especially excluded from the general amnesty offered to the other leaders, and was outlawed. After many attempts to capture him had failed, he was taken by Sir John de Menteith in 1305. On August 23 he was placed on trial in Westminster Hall. He was convicted the same day and condemned to be hanged, drawn, beheaded, and quartered. The sentence was executed on the following day. Blind Harry's *Life of Wallace* has been edited frequently. The best editions are by Jameson (Edinburgh, 1820) and Moir (Scottish Text Society, Edinburgh, 1885–89). Consult: P. F. Tytler, *History of Scotland*, vol. i (Edinburgh, 1866); James Moir, *Sir William Wallace* (Aberdeen, 1886); A. W. Murison, *Sir William Wallace* (Edinburgh, 1898). G. R. Pauli, in his *Geschichte Englands* (Hamburg, 1853), gives a good account of Wallace's services to Scotland.

WALLACE, William (1844–97). A British philosopher, born at Cupar-Fife, Scotland. Educated at the University of St. Andrews and at Balliol College, Oxford, he became a fellow of Merton College in 1867. Appointed tutor at Merton in 1868 and Whyte professor of moral philosophy at Oxford in 1882, he held both offices until his death. His works include: *The Logic of Hegel* (1874; 2d ed., 1894), a translation from Hegel's *Encyclopædia of Philosophical Sciences; Epicureanism* (1880), *Kant* (1882; reprint, 1899); *The Life of Arthur Schopenhauer* (1890); *Lectures and Essays on Natural Theology and Ethics* (1898)

WALLACE, William (1860–1922). A British composer, born at Greenock, Scotland. He studied ophthalmic surgery in Vienna and Glasgow, but later in 1889 entered the Royal Academy of Music in London, where he spent two terms. From the very beginning his compositions, almost exclusively in the larger forms, attracted attention. His principal works include six symphonic poems, *The Passing of Beatrice* (1892), *Amboss oder Hammer* (1896), *Sister Helen* (1899), *Greeting to the New Century* (1901), *Sir William Wallace* (1905), *François Villon* (1909); a symphony, *The Creation* (1899); a choral symphony, *Koheleth* (MS.); an orchestral suite, *Pelléas et Mélisande* (1900); several cantatas, chamber music, and two song cycles. He wrote *The Musical Faculty, its Origins and Processes* (1914).

WALLACE, William Vincent (1813–65). An Irish musician and operatic composer, born at Waterford. After being for some years leader of the orchestra of a Dublin theatre, he emigrated to Australia, and subsequently gave successful concerts there, as also in New Zealand, India, and America. In 1845 he went to England, and wrote his first opera, *Maritana*, which was an immediate success both in London and Vienna. *Matilda of Hungary* followed in 1847. During a sojourn of some years in Germany Wallace continued his musical studies; and after again visiting North and South America composed *Lurline*, which was brought out in London in 1860, with even greater success than *Maritana* In 1861 he produced *The Amber Witch;* in 1862, *Love's Triumph;* and in 1863, the *Desert Flower*. Wallace died at the Château de Bages, in the south of France, leaving another opera, *Estrella*, nearly completed. Consult W. H. Grattan-Flood, *William Vincent Wallace* (London, 1912).

WALLACEBURG. A town in Kent Co., Ontario, Canada, on the Sydenham River and on the Pere Marquette, Grand Trunk, and Canadian Pacific railways (Map: Ontario, C 8). It has a variety of manufactures. Pop., 1901, 2763; 1911, 3438.

WALLACH, väl'ăG, Otto (1847–). A German chemist. He was born in Königsberg, Prussia, and studied chemistry at the universities of Göttingen and Berlin (Ph.D., 1869). He was professor of chemistry at Bonn from 1876 to 1889, and thereafter professor in and director of the Chemical Institute at the University of Göttingen. Wallach became a member of the Royal Academy of Sciences and a Privy Councilor, and in 1910 received the Nobel prize in chemistry for his researches on the constitu-

tion of organic compounds, especially of the camphors and related substances His studies on the constitution of ethereal oils and perfumes have resulted in important advances in the industries concerned with their artificial production. In addition to his many scientific papers he is the author of *Hulfstafeln fur den chemisch-analytischen Unterricht* (1889); *Tabellen zur chemischen Analyse* (3d ed., 1898); *Forschung und Lehre in der Chemie* (1899); *Terpene und Camphor* (1909).

WALLACHIA, wŏl-lā'kĭ-ȧ. A former principality of Europe, now forming the southwestern part of Rumania (q.v.). It is bounded by the Transylvanian Alps, Moldavia (on the northeast), and the Danube, and is divided by the Aluta, a tributary of the Danube, into Great Wallachia on the east and Little Wallachia on the west (Map: Balkan Peninsula, E 2). Total area, 29,915 square miles. Pop., 1912, 4,712,291. The principal city is Bucharest. See RUMANIA.

WALLACHS, wŏl'lăks. See RUMANIA, RUMANIAN LANGUAGE; RUMANIAN LITERATURE.

WALLACK, JAMES WILLIAM (?1794–1864). A well-known actor and manager, born in London. He was of a theatrical family, and when quite young became a member of the company at Drury Lane, supporting Elliston, Edmund Kean, and others. In 1818 he made his first appearance in the United States as Macbeth at the Park Theatre, New York, and for a number of years he divided his time between England and America. During several years he was stage manager at Drury Lane. In 1852, having finally settled in the United States, he took control of the first theatre known as Wallack's, at Broadway and Broome Street, New York. In 1861 he built the second Wallack's Theatre, at Broadway and Thirteenth Street, of which his son John Lester Wallack became the manager. As an actor Wallack was at his best in comedy and in romantic parts, such as Rolla in *Pizarro* and Don Cæsar de Bazan. Consult: *A Sketch of the Life of James William Wallack, Late Actor and Manager* (New York, 1865); Lester Wallack, *Memories of Fifty Years* (ib., 1889); William Winter, *The Wallet of Time*, vol. i (ib., 1913).

WALLACK, (JOHN) LESTER (1820–88). An American actor, the son of James William Wallack. His real name was John Johnstone Wallack. He was educated in England for the British army. After having left the army for the theatre he came to America in 1847, making his first appearance as Sir Charles Coldstream in *Used Up*. In 1852 he became stage manager at his father's theatre. In 1882 he opened the third and last Wallack's Theatre, at Broadway and Thirtieth Street, New York, which he conducted with great liberality and much artistic success, many famous stars appearing there. This theatre passed in 1887 under the management of Henry E. Abbey, and from 1888 to 1896 it was known as Palmer's Theatre (owned by A. M. Palmer, q.v.). Afterward, till it was torn down in 1915, it was again called Wallack's. Lester Wallack himself was a very popular actor, especially in comedy. His Charles Surface and his Benedick were admirable, and in several melodramatic rôles he was extremely successful. He was the author of several plays, of which *Rosedale* is best known. He died at Stamford, Conn. Consult his *Memories of Fifty Years* (New York, 1889) and M. J. Moses, *Famous Actor-Families in America* (ib., 1906).

WAL'LAROO' (Australian name). A well-known kangaroo (*Macropus robustus*) of Queensland and southward, which is of large size and robust form, and has long, thick, smoky gray fur. See Plate of KANGAROOS.

WALLAS, wŏl'ȧs, GRAHAM (1858–). An English economist, born at Sunderland. He attended Corpus Christi College, Oxford, in 1877–81, was a classical schoolmaster in 1881–90, and thereafter was an extension lecturer of the university, and after 1896 lectured also at the London School of Economics. He was a member of the London School Board from 1894 to 1904, and in 1904–07 a member of the London County Council, on whose education committee he served in 1908–10. After 1912 he was a member of the Royal Commission on Civil Service. In 1914 he held the chair of political science at London University, and in that year was also Lowell Lecturer in Boston A member of the Fabian Society from 1886 to 1904, he published one of the *Fabian Essays* in 1889. His writings include also: *Life of Francis Place* (1898); *Human Nature in Politics* (1909; Ger trans., 1911); *The Great Society* (1914).

WALLASCHEK, vȧl'las-chĕk, RICHARD (1860–). An Austrian musical scholar, born at Brunn, Moravia. He studied jurisprudence and philosophy at Vienna, Heidelberg, and Tübingen, became privatdocent at Freiburg in 1886, and the same year published his *Aesthetik der Tonkunst*. The results of his study (1890–95) of the manuscripts in the British Museum he published in his books, *On the Origin of Music* (1891) and *Primitive Music* (1893; enlarged as *Anfange der Tonkunst*, 1903). In 1896 he was appointed instructor in musicology at the University of Vienna and subsequently became professor. In 1900–02 he lectured on æsthetics at the Vienna Conservatory. Important works other than those mentioned are: *Anfange unseres Musiksystems* (1897), *Urgeschichte der Saiteninstrumente* (1898), *Geschichte der Wiener Hofoper* (1907–08).

WALLASEY, wŏl'ȧ-sȧ. A manufacturing town in Cheshire, England, on the west bank of the Mersey estuary, 4 miles west of Liverpool. It is practically a suburb of Birkenhead (q.v.), and its chief feature is its immense dock formed from a former marsh called Wallasey Pool. Another notable feature is the Wallasey embankment, which prevents the inroads of the sea on the peninsula. Pop., 1901, 53,580; 1911, 78,514.

WALLAWALLA, wŏl'ȧ-wŏl'ȧ (rushing water, or many waters). A tribe of Shahaptian stock (q.v.) formerly occupying the territory about the river of the same name and the adjacent banks of the Columbia, in Washington and Oregon, and since 1855 associated with the Cayuse and Umatilla upon the Umatilla Reservation, Oregon. They were visited by Lewis and Clark in 1804 and were Christianized by Jesuit missionaries about 40 years later. They lived originally by fish, roots, and game, but are now fairly prosperous farmers and stock raisers, with a population of 397.

WAL'LA WAL'LA. A city and the county seat of Walla Walla Co., Wash., about 200 miles south by west of Spokane; on Mill Creek and on the Northern Pacific, the Walla Walla Valley, and the Oregon-Washington Railroad and Navigation Company lines (Map: Washington, G 4). It is an educational centre, having Whitman and Walla Walla colleges, St. Paul's School,

St. Vincent's Academy, De La Salle Institute, and the Empire Business College. The manufactures are agricultural implements, beer, cigars, flour, leather, saddletrees, ice, threshing machines, artificial stone, brick, candy, sashes, doors, and blinds. A United States land office, United States District and Circuit Courts, Fort Walla Walla, a four-troop cavalry post, and the State penitentiary are situated here. Other prominent features are, a modern opera house, a Carnegie library, a fine Y. M. C. A building, two modern hospitals, the State Odd Fellows' Home, and the Stubblefield Home for Widows and Orphans. A military post was established here in 1856 and the settlement which grew up about it was at first called Steptoe City. In 1868 it was chartered under the present name. Walla Walla has adopted the commission form of government Pop., 1900, 10,049; 1910, 19,364; 1915, 24,205; 1920, 15,503.

WALL CREEPER. The Alpine wall creeper (*Tichodroma muraria*) is a beautiful little bird of the creeper family (Certhiidæ), which is found from the European Alps along the mountain ranges to the Himalaya. During the summer months it makes its home among precipitous rocks, fluttering about the faces of cliffs with queer butterfly movements, and darting hither and thither like a humming bird. Its resemblance to the latter is enhanced by the very long, straight, slender bill, with which it probes the crevices and cracks of the rocks in search of the spiders and flies upon which it lives. Its colors are gay, but its song is insignificant. See illustration on Plate of CREEPERS.

WALLENSTEIN, wŏl'en-stīn; *Ger. pron.* väl'en-shtīn (originally WALD- and WALDENSTEIN), ALBERT EUSEBIUS WENZEL VON, Duke of Friedland, Sagan, and Mecklenburg (1583–1634). An Imperialist general in the Thirty Years' War. He was the third son of a noble though not wealthy Bohemian family, and was born at Hermanic, in Bohemia, Sept. 24, 1583. His parents, who were Protestants, intrusted his education to the Moravian Brotherhood of Koschumberg, who made little of their stubborn and passionate pupil. On his parents' death his uncle, Albert Slavata, a Catholic, took charge of him, and, having won him to his own creed, sent him to the Jesuit convictorium at Olmütz, and to the universities of Altdorf, Bologna, and Padua, where his education was completed. He traveled in Germany, France, and Holland, took service in the Imperial army, fought against the Turks in Hungary, and, returning in 1606, married a widow of noble rank, who at her death in 1614 left him all her wealth. This, with his uncle's estates, made him one of the richest and most influential noblemen of Bohemia. In 1617 he raised a volunteer corps with which he fought for the Hapsburg cause against Venice, and he was made a count of the Empire and colonel in the Imperial army. Upon the outbreak of the Bohemian Revolution in 1618 he sent a regiment to the aid of the Emperor, and after the battle of the White Hill near Prague (1620) acquired possession at slight values of 60 confiscated lordships in Bohemia In 1623 he married a daughter of Count Harrach, of great influence at the Imperial court, and was created Duke of Friedland. Two years after, when the King of Denmark, Christian IV, took up arms for the Protestants against the Emperor, Wallenstein offered to raise, equip, and maintain 20,000 men, provided he were intrusted with absolute command, and might appoint his own officers, a proposal accepted by the Emperor Wallenstein brought to Bohemia adventurers from all quarters, men who knew his service meant ample booty, and soon his army far exceeded the 20,000 With this array he marched into north Germany, and, acting with Tilly (q.v.), routed Mansfeld at Dessau (April 25, 1626), pursued him through Silesia and Moravia, and on his junction with the army of Bethlen Gábor in Hungary, compelled, by strategy, the combined forces to remain on the defensive. Released by a truce with the Transylvanian Prince and the death of Mansfeld, he returned by way of Silesia, recovered the fortresses which Thurn had captured, forced the Elector of Brandenburg to submit to the Emperor, and joined Tilly in annihilating the military power of Denmark.

The value of Wallenstein's services caused the Emperor to overlook the complaints of the princes whose possessions suffered greatly from the rapacity and license which his soldiers were allowed to exercise. Wallenstein was rewarded with the Mecklenburg duchies, the rank of generalissimo on land, and admiral of the Baltic. He made himself master of his new territory; fitted out a fleet, and captured Usedom and Rügen, with various Baltic ports, and laid siege to Stralsund, but failed before the heroic resistance of its inhabitants. His arrogance grew with his success and aroused the enmity of a powerful party at court. The Catholic League, headed by the Duke of Bavaria, became his adversary, and, backed by the intrigues of France, induced the Emperor to dismiss Wallenstein in 1630. Wallenstein obeyed and went into retirement, waiting for the day when he would be again needed. He lived in magnificent state at Prague, but spent much time scheming for revenge All the while he kept a watch over affairs in Vienna The death of Tilly (April, 1631) and the advance of Gustavus Adolphus towards the hereditary Austrian dominions made it necessary for him to be recalled, and after pretense of indifference he consented to take the field on condition that he be given absolute command over the Imperial forces with power of negotiating and, at need, of concluding peace. With the Swedes on the Danube, the Saxons in Bohemia, and the army of the League almost annihilated, the Emperor had no choice: Wallenstein within three months was at the head of 40,000 men, well armed and disciplined. Commands and entreaties were in vain employed to induce him to save Bavaria from the Swedes; but in July, 1632, he moved against Gustavus Adolphus, who was intrenched in Nuremberg. There Wallenstein fortified himself, and for more than two months the armies confronted each other, an attack by the Swedes on Wallenstein's lines (September 3) being repulsed with heavy loss. At last Gustavus retreated to the Danube, whence his skillful opponent soon drew him by marching on Saxony. They confronted each other at Lützen (q.v.), where a great battle was fought in which the Swedes gained the advantage, though at the price of the death of their King (Nov. 16, 1632).

Wallenstein now set out upon a course of action entirely independent of the Emperor, and early in 1633 entered into negotiations with Sweden, Saxony, and France, whether with treasonable designs against the Emperor (his

enemies charged him with aspiring after the Bohemian crown) or for the purpose of deceiving the enemy, has not been definitely determined. Suddenly breaking off negotiations, he renewed the struggle against Saxony and Brandenburg; but this did not prevent his opponents from spurring on the Emperor to remove him. In winter quarters at Bohemia Wallenstein was aware of the progress of the intrigues, and he sought to attach the officers of his army to himself by causing them to pledge absolute obedience to him. His enemies finally carried the day, and in February an Imperial edict removed him from his command on the ground of conspiracy. A number of his officers had been gained over to the Imperial side, chief among whom were Piccolomini and Gallas (qq.v.), to the latter of whom the command of the army was transferred. Wallenstein now removed from his headquarters at Pilsen to Eger, for the purpose of establishing communication with the Swedish army under Bernhard of Weimar. On the way to Eger he was joined by Colonel Butler, commander of a regiment of dragoons, to whom had been intrusted the task of seizing the person of Wallenstein. No opportunity offered for the execution of the plan until the arrival at Eger, where, with two other Scottish officers, Gordon and Leslie, Butler determined upon the assassination of the great general. On the night of February 25 an Irish officer named Devereux with a number of soldiers broke into the house where Wallenstein had his quarters and slew him with a pike thrust in the breast. His estates were confiscated by the Emperor Wallenstein had much of the ability of the statesman as well as the soldier. He was more liberal than his age and tolerant in religious matters, having no convictions of his own. He was unscrupulous, and his ability was curiously affected by a superstitious faith in astrology, which he had studied deeply in Italy.

Bibliography. There is a large amount of literature, both history and fiction, relating to Wallenstein. Much of it is controversial. Schmid, "Die Wallensteinlitteratur," in *Mitteilungen des Vereins für Geschichte der Deutschen in Böhmen* (Prague, 1879, 1883, 1885, 1896, 1902), mentions 1865 titles. Consult: Ranke, *Geschichte Wallensteins* (Leipzig, 1880), the classic biography; Förster, *Briefe Wallensteins* (Berlin, 1828–29); id., *Albrecht von Wallenstein* (Potsdam, 1834); id., *Wallensteins Prozess* (ib., 1844); Sarasin, *La conspiration de Waldstein* (Paris, 1853); T. Baaster, *Wallenstein als Student* (Nuremberg, 1860); Hallwich, *Wallensteins Ende, ungedruckte Briefe und Akten* (ib., 1879); Gindely, *Waldstein während seines ersten Generalats, 1625–30* (Prague, 1886); and a reply to Hallwich, *Zur Beurtheilung des k. Generals A. von Waldstein* (ib., 1887); Bilek, *Beiträge zur Geschichte Wallensteins* (ib., 1886); Wittich, "Zur Geschichte Wallensteins," in Sybel's *Historische Zeitschrift* (1892–93); Vetter, *Wallenstein in der dramatischen Dichtung* (Frauenfeld, 1894); F. Stieve, *Wallensteins Uebertritt zum Katholizismus* (Munich, 1897); P. Schreiser, *Die Wallenstein-Frage* (Zurich, 1899). See THIRTY YEARS' WAR.

WALLENSTEIN TRILOGY. A name applied to three famous plays by Schiller based on the career of the Austrian General Wallenstein. The newly built theatre at Weimar was opened with *Wallensteins Lager* (Wallenstein's Camp) on Oct. 12, 1798; *Die Piccolomini* (q.v.) was presented on Jan. 30, 1799, and *Wallensteins Tod* (Wallenstein's Death) on April 20, 1799.

WALLER, wŏl'lẽr, EDMUND (1606–87). An English poet, born at Coleshill, in Buckinghamshire. He was sent to Eton, and thence to King's College, Cambridge (1620), but seems to have left the university without a degree. In 1622 he was a student of Lincoln's Inn. It appears that at the age of 18 (perhaps earlier) he obtained a seat in Parliament for Amersham. After the death (1634) of his first wife, Anne Banks, Waller courted Dorothy Sidney, eldest daughter of the second Earl of Leicester, whom he commemorated in verse under the name of Sacharissa. In the Long Parliament Waller joined the party of his cousin Hampden, but when the attack was made on Strafford and the episcopacy (1641) he began to move towards the Royalist side and was soon won over. In 1643 he was appointed by Parliament one of the commissioners to negotiate with King Charles, then at Oxford. On this occasion he was drawn into a plot to secure the city of London for the King. He seems to have turned informer to save his own life, and some of his colleagues were hanged, he himself escaping with a fine of £10,000 and banishment from the kingdom (1644). After an exile of seven years, spent mostly in France, Waller was pardoned. Returning to England, he now gave his support to the Commonwealth, and was subsequently appointed a commissioner of trade (1655). After the Restoration he was elected to Parliament for Hastings (1661), and continued a member down to his death. The last volume of his verse to appear in his lifetime was *Divine Poems* (1685). He died at Beaconsfield, Buckinghamshire. Three editions of his collected poems appeared in 1645, and new editions with added poems were frequent after the Restoration. The heroic couplet he reduced to an art, and used extensively. Waller's poetry as a whole has long since ceased to interest a wide public, but he lives by a few perfect little poems, such as the song beginning "Go, lovely rose," and the lines "On a Girdle." Consult his *Poems*, edited by J. T. Drury (Muses' Library, London, 1893); E. A. Gosse, *Seventeenth Century Studies* (new ed., ib., 1897); Samuel Johnson, *Lives of the British Poets*, edited by G. B. Hill, vol. i (ib., 1905).

WALLER, FRANK (1842–1923). An American architect and artist. He was born in New York City and in 1870 went to Rome, studying under John Chapman for a year. The year following he traveled in Egypt, making many studies and sketches. He was one of the incorporators of the Art Students' League and was its first president (1875). From 1888 he devoted himself to architecture in New York. He wrote *Report on Art Schools* (1879) for the Art Students' League, and the first report of the League (1886).

WALLER, LEWIS (1860–1915). English actor-manager, born at Bilbao, Spain. He was educated for a commercial career and for five years was employed in his uncle's London office. His first appearance on the professional stage was at Toole's Theatre, London, in 1883, but prior to this he had acted frequently as an amateur. During the next 10 years he played a wide range of parts, both in the London theatres and in the provinces, and by hard work forged his way to the front rank of his

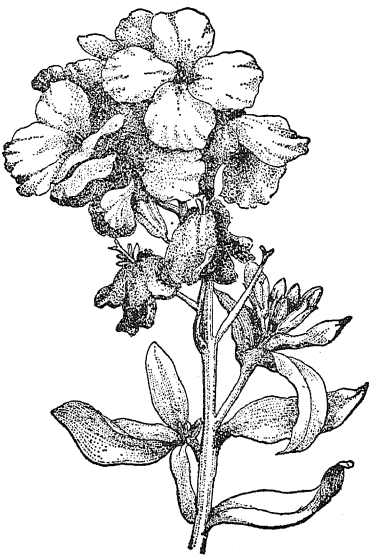
profession. In 1895 he was associated with Sir Charles Wyndham (q.v.) in the production of *The Home Secretary*, and under Sir Herbert Beerbohm Tree's (q.v.) management played in *The Three Musketeers*. In the same year he assumed the management of the Shaftesbury Theatre. During the next decade he managed the Lyceum, the Comedy, the Lyric, the Imperial and other theatres for short periods, producing and appearing in many of the most successful plays of the time. His best-known rôle was Monsieur Beaucaire in Booth Tarkington's play of that name, which at the first production ran for over 400 nights and afterward was revived innumerable times. Waller visited America for the first time in 1911, appearing at the Century Theatre in *The Garden of Allah* and later at Daly's, of which he had assumed the management, in a revival of *Monsieur Beaucaire*. One of his notable impersonations was that of the Shakespearean Richard III, presented in New York in 1913. His wife (died 1912), who before her marriage was Florence West, was an actress of high abilities.

WALLER, SIR WILLIAM (c.1597–1668). A parliamentary general, son of Sir Thomas Waller, lieutenant of Dover. He studied at Magdalen Hall, Oxford, and became a soldier of fortune. In 1640 he was elected to the Long Parliament as a member of the popular party. When the English Civil War began he entered the parliamentary army as colonel of a regiment of horse and gained numerous successes, but was defeated at Roundway Down in July, 1643. He was given another army and gained several successes, but in June, 1644, was defeated by King Charles at Cropredy Bridge. In the early part of 1645 he led the expedition for the relief of Taunton. The Self-Denying Ordinance (q.v.), which forbade members of Parliament to hold a command in the army, put an end to his military career, and he then became one of the Presbyterian leaders in Parliament, gained the enmity of the army, and in 1647 fled to France. Returning to England, he supported the proposed treaty with the King, and in December, 1648, was imprisoned on a charge of having instigated the Scots to invade England. He was later active in negotiating for the return of Charles II; in February, 1660, sat in the Long Parliament; was a member of the last council of state; promoted the calling of a free Parliament; and sat in the Convention. A *Vindication of the Character and Conduct of Sir William Waller*, written by himself, was published posthumously in 1797.

WALL-EYED PIKE. See PIKE PERCH; and Plate of PERCHES OF NORTH AMERICA.

WALL-EYED POLLACK. See POLLACK.

WALLFLOWER (*Cheiranthus*). A genus of herbs or shrubby biennials and perennials of the family Cruciferæ, characterized by racemes of rather large yellow or purple flowers. The common wallflower (*Cheiranthus cheiri*), a native of Europe, which occurs in rocky places and on old walls, is frequently grown for ornamenting such places. In the wild state its flowers are always yellow, but the numerous cultivated varieties are diversely colored. In the north, where it is not hardy, it is grown as a house plant. The double varieties are especially ornamental. *Cheiranthus semperflorens* is a north African perennial producing yellow and white flowers at different periods of the year. It requires a dry, sheltered place in winter. Wallflowers thrive best in a rather dry gravelly soil. They are propagated by seeds and cuttings. The plants flower the second season at the north.



WALLFLOWER (*Cheiranthus cheiri*).

WALLICH, väl'lĭk, NATHANIEL (1786–1854). A British naturalist, born at Copenhagen, Denmark. He studied medicine in his native city, and in 1807 became surgeon to the Danish settlement of Serampore, in India. When the English captured that settlement in 1813, he entered the service of the East India Company, and in 1815 became superintendent of the Calcutta botanical garden. He explored Nepal, the forests of western Hindustan and those of Ava and Lower Burma; in 1828 took to England more than 8000 specimens of plants; and after returning to India explored Assam and other places. His published works include: *Testamen Florœ Nepalensis Illustratœ* (1824–26); *A Numerical List of Dried Specimens of Plants in the East India Company's Museum* (1828); and *Plantœ Asiaticœ Rariores* (3 vols., 1830–32).

WALLIN, väl-lēn', JOHAN OLOF (1779–1839). A Swedish poet and archbishop, born in Dalarna. He entered the ministry, and in 1837 he was made Archbishop of Upsala. Early in life he began to write poetry, and first obtained general recognition in 1815 through the didactic poem *Uppfostraren* (the educator), which was awarded the highest prize by the Academy. On account of his great success in writing hymns he was called by Tegnér "David's Harp of the North." His *Psalmbok*, of which 128 hymns were his own, was authorized as the hymn book of the country in 1819 and is still in use. His other poems include: "George Washington," "Gustavus III," "Hemsjukan," and "Dödens ängel." A collection of his poetical works was published at Stockholm in 1848.

WALLING, wąl'ĭng, WILLIAM ENGLISH (1877–). An American Socialist writer, born at Louisville, Ky. He graduated from the University of Chicago in 1897, was a factory inspector in Illinois in 1900–01, and resided at the University Settlement, New York, in 1902–05. He became a director of the National Association for the Advancement of the Colored

People, and a member of the executive committee of the Intercollegiate Socialist Society, was a director of the *New Review* and a contributing editor to the *Masses*. Besides contributing to the *Independent*, the *Outlook*, *Collier's*, and other periodicals he wrote: *Russia's Message* (1908); *Socialism as It Is* (1912); *The Larger Aspects of Socialism* (1913); *Progressivism and After* (1914), and edited *The Socialists and the War* (1915) and *The Socialism of To-Day* 1916). His wife, ANNA STRUNSKY WALLING, also became identified with Socialistic work. She wrote *Violette of Père Lachaise* (1915)

WALLINGFORD, wŏl'ĭng-fĕrd. A borough in a town of the same name in New Haven Co., Conn., 12 miles north by east of New Haven, on the Quinnipiac River and on the New York, New Haven, and Hartford Railroad (Map: Connecticut, D 4) It has a public library, a sanitarium, fine high-school and post-office buildings, and a Masonic Home. The most important manufactured products are sterling silver goods, plated ware, insulated wire, brassware, celluloid novelties, hardware, and iron and brass bedsteads. In 1670 Wallingford was incorporated by Connecticut and settled by 100 planters from New Haven The Wallingford Community was organized in 1851, near the town, on the model of Oneida Community (q.v.). Pop, 1900, 6737; 1910, 8690; 1915 (U. S. est.), 9719; 1920, 12,010. Consult Davis, *History of Wallingford* (Meriden, 1870).

WALLINGTON. A borough in Bergen Co., N. J., 9 miles north of Newark. The chief industries are represented by chemical works, a handkerchief factory, and a fur and robe factory. Pop., 1900, 1812; 1910, 3448.

WALLIS, wŏl'ĭs, JOHN (1616–1703). An English theologian and mathematician, born at Ashford. He was educated for the ministry at Cambridge. He took the degree of B.A. at Emmanuel College in 1637, received the M.A., and was ordained in 1640, and soon after became a fellow of Queens' College (1644). He sided with the Parliament in the Civil War and was of great service in deciphering intercepted messages of the Royalists. He became an adept in cryptology and was for a long time in the employ of the state. In 1649 he was chosen Savilian professor of geometry at Oxford, holding this position until his death. Wallis was a student of polemics, language, mechanics, and theology, but his genius for mathematics eclipsed his ability in other lines He systematized and extended the new geometry, extended the application of Kepler's law of continuity (see CONTINUITY), first made popular the present meaning of fractional and negative exponents, and introduced the symbol ∞ for infinity. His work on quadratures was original and included a discussion of such curves as represent $y = x^n$, $y = x^0 + x^1 + x^2 + \ldots$. His attempt at interpolation was the beginning of a more general method employed by mathematicians of the seventeenth century, which later enabled Newton to generalize the binomial formula. He increased the power of algebra by the systematic use of formulas, gave the law for forming the successive convergents of a continued fraction, and suggested (1685) a modern graphic interpretation of imaginaries. His chief works are: *Arithmetica Infinitorum* (1655); *Tractatus de Sectionibus Conicis Nova Methodo Expositis* (1655); *De Angulo Contactus et Semicirculi Tractatus* (1656); *De Cycloide* (1659); *Commercium Epistolicum* (1658); *Mathesis Universalis* (1657), *Mechanica, sive de Motu Tractatus Geometricus* (1669–70–71); *De Gravitate et Gravitatione Disquisitio Geometrica* (1662 and 1674); *Treatise on Algebra* (1685; Latin trans., 1693); *Institutio Logicæ* (1687), *Grammatica Linguæ Anglicanæ* (1652). His complete works were published in Oxford (1693–99).

WALLIS, SEVERN TEACKLE (1816–94). An American lawyer, born at Baltimore, Md. He graduated at St. Mary's College, Baltimore, in 1832, and was admitted to the bar in 1837. Early in life he became interested in Spanish history and literature and in 1849 was sent to Spain by the United States government to investigate the title to certain public lands in Florida. In 1861 he was elected to the Maryland Legislature, where, as leader of the faction opposed to the Civil War, he incurred the displeasure of the Federal authorities and was arrested and imprisoned Upon his release, in November, 1862, he returned to his law practice and in 1870 was chosen provost of the University of Maryland. Wallis contributed to various periodicals and also wrote *Glimpses of Spain* (1849); *Spain: Her Institutions, Politics, and Public Men* (1853); *Discourse on the Life and Character of George Peabody* (1870).

WALL OF ANTONIUS. See ROMAN WALL.

WALL OF AURELIAN. See AURELIAN, WALL OF.

WALLON, vȧ'lôN', HENRI ALEXANDRE (1812–1904). A French politician and historian. He was educated at the Paris Normal School, and in 1840 was appointed Guizot's substitute in history and modern geography at the Sorbonne. Elected to the Legislative Assembly as a Conservative in 1849, he resigned in the following year because of the restriction of universal suffrage, and participated no further in politics during the Empire. In 1871 he was elected to the National Assembly as a Moderate Conservative; in 1875 proposed the clause by which the Republic was constitutionally established; and in the same year became Minister of Public Instruction. In 1876 he resigned and was elected life Senator. His works include *La vie de Jésus et son nouvel historien* (1864), answering Renan; *La terreur* (1873); *Histoire du tribunal révolutionnaire de Paris* (1880–82); *Les représentants du peuple en l'an II (1793–1794)* (1888–90)

WALLOON (wŏl-lo͞on') **CHURCH.** A church in the Netherlands, the members of which are descendants of refugees of the Reformed faith, who entered Holland from France and Flanders in 1581 and subsequent years. Their services are still conducted in the French language and they use the Geneva Catechism instead of that of the Synod of Dort. In 1916 they had some 25,000 adherents.

WALLOONS. The name given to those among the Belgians whose mother tongue is French or a French dialect, in contrast to the Flemings, who speak Dutch or Dutch dialects. The name has been given to them by the neighboring Teutons. It is the same as Welsh to designate the Celts of Great Britain, or Wallach as applied to the Rumanians. Like the German Welsch, it simply means Roman or Celtic. It comes from Old High German Walah, an adulteration of Volca, the name of a Celtic tribe in northern Italy, the first one that the Teutons found on their way to the south. The Walloons

are the remnants of the romanized Celts of northern Gaul, the so-called Belgæ of Julius Cæsar. (See CELTIC LANGUAGES; CELTIC PEOPLES.) After having offered a stubborn resistance to the Romans, they were finally conquered by them and like the other tribes of Gaul gradually abandoned their Celtic speech for Latin, which is therefore the source of all present Wallonian dialects. The north of Belgium was barren and unprotected. It was soon raided by Teutonic tribes. Among these, the Toxanders settled in the heaths and marshes of the Campinian plain, with the consent of the Romans Flanders, the land of the Menopii, was also devastated and the whole north of Belgium was first invaded by the Franks The south remained for some time under the protection of the Roman legions in Tournay, but at the end of the fifth century the Franks took possession of the greater part of Gaul. This, however, was a mere conquest and did not result in any Teutonization of the country. The Teutonic settlements extended only as far south as the Carbonaria silva in the centre of Belgium, for the Teutons, being agriculturalists, were able to cultivate the more barren soil. In the wooded region of Hainault and the Ardennes, they simply appropriated large estates that were being cultivated by the Gallo-Romans. This explains why the language has remained Romance, while a great many place names are Teutonic: Hagina, the wooded river (La Haine); Hees-apa-gau, the land of the bushy brook (La Hesbaye); Leudico, town of Leudo (Liége); Namuco, town of Namo (Namur). Village names like Robechies, Obrechies, Gelbressée, Gonrieux, though Latin in form, preserve the names of Frankish lords: Robert, Odbert, Gilbert, Gunther.

In the Middle Ages the Wallonian provinces did not play so conspicuous a part as Flanders and Brabant. The communes of Liége and Dinant, however, were famous for their prosperity and their independence. The severe treatment inflicted upon Dinant by Charles of Burgundy has remained memorable. Liége was an episcopal principality notorious for the contests between bishops and citizens. In the sixteenth century, during the religious wars, the Walloons (the "Malcontents") sided principally with Spain and helped in the reconquest of the Flemish country. Only in Tournay, Valenciennes, and Artois were there Protestant communities, whose members later emigrated to the Dutch Republic, where they founded the so-called Eglises wallones. Some also went to America, among them Jean de Forest, from Avesnes, one of the founders of the city of New York (consult Emily De Forest, *A Walloon Family in America* (Boston, 2 vols., 1914), while Guido de Bray or Bres from Mons is supposed to have been the author of the "Belgic Confession" (q.v.). The Walloons in the Spanish Low Countries provided good mercenaries for Spain, especially the so-called Walloon Guard, a bodyguard.

In 1916 the Walloons in Belgium numbered about 3,000,000, as compared with 4,000,000 Flemings. They occupy the provinces of Hainault, Namur, Liége, Luxemburg, and a part of Brabant, or all the regions south of a line drawn from Aix-la-Chapelle to the environs of Lille. The linguistic frontier is clearly drawn and has not materially changed for centuries. There are a great many Wallonian dialects, belonging to two main groups: the Wallonian, properly called, found in the old diocese of Liége, and the Picardish, found in the old diocese of Cambrai. The French words château, poisson, chien, e.g., appear as tchastyâ, pehon, tchin, in the former, as kastyo, pishon, kyé in the latter. Though the Flemings and Walloons have been politically united for centuries, their physical and moral characteristics are still easily distinguishable. The Walloons, like the French, are mostly of the brunette type, and are more nervous and vivacious than the Flemings. They are more industrious and thrifty than their neighbors, but less consistent in feeling The lower classes are somewhat careless personally, in contrast with the proverbial Flemish and Dutch cleanliness, but they have more natural distinction than their Teutonic neighbors.

The Walloons are not so conspicuous as the Flemings for their artistic achievements, although they had some good painters in the fourteenth century and in modern times have produced the musician Grétry (q.v.). By Wallonian literature is sometimes meant songs, plays, and satires written in the dialects of Liége or Mons. It has a merely local interest The real Wallonian literature, written in French, claims such names as Clesse, Mockel, Séverin, Des Ombiaux, Nothomb. The activity of the authors mentioned is inseparable from the general evolution of the Belgian literature in French, practiced both by Walloons and by French-speaking Flemings. As early as the Middle Ages Belgium produced French writers such as the historians Froissart (q.v.) and Commines (q.v.), while Adenet Leroy wrote long romances in verse and Jean Lemaire des Belges was a court poet. From 1500 to 1850, however, very few valuable works in French were published in Belgium. The period from 1850 till 1880 was not very brilliant either, but, at least, it was marked by some isolated names such as A. van Hasselt (q.v.), the Romanticist; Charles Decoster (q.v.); Octave Pirmez, a moralist, author of valuable essays of a pessimistic tendency; Antoine Clesse, "the Walloon Béranger," who composed cheerful songs expressive of the Hainault temperament. The first years of the eighties witnessed an important literary movement. The *Jeune Belgique*, a magazine edited by a group of Louvain students, became the medium of expression for many young writers of talent and vigor, among them Max Waller, G. Eekhoud (q.v.), Camille Lemonnier (q.v.), E. Verhaeren (q.v.), T Gilkin, A. Giraud. They had a long war to wage against the prejudices and the indifference of the public, but finally forced attention by their works. Beside the *Jeune Belgique*, the Belgian renaissance was furthered by Edouard Picard's *L'Art Social*, a review with Socialistic tendencies, and by Albert Mockel's *La Wallonie*. Mockel became the theorist of symbolism and the head of the Franco-Belgian school of Symbolist poets, a group comprising Maeterlinck (q.v.), Van Lerbergh, Le Roy, Fontainos, and Séverin among the Belgians, Mallarmé (q.v.), Héredia (q.v.), Rotté, Moréas (q.v.), and Louys (q.v.) among the French. The Belgian writers illustrate two main artistic tendencies: realism and symbolism. The most conspicuous among the realists are G. Eekhoud and Camille Lemonnier (qq.v.), whose verse and more important novels show remarkable power of description and an almost truculent naturalism, while Gaston Virrès is the

painter of the life of the middle class in the small towns. Emile Verhaeren (q.v.), in his first works (*Les Flamandes, Les Moines, etc.*), was also a violent realist. His method underwent an evolution towards social art. In *Les débacles, Les campagnes hallucinées, Les villes tentaculaires,* and *Les spectacles* he is sorely grieved by the triviality and gloominess of large cities and extols the simple vocations of the country. Later works, however, showing him deeply impressed by the grandeur of human effort in modern industry and science, have a Socialistic and atheistic tendency

Belgium has produced several dreamy and mystical poets who all, to a greater or less degree, identified themselves with the Symbolistic school, among them being Max Elskamp, who delights to portray the piety of the Flemings; George Rodenbach, the painter of peaceful old Bruges; the mystic Ch. Van Lerberghe; Grégoire Le Roy; Albert Mockel, a graceful and lyric Symbolist, and F. Séverin, whose delicate soul is expressed in refined and simple verse—two poets who, like Verlaine (q.v.), came from the Ardennes; and above all, Maurice Maeterlinck (q.v.), who constantly associates man's life and activity with nature and manifests a pantheistic tendency. It should be remembered that the Belgian literature in French is not exclusively of Wallonian inspiration. Features of the Flemish character, such as an exuberant realism and a mystical symbolism, are discoverable in many a Belgian writer, and notably in Verhaeren, Maeterlinck, and Rodenbach.

Consult: C. M J. Grandgagnage, *Dictionnaire etymologique de la langue wallone* (3 vols., Liége, 1845–80); id., "De l'origine des Wallons," in Institut Archéologique liégeois, *Bulletin,* vol. i (ib., 1852); Paul Marchot, *Phonologie détaillée d'un patois Wallon: contribution à l'étude du wallon moderne* (Paris, 1892), containing a bibliography; Oscar Colson, *Table générale systematique des publications de la Société liégeoise de littérature wallonne, 1856–1906* (Brussels, 1908); Maurice Wilmotte, *La culture française en Belgique* (Paris, 1912).

WALL PAPER. Paper made to decorate walls. It usually carries colored patterns or designs produced by painting, stenciling, or printing. The equivalent term in French is papier peint, painted paper; in German, Tapete, formerly tapestry, and still used in that sense in Austria, but usually with a qualifying word like Flemish to distinguish the woven from the paper hangings. The use of wall paper in the present fashion to cover all or most of the side walls of a room did not become common until the eighteenth century. Isaac Ware in his *Classic Architecture,* published in 1756, laments that: "Paper has taken the place of sculpture," by paper meaning wall paper, and by sculpture relief ornament in wood or plaster.

However, wall paper painted in China had been used in Europe as early as the middle of the sixteenth century, although it did not become fashionable until over a century later. Macky about 1720 speaks of Sir Richard Child's residence as having: "a parlour finely adorned with China paper, the figures of men and women, birds and flowers, the liveliest I ever saw come from that country." A paper representing the trade and occupations of China was put about 1780 into the drawing room of Brasted in Kent, by Dr. Turton, favorite of George III, who is reported to have received it as a present from the Emperor of China. Such papers were at this period customary gifts from ambassadors and merchants in China to their friends at home. A number of boxes of Chinese wall paper, each box generally containing 12 lengths, have been discovered in recent years unused in the attics and lumber rooms of English country houses. Also many eighteenth-century wall papers in Chinese design, some made in China for the European trade and others made in England, are still on the walls where they were first hung, notably the one in the bedroom at Badminton, and the one in the Baroness' room at Coutts' Bank on the Strand, brought to England by Lord Macartney, the British Envoy to China, who immortalized himself by refusing to "kow-tow" to the Chinese Emperor. Of course these papers were backed with canvas and mounted on wooden frames with an air space between them and the walls. If they had been pasted fast to the plaster as now they would not have lasted much longer than do our modern papers The painted Chinese paper on the Cadwalader room in the Metropolitan Museum of Art, New York, hung on the walls of a house in England for over 200 years, before it was safely removed and brought across the Atlantic. Of the fidelity with which these Chinese papers pictured Chinese life, Sir Joseph Banks said in his *Journal* in 1770: "A man need go no further to study the Chinese than the China paper, the better sort of which represent their persons and such of their customs, dresses, etc as I have seen, most strikingly like, though a little in the caricatura style."

It must not, however, be imagined that the Chinese themselves used wall paper in the European manner. When Robert Fortune commenting on the house of a Chinese mandarin remarks: "a nicely furnished room according to Chinese ideas, that is, its walls were hung with pictures of flowers, birds, and scenes of Chinese life . . . I observed a scene of pictures which told a long tale as distinctly as if it had been written in Roman characters. The actors were all on the boards, and one followed them readily from the commencement of the piece until the fall of the curtain," he refers not to a series of strips of paper fixed fast to the walls, but to a series of kakemonos or paintings on silk or paper, mounted on rollers in the Chinese and Japanese fashion and attached to the walls only temporarily, and much easier to remove and change than European framed paintings. Even to-day the Chinese are only just beginning to use wall paper as in Europe and America.

Hand-blocked papers bear about the same relation to hand-painted papers that roller prints do to block prints. In the painted papers there is the utmost freedom of design. There is no more restriction upon the extent of the pattern than in a fresco or other mural painting. Many of the earlier block papers had the outline only made with the block, all the coloring being done later with the brush. The block, of course, makes it much easier and hence cheaper to produce several copies of a design, but the economy is proportionate to the limitations in size of the design. The roller goes still farther in the pattern or small repeat directions and is most effective for quantity when the pattern is not larger than 18 inches square, whereas blocks can be used economically on designs many times larger. The tendency to develop in the repeat direction seems to have been European

rather than Chinese, and while block printing in black and white in China dates back to the sixteenth century A.D., according to Chinese historians, and in color at least to the seventeenth century, there is no doubt that the block printing of wall paper in colors is a process that was developed and brought to perfection in Europe. There still exist in England a few paper imitations of Italian velvets, which are attributed to the Elizabethan period, and generally have a flock surface. Follot, however (see bibliography), maintains that the wall-paper industry in France dates from the beginning of the seventeenth century, and names Le François, *dominotier* and *enlumineur*, who in 1610 made at Rouen "des papiers veloutes pour tentures" (flock papers for hangings). The patterns of these were stenciled on in varnish and the flock powder was then blown on with the bellows, and tinted with water color when dry. Follot attributes the invention of the block as it is used in printing wall paper to Jean Papillon, a French engraver, in 1688. However, there was recently discovered at Borden Hall in England a thick block-printed paper of Indian floral design which is attributed to the last half of the sixteenth century. In 1692 a patent was granted in England to William Bayley for the manufacture of paper hangings.

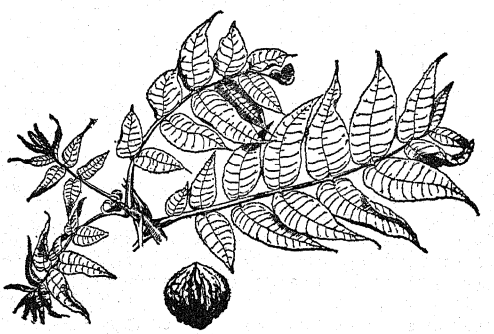
In the nineteenth century, the wall-paper industry was transformed, and the production of huge quantities at a trifling price was made possible, by the introduction of continuous paper, the roller, and power. Paper in continuous rolls was first made in 1829 by Zuber in Alsace, who sold the English rights for $5000. Previously rolls had been made by pasting together sheets 18 inches wide. About 1850 Zuber brought from Manchester in England a six-color roller-printing machine based on the one used in printing cottons. (See TEXTILE PRINTING.) Henceforth the majority of papers were machine made, although since William Morris began to design wall papers in 1862 a few modern patterns have been hand-blocked, and some of the finest eighteenth-century ones, even those requiring more than 2000 blocks like the famous Cupid and Psyche scenes designed by David for Napoleon, are still printed from the ancient blocks. The block-printing of paper is easier than that of cloth and the blocks are consequently larger. While the rollers from which textiles are printed are of copper, the wall-paper rollers are of wood, with the pattern outlined in copper or brass ribbon, and the solid surface filled in with felt. One reason that block-printed papers are superior to roller prints is that the block surface is softer, being mostly of wood, and carries the ink better; also in block printing each color dries before the next is applied, while in roller printing all the colors follow one another immediately. Also the block releases more of the pigment, and drives it harder into the paper, while the effect of the roller prints is comparatively thin and poor. Consult: Félix Follot, *Papiers peints* (Paris, 1900); Horace Warner, "How Wall Papers are Printed," in the *Art Journal* (London, 1901); Kate Sanborn, *Old Time Wall Papers* (New York, 1905), valuable chiefly for the many illustrations of ancient papers from the walls of American houses; G. L. Hunter, *Home Furnishing* (ib., 1913).

WALLS'END. A town in Northumberland, England, 4 miles east-northeast of Newcastle (Map: England, E 1). It is celebrated for its collieries and the quality of its coal, has shipbuilding yards, engineering works, lead and copper smelting works, and manufactories of aluminium, cement, bricks, and tiles. As Segedunum it was a provision depot of the Romans, and the remains of its ancient quay have been discovered. It derives its modern name from its position at the east end of Hadrian's Wall. Pop., 1901, 20,932; 1911, 41,464.

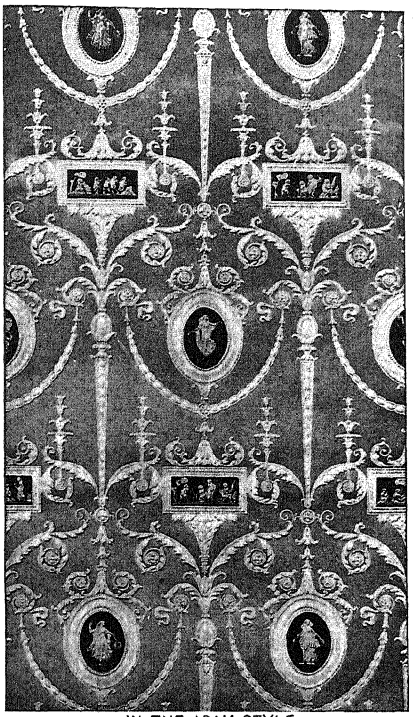
WALL STREET. A street in New York City from Broadway to the East River, following the line of the early city wall across Manhattan Island. It contains the United States Sub-Treasury and numerous banking institutions, and is the centre of financial operations in the United States.

WALLY, vȧ'lē', LA. An opera by Catalani, first produced in Milan, Jan. 20, 1892; in the United States, Jan. 6, 1909 (New York).

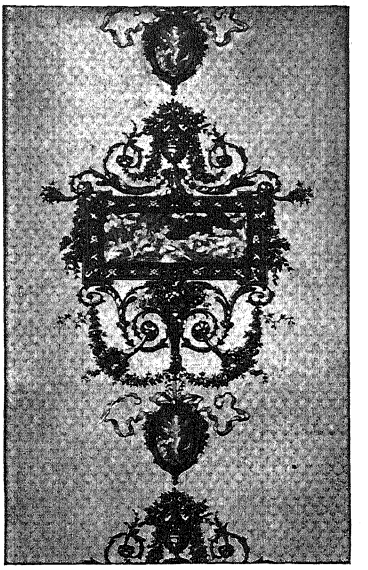
WALNUT (AS. *walhhnutu*, walnut, foreign nut, so called because first brought from Italy and France, from *wealh*, OHG. *walh*, foreign + *hnutu*, Icel. *hnot*, Ger. *Nuss*, nut), *Juglans*. A genus of beautiful trees of the family Juglandaceæ. The species, of which about 12 are known, are mostly North American and Asiatic. All but one or two species are trees with alternate pinnated leaves, monœcious flowers, and a drupe with a deciduous fleshy husk and a deeply wrinkled two-valve shell, within which is the curiously lobed and wrinkled seed. The species of hickory (q.v.) were formerly included in this genus. The common walnut, Persian, Circassian, or English walnut (*Juglans regia*), is a native of Persia and the Himalaya, but has long been cultivated. The wood is usually called Circassian walnut and the nuts are called English walnuts quite generally in the United States. The date of its introduction is unknown, but it was certainly cultivated by the Romans in the reign of Tiberius. It is a lofty tree of 60 to 90 feet, with large spreading branches. The leaves have a balsamic odor when bruised. The tree yields a sugary sap and is sometimes tapped like the sugar maple. Pickles and ketchup are made of the unripe fruit. The ripe fruit is one of the best of nuts (q.v.) and an important article of export from southern Europe and California, where the trees are extensively cultivated. The nearly mature nuts are much used in France with vinegar, salt, pepper, and shallots. Walnuts yield by expression a bland, fixed oil, which under the names of walnut and nut oil is used by painters and in the countries of its production as an article of food. The cake left after expressing the oil is sometimes used as human food and for cattle



BLACK WALNUT (*Juglans nigra*).



IN THE ADAM STYLE.



IN THE LOUIS XVI STYLE.

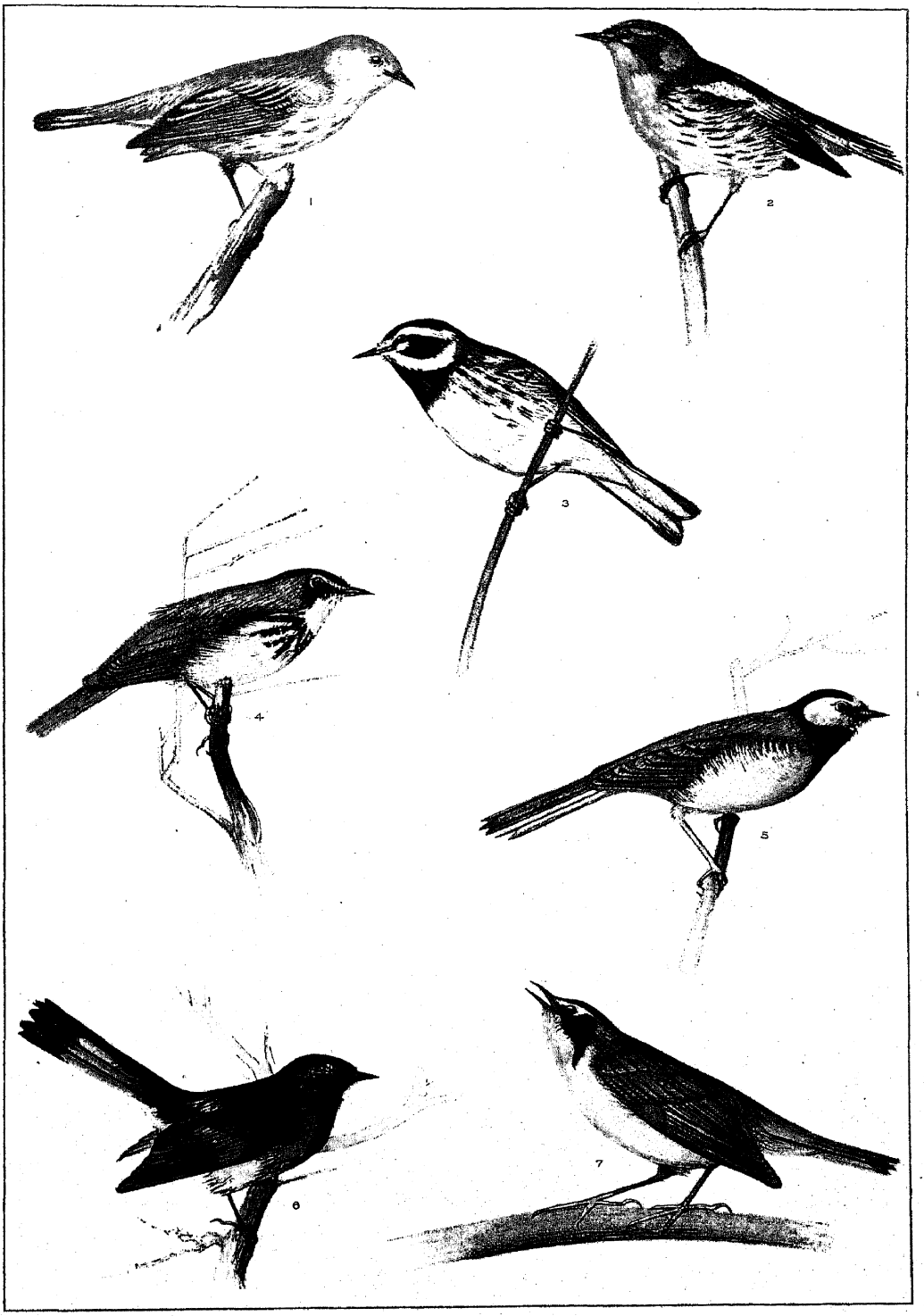


REPRODUCTION OF ILLUMINATED LEATHER.



AN EXCELLENT LANDSCAPE VERDURE.

AMERICAN WOOD-WARBLERS



© BY DODD, MEAD & COMPANY.

1 SUMMER YELLOWBIRD (DENDROICA ÆSTIVA)
2 BLACKBURNIAN WARBLER (DENDROICA FUSCA)
3 TOWNSEND'S WARBLER (DENDROICA TOWNSENDI)
4 CANADA WARBLER (WILSONIA CANADENSIS)
5 HOODED WARBLER (WILSONIA CITRINA)
6 REDSTART (SETOPHAGA RUTICILLA)
7 KENTUCKY WARBLER (OPORORNIS FORMOSUS)

and poultry. The timber of the walnut is valuable, and is used for cabinets, gunstocks, etc It is light, although hard and fine-grained. The wood of young trees is white and little esteemed; that of old trees is brown, veined and shaded with darker brown and black. The wood of the roots is beautifully veined Both the root and the husks of the walnut yield a dye, used to stain light-colored woods brown. The walnut when meant to become a timber tree is best sown where it is to remain, as the roots are injured by transplanting. The best kinds of walnut for fruit are generally grafted. The black walnut (*Juglans nigra*), a similar tree, found in most of the United States, except the most northern, is one of the finest, largest, and most beautiful trees in American forests, attaining heights of 150 feet and diameters of 6 or 7 feet. The fruit, which has a thick woody shell, is inferior to that of the Persian walnut. *Juglans californica*, a Western species, greatly resembles the Eastern black walnut, and in California is much used as a stock on which *Juglans regia* is grafted. *Juglans rupestris* is a small tree or shrub from Colorado to Mexico. *Juglans sieboldiana* and *Juglans mandshurica* are the most important East Asiatic species. *Juglans cinerea*, the white walnut or butternut (q.v.), is a close relative. A species, *Juglans insularis*, occurs in Cuba, where it sometimes attains a height of 100 feet.

WALNUT FAMILY. See JUGLANDACEÆ.

WALNUT INSECTS. The chief insect enemy of the black walnut in the United States is the hickory and locust tree borer (*Cyllene pictus*). The beetles which are reared from walnut, however, are larger in size, and their yellowish markings are more or less white. (See LOCUST TREE INSECTS.) The common June beetle (q.v.) of the South is especially fond of the foliage of the walnut. The larvæ of the luna moth and of the regal moth are also found commonly feeding upon walnut leaves, and several species of underwing moths (q.v.) are especially fond of this tree; also one of the hawkmoths (*Cressonia juglandis*), which has a large pale blue-green caterpillar. Several leaf miners and leaf rollers (qq.v.) also attack the foliage, and a weevil (*Conotrachelus juglandis*) allied to the plum curculio feeds in the nuts. A scale insect (*Aspidiotus juglans-regiæ*) occurs on the bark of the English walnut. Forty-five species of insects have been recorded as attacking this tree in the United States, while only 15 are recorded from the so-called English walnut (*Juglans regia*) in Europe. Consult A. S. Packard, *Insects Injurious to Forest Trees* (Washington, 1890).

WALPOLE, wąl'pōl. A town in Norfolk Co., Mass., 18 miles south by west of Boston, on the New York, New Haven, and Hartford Railroad (Map: Massachusetts, E 4). It contains a public library and the Union Training School, has a paper mill, rubber factory, dyeing and bleaching works, machine shop, tannery, sandpaper mill, and manufactures medical supplies, asbestos products, felt goods, asphalt roofing, etc. Pop., 1900, 3572; 1910, 4892.

WALPOLE. A town in Cheshire Co., N. H., 18 miles by rail northwest of Keene, on the Boston and Maine Railroad (Map: New Hampshire, D 7). The high school and Bridge Memorial Library are attractive features. Walpole is essentially a farming town and has a great many places of historical interest. Its first charter was granted in 1752 Pop., 1900, 2693; 1910, 2668.

WALPOLE, wąl'pōl, HORACE or HORATIO, fourth EARL OF ORFORD (1717–97). An English littérateur He was probably the fourth son of Sir Robert Walpole, although some of his contemporaries believed the scandal according to which Carr, Lord Hervey, was his father, owing to the remarkable differences in temperament and taste between Horace and his brothers He was educated at Eton and Cambridge, afterward traveling abroad for some years, principally in Italy. In 1741 he returned to England and took his seat in Parliament. In 1747 he purchased a piece of ground near Twickenham, and built there his famous mansion and literary establishment—Strawberry Hill. In 1758 he published his *Catalogue of Royal and Noble Authors*. This was followed by *The Castle of Otranto* (1764), a weird tale of mystery which was one of the earliest signs of the Romantic movement, *The Mysterious Mother*, a tragedy (1768); and the *Historic Doubts on the Life and Reign of Richard III* (1768). Among a multitude of works, however, those to which he owes the preservation of his name are his *Letters*. These will always be interesting as pictures and records of the society and fashionable gossip of his day, although their historical value is considerably marred by their evident want of truthfulness. Though Walpole thought of himself rather as a fine gentleman who condescended to write than as a professional author, the literary value of his *Letters* is very high, and sets him at the head of English letter writers. On the death of his nephew in 1791 he became fourth Earl of Orford, but seems never to have cared to exercise his privileges as a member of the House of Lords. The best edition of the *Letters* is by Mrs. Paget Toynbee (16 vols., London, 1904), others are edited by Cunningham (ib., 1886), and by Yonge (ib., 1891). Among his other writings in modern editions are *Memoirs of the Last Ten Years of George II* (London, 1846); *Memoirs of the Early Reign of George III* (ib., 1845); *Journal of the Reign of George III from 1771 to 1783* (ib., 1859). Consult also: Eliot Warburton, *Memoirs of Horace Walpole* (London, 1851); T. B. Macaulay's well-known essay on Walpole in the *Edinburgh Review* for October, 1833, edited by G. A. Watrous (New York, 1901); Austin Dobson, *Horace Walpole* (ib., 1890); M. A. Havens, *Horace Walpole and the Strawberry Hill Press* (ib., 1901); *Correspondence of Gray, Walpole, West, and Ashton, 1734–1771*, with introduction, notes, and index by Paget Toynbee (2 vols., Oxford, 1916).

WALPOLE, HUGH SEYMOUR (1884–). An English novelist, son of the Rt. Rev. G. H. S. Walpole, Bishop of Edinburgh. Educated at King's School, Canterbury, and at Emmanuel College, Cambridge, he subsequently taught school for a time, and would seem to have drawn upon his experience as a schoolmaster when he wrote his first novel, *The Wooden Horse* (1909). After the publication of that book, he turned to literature as a profession, and wrote successively: *Maradick at Forty* (1910); *Mr. Perrin and Mr. Trail* (1911); *The Prelude to Adventure* (1912); *Fortitude* (1913); *The Duchess of Wrexe* (1914); *The Golden Scarecrow* (1915); *The Dark Forest* (1916). In 1916 he served with the Russian Red Cross in the European War.

WALPOLE, SIR ROBERT, first EARL OF OR-

FORD (1676–1745). An English statesman, born at Houghton, Norfolk, and educated at Eton and King's College, Cambridge. He was elected to Parliament from the family borough of Castle Rising in 1701, and from the more important constituency of King's Lynn in 1702. Through membership in the council to Prince George of Denmark in 1705, and services as Secretary of War from 1708 to 1710, he won a high position in the Whig councils, only to fall with his party through the failure of the impeachment proceedings against Sacheverell. A brilliant share in the opposition incurred for him the bitter enmity of the Tories. Reelected to Parliament from King's Lynn in 1713, the accession of George I in the following year secured his return to ministerial favor. Serving at first as Privy Councilor and Paymaster-General of the forces, on the impeachment, largely through his endeavors, of the Bolingbroke ministry, he was in 1715 made Chancellor of the Exchequer and First Lord of the Treasury. Disunion in the cabinet during the year 1717 led to his resignation and the transfer of his energy to the opposition, in which he was a most determined enemy of the South Sea scheme. Restored to the paymastership of the forces in 1720, the disastrous failure of the South Sea bubble was followed in 1721 by his elevation for the second time to the office of First Lord of the Treasury and Chancellor of the Exchequer. From this time until his retirement in 1742, the life of Walpole may be said to be the history of England. "But his long administration is almost without a history," says Green; "all legislative and political activity abruptly ceased with his entry into office." His policy throughout was peace abroad and sound finance at home. Frauds in the excise during 1733, and the unpopular Gin Act of 1736, weakened his hold on popular affection; and quarrels between the King and the Prince of Wales in 1737, together with the Spanish War, into which the ministry was forced in 1739, led to the overthrow of Walpole in 1742. He resigned February 2 of that year and was created Earl of Orford. His name is chiefly remembered for his frank avowal of the necessity of parliamentary corruption.

In addition to the various parliamentary records, source material of value may be found in the writings of Horace Walpole (q.v.). Consult: William Coxe, *Memoirs of the Life and Administration of Sir Robert Walpole, Earl of Orford* (4 vols., London, 1798), the standard biography; John Morley, *Walpole* in "Twelve English Statesmen Series" (ib., 1890); N. A. Brisco, *The Economic Policy of Robert Walpole* (New York, 1907).

WALPOLE, SIR SPENCER (1839–1907). An English historian, grandson of Spencer Perceval (q.v.). He was educated at Eton, and held several minor governmental positions, but is known chiefly for his historical works. His *History of England from 1815*, which appeared in five volumes from 1878 to 1886, is in some respects the best work that appeared on England in the nineteenth century. In 1898 Walpole was knighted. Other works by him are *Life of the Right Honorable Spencer Perceval* (2 vols., 1874); *The Electorate and the Legislature* (1881; 2d ed., 1892); *Foreign Relations* (1882); *Life of Lord John Russell* (2 vols, 1891); *The History of Twenty-Five Years* (4 vols., 1904–08); *Essays Political and Biographical* (1908). Consult J. F. Rhodes, *Historical Essays* (New York, 1909).

WALPURGA, väl-pur'gȧ, or **WALPURGIS,** -gēs, or **WALBURGA,** SAINT (?–c.780). An early missionary to Germany, born in Sussex, England, the niece of St. Boniface and the sister of Saints Willibald and Wunnibald. She went to Germany, where her uncle and brothers had founded Christian establishments, about 750, and founded a nunnery at Bischofsheim, and in 754 became abbess in the double monastery of Heidenheim, where Wunnibald was abbot. Upon his death in 760, she succeeded him as head of both parts of the monastery. Bishop Otgar (879–880) caused her bones to be removed to Eichstätt, where later the nunnery of St. Walpurgis arose. From the rock in which her tomb was made an oil exuded, believed to come from the body of the saint and to be of medicinal value. On account of this she is pictured as bearing a vial of oil. She is the patron saint of various places in Germany, and her cult has spread to France, England, and the Netherlands. The true day of the saint is February 25, but her name, without good reason, became attached to May 1, and took up customs inherited from an ancient spring festival. With these ideas witch superstitions became connected in the Middle Ages, and Walpurgisnacht, between April 30 and May 1, was regarded as the time of the witches' assembly. This was held at various places, but the Brocken, or Blocksberg, in the Hartz Mountains was the most famous. Goethe's *Faust* makes use of the superstition. Walpurga was regarded as the protector from magic. Consult Ballandist, *Acta Sanctorum III*, February 25; F. Schanerte, *Die Heilige Aebtissin Walpurga* (Paderborn, 1892); G F. Brown, *Boniface of Crediton and his Companions* (London, 1910).

WALRAS, väl'ras', MARIE ESPRIT LÉON (1834–1910). A French economist, born at Evreux. From 1870 until his retirement in 1892 he was professor of political economy at the University of Lausanne. Walras became known for his employment of the so-called mathematical method in economics, of which his *Eléments d'économie politique pure* (1874; 4th ed., 1900) is a good example. His writings include, also: *Francis Sauveur* (1858); *L'Economie politique et la justice* (1860), which refuted the economic doctrines of Proudhon; *Théorie critique de l'impôt* (1861); *Recherches de l'idéal social, théorie générale de la société* (1868); *Etudes d'économie sociale* (1896).

WALRUS, wôl'rŭs (Swed. *hvalross*, Dan. *hvalros*, walrus, whale horse, from Swed., Dan. *hval*, whale + Swed. *hross*, Dan. *hros*, horse). One of the largest animals of the seal tribe (Pinnipedia), the two species of which constitute the family Trichechidæ (formerly Rosmaridæ) and classified on anatomical grounds between the eared seals (otaries) and earless or common seals, though having little external resemblance to either. The form is thick and clumsy (see Colored Plate of SEALS), and a full-grown male will measure 12 feet in length and may exceed 2200 pounds in weight; females are somewhat smaller. Young ones are thickly clothed with a faded brown fur, but as age advances this falls out, and old individuals are almost naked. The blunt muzzle is set with a thick mustache of bristles, which with the lips is very mobile. The ear is marked only by a fold of skin. The primary characteristic of the family is the possession of a pair of enormous tusks (the canine teeth), which project downward from the upper jaw, and are solid ivory, hard and more yellow-

ish than those of elephants Those of the female are longer (reaching sometimes 30 inches) than the male's, but his are stronger and thicker. For the support of these huge teeth—used as pickaxes in digging up mollusks, for aid in climbing on ice or rocks, and as weapons—the anterior part of the skull is greatly enlarged and strengthened. Most of the other teeth fall out, so that an old walrus has in the upper jaw, besides the tusks, only two incisors and three pairs of molars, and in the lower jaw no incisors, two canines, and four pairs of molars. These animals are confined to northern shores, and two species are known—the Atlantic (*Odobœnus* or *Trichecus rosmarus*) and the Pacific walrus (*Odobœnus obsesus*). The latter is rather larger and more obese than its congener, and the tusks are usually longer and thinner. The Atlantic walrus, the rosmarus or morse of old writers, is found from the archipelago north of America eastward to about the mouth of the Yenisei, and in Hudson Bay, Labrador, and Greenland, but it no longer, as formerly, comes south to Nova Scotia or southern Norway, and is scarce around Spitzbergen and Nova Zembla. The Pacific walrus is no longer seen south of the Aleutian Islands, and does not pass eastward of Point Barrow, nor much west of Bering Strait.

They pass most of their time near ocean shores, resting in crowds on the floating ice, and do not often go ashore except in early summer, when the females produce their one or two young. The period of gestation is said to be about nine months. Their food consists mainly of clams, dug with the tusks; seaweed is also eaten. The flesh is an important factor in the sustenance of the natives of Arctic coasts, but is not well liked by civilized men. The diminution of the Pacific walrus has been a serious deprivation to the natives of Alaska and neighboring Siberia, threatening famine here. Their greatest natural enemy is the polar bear. Their oil is inferior in quantity and quality to that of seals; but the thick hide is used in Russia and Scandinavia as sole leather and for harness and ship rigging, while the ivory is valuable. This commercial importance has led to a steady hunting of the animal, and the race is diminishing in all accessible parts of its habitat. Occasionally a young one is captured alive, and shows docility and some intelligence, but none have long survived captivity.

Consult Allen, *North American Pinnipeds* (Washington, 1880), which contains an exhaustive treatment and bibliography of the subject.

WALSALL, wôl'sąl. A manufacturing market town, municipal, and parliamentary borough, in Staffordshire, England, on an eminence near the Tame, eight miles northwest of Birmingham (Map: England, E 4). The town has fine ecclesiastical and municipal buildings, markets, and a free library; it has built artisans' dwellings and it owns the tramways and other works. Coal, iron, limestone, and clay are obtained in the neighborhood; tanning, malting, and the manufacture of hardware, saddlery and other leather goods, and iron and brass founding, are the industries. Walsall was fortified early in the tenth century and received charters from Edward III and Henry IV, confirming prior royal privileges. Pop., 1901, 86,440; 1911, 92,130. Consult Willmore, *History of Walsall* (1887).

WALSCHMIDT, väl'shmĭt, MAX. See SCHMIDT, MAX.

WALSH, EDWARD (1805–50). An Irish poet whose significance lies in his relation, as a precursor, to the Celtic revival (see IRISH LITERATURE, *Irish Literature in English*). Born in Londonderry, Walsh became a teacher, and, eventually and incongruously, a schoolmaster to convicts on Spike Island Up to 1848 he was a regular contributor to the Irish patriotic paper the *Nation*. He collected, and made known to English-reading people, many fine waifs and strays of Irish popular poetry. His work is represented in his *Reliques of Irish Jacobite Poetry* (1844) and *Irish Popular Songs* (with translations and notes, 1847). Walsh is to be associated with J. J. Callanan, who was the first to give adequate English renderings of Gaelic poems.

WALSH, FRANCIS PATRICK (1864–) An American lawyer and investigator. Born in St. Louis, he was educated there in St. Patrick's Academy, was admitted to the Missouri bar in 1889, and was a member of the Kansas City Tenement Commission in 1906–08 In the same city Walsh became attorney of the Board of Public Welfare in 1908 and president of the Board of Civil Service in 1911. In 1913 he was appointed by President Wilson chairman of the Federal Commission on Industrial Relations, in which office he attracted attention by his investigation in 1914 of industrial conditions in Colorado.

WALSH, JAMES JOSEPH (1865–). An American physician and author, born in New York City. He graduated from Fordham College in 1884 (Ph.D., 1892) and from the University of Pennsylvania (M.D.) in 1895. After postgraduate work in Paris, Vienna, and Berlin he settled in New York, where in 1906 he became professor of physiological psychology at Cathedral College and professor of nervous diseases in and dean of the Fordham Medical School. He resigned his Fordham offices in 1912. In 1916 he received the Lætare medal (q.v.). He contributed to medical and other journals, and published various works of popular type: *Catholic Churchmen in Science* (1906; 2d series, 1909; 3d series, 1915); *Makers of Modern Medicine* (1907); *The Popes and Science* (1908; new ed., 1915); *The Thirteenth, Greatest of Centuries* (3d ed., 1910); *Modern Progress and History* (1912).

WALSH, ROBERT (1784–1859). An American publicist. He was born in Baltimore, was educated at the Jesuit College of Georgetown, and for a short time practiced law. From 1811 to 1813 he published the first quarterly in the United States, the *American Review of History and Politics*, revived by him in 1827–37. From 1821 to 1837 he edited the *National Gazette*, and in 1822 the *Museum of Foreign Literature and Science*. In 1837 he removed to Paris, where from 1845 to 1851 he was United States consul. He contributed to many publications of the time, and his books include a *Letter on the Genius and Disposition of the French Government* (1810), *Correspondence Respecting Russia* (1813), an *Essay on the Future State of Europe* (1813), and *An Appeal from the Judgments of Great Britain* (1819).

WALSH, THOMAS JAMES (1859–). An American legislator, born at Two Rivers, Wis. He graduated LL.B. from the University of Wisconsin in 1884, and then took up the practice of law at Redfield, S. Dak. Moving to Helena, Mont., in 1890, he became interested in land and cattle companies in that State in addition

to his law practice Walsh was unsuccessful as Democratic candidate for Representative in Congress in 1906 and for Senator in 1910, but was elected to the latter office for the term 1913–19. He served as a delegate to the Democratic National Conventions in 1908 and 1912.

WALSH, WILLIAM J (1841–1921) An Irish Roman Catholic prelate. He was born in Dublin and educated at Maynooth College, where he became professor of dogmatic and moral theology in 1867. He was made vice president in 1878, and in 1881, on the death of Dr. Russell, was unanimously chosen president by the Irish bishops. He was consecrated Archbishop of Dublin in 1885, and since then has been a member of many important government commissions. besides having had great influence in the framing of the Irish Land Act of 1881, of which he published a *Plain Exposition* in the same year. His other works include a *Harmony of the Gospel Narratives of the Passion* (1885) and *Bimetallism and Monometallism* (1893).

WALSINGHAM, wŏl'sĭng-ăm, ALAN DE An English prelate and architect of the fourteenth century, subprior of Ely in 1321 and prior from 1341. He is principally famed for the great octagon and lantern which he erected after the fall of the Norman tower over the crossing had wrecked the central part of the cathedral. Here he created an octagonal rotunda about 80 feet in diameter, and covered it with a pseudo-vault and lantern, all of wood, externally covered with lead—a unique feature of Gothic architecture.

WALSINGHAM, SIR FRANCIS (c.1530–90). An English statesman, born either in London or in Kent. He studied at King's College, Cambridge, but appears not to have graduated. He was a zealous Protestant and lived abroad during the five years of Mary's reign, acquiring a knowledge of foreign languages and politics which was of the utmost value to him in his conduct of England's foreign affairs under Elizabeth. Burleigh sent him on a difficult mission to France in August, 1570. He remained in Paris until April, 1573, and acquitted himself so well that he was made one of the principal secretaries of state, a member of the Privy Council, and knighted. He labored incessantly for intervention in the Netherlands and the suppression of Catholic plots which Spain encouraged in England. In 1578 Walsingham was sent to the Netherlands with the unwelcome task of trying to pacify the country by diplomacy; in 1581 he was sent to France and in 1583 to Scotland. In 1585 he brought Elizabeth to a momentary support of the Dutch, but the results did not meet his expectations. In 1586 he unearthed the Babington plot, the object of which was the murder of Queen Elizabeth, and Walsingham produced letters in Mary's cipher, which, if genuine, proved beyond a doubt Mary's complicity in the conspiracy. (See BABINGTON, ANTONY.) Walsingham was one of the commissioners by whom Mary was tried and condemned, and he was one of the most active in bringing Elizabeth to the point of signing the death warrant. In 1587 and 1588 Walsingham's secret service kept him completely informed of the plans and progress of the great Armada (q.v.). During Walsingham's last years he was greatly embarrassed by debt, due in part to expenditures in the service of the state, but Elizabeth gave him no relief. He died April 6, 1590, and was buried privately at night in St. Paul's Church. The Camden Society has published *Sir Francis Walsingham's Journal* from December, 1570, to April, 1583 (London, 1870). Consult: Thomas Wright, *Queen Elizabeth and her Times, a Series of Original Letters* (London, 1838), M. A S Hume, *The Great Lord Burleigh* (ib., 1898); Karl Stahlin, *Sir Francis Walsingham und seine Zeit* (Heidelberg, 1908).

WALSINGHAM, THOMAS (?–c.1422). An English monk and historian, supposed to have been born in Norfolk. He was connected with the Abbey of St. Albans as precentor and scriptorarius, and in 1394 he became prior of Wymondham. He is thought to have composed: *Chronicon Angliæ*, covering the period from 1328 till 1388 ("Rolls Series" for 1874); *Gesta Abbatum*, history of the abbots of St Albans ("Rolls Series" for 1867–69, in 3 vols.), *Historia Anglicana*, covering the years 1272–1422 ("Rolls Series" for 1863–64); *The Ypodigma Neustriæ*, a history of the dukes of Normandy ("Rolls Series," 1876); and other works. Although he was a chronicler rather than an historian, his works form the chief source upon the reigns of Richard II, Henry IV, and Henry V, including the career of Wiclif and the insurrection of Wat Tyler. Consult Charles Gross, *Sources and Literature of English History* (2d ed., London, 1915).

WALT, vâlt, ABRAHAM. See LIESIN, ABRAHAM.

WALTER, wal'tẽr, EUGENE (1874–). An American playwright, born in Cleveland, Ohio. He began his career as a reporter on the Cleveland *Plain Dealer* and was later connected with several newspapers in different parts of the country. Subsequently he acted as advance agent and business manager for various traveling theatrical companies. He began writing for the stage in 1900, and his first successful play, *Paid in Full*, was produced in New York in 1908. The best known of his later plays are *The Easiest Way* (1908), *Fine Feathers* (1911), and *Just A Woman* (1916). He was married to Charlotte Walker, the actress, in 1908.

WALTER, HUBERT (c.1150–1205). An English statesman and ecclesiastic. In 1184 and 1185 he was a baron of the exchequer and in 1189 was one of the justices of the Curia Regis. Richard appointed Hubert Bishop of Salisbury, and he accompanied the King on the Crusade and distinguished himself by his courage, astuteness, and charity. In 1193 Hubert Walter returned to England and superintended the collection of money for Richard's ransom. At the same time he was chosen Archbishop of Canterbury, and when at the end of this year King Richard returned from his German prison, he appointed Hubert justiciar of the realm, and left him virtual ruler of England. But the Cathedral Chapter objected to the employment of the Archbishop in the royal service, and in 1198 Innocent III compelled him to resign by forbidding priests to hold secular offices. Nevertheless Hubert still continued to exert considerable influence, and acted as a restraint on John, which was sadly missed after his death. Consult Kate Norgate, *England under the Angevin Kings*, vol. ii (London, 1887); William Stubbs, *Constitutional History of England*, vol. i (6th ed., Oxford, 1897).

WALTER, JOHN (1739–1812). The founder of the London *Times*. He was born in London, the son of a coal merchant, to whose business he succeeded in 1755. He was very successful and established the coal exchange. In 1781, however, he retired from the coal business in order to take up the vocation of an underwriter

While at first successful, his speculations resulted in his failure in 1782. He succeeded in paying his creditors, who thereupon made him a gift of money With this sum Walter purchased the patents of a new printing process and established the printing office in Blackfriars (1784), which is still the seat of *The Times*. On Jan. 1, 1785, appeared the first issue of *The Daily Universal Register*, which on Jan. 1, 1788, was changed to *The Times, or Daily Universal Register*, and on March 18 of that year became simply *The Times*. From the first it showed that attention to Parliamentary debates and that independence of attitude which have always been its distinguishing characteristics. Indeed, Walter was twice imprisoned and five times fined for libel, in consequence of the freedom of his comments. See TIMES, THE.

WALTER, MASTER. The title character in Sheridan Knowles's comedy *The Hunchback* The rôle was created at Covent Garden, April 5, 1832, by the author himself.

WALTER, THOMAS USTICK (1804–87). An American architect, born in Philadelphia He was the pupil of William Strickland in that city and of William Mason, the water colorist. Establishing himself in Philadelphia in 1830, he constructed the county prison at Moyamensing in 1831. In 1833 his design for Girard College was accepted; it was the most ambitious architectural effort of its time in the style of the Greek Revival. In 1836 he was sent by the directors to Europe to study the best methods of fitting up this institution During the next ten years he designed the breakwater at La Guayra, Venezuela; St. George's Hall, the Preston Retreat, and several banks and churches, all in Philadelphia, and the Biddle and Cowperthwaite mansions on the Delaware. In 1848 he was commissioned by President Fillmore to undertake the enlargement of the Capitol at Washington and to superintend the work. He designed the fine north and south wings for the Senate and House and the imposing dome over the rotunda, though this was not completed until 1873. Walter also designed and completed the extensions of the Patent Office and Post Office, the hospital for the insane, and the Treasury building. He built marine barracks at Brooklyn and at Pensacola. After his return to Philadelphia in 1862 his only professional work was the supervision of the construction of the city hall, after the death of its architect McArthur. The American Institute of Architects, which he had founded in 1837, and assisted to reorganize in 1857, elected him president in 1876. Walter was the most accomplished architect of his time in America, a master of monumental design, and a consummate draftsman.

WALTER DE HENLEY. See HENLEY, WALTER DE.

WALTERS COLLECTION. One of the most important art collections in the United States, located at Baltimore. It was begun by William Thompson Walters (1820–94), merchant and capitalist, who had been art commissioner from the United States to the Paris expositions of 1867 and 1878 and to the Vienna Exposition in 1873. He acquired an extraordinary collection of modern French paintings, including many celebrated pieces, the most extensive existing collection of bronzes and water colors by the French sculptor Barye (q.v.), and a unique collection of Chinese porcelains, especially peach blooms, which he was the first Occidental collector to appreciate. His collection was much increased by his son Henry Walters, who constructed the building which was opened to the public in 1909. To him the museum owes its collection of ancient art, particularly Greek and Roman sculptures, Italian paintings, including the "Madonna of the Candelabra," Limoges enamels, and other departments Consult: S. W. Bushell, *Oriental Ceramic Art-Collections of W. T. Walters* (New York, 1899), a manual of the subject with magnificent folio reproductions, R B. Gruelle, *Notes Critical and Biographical—Collection of W. T. Walters* (Boston, 1895).

WALTERSHAUSEN, AUGUST See SARTORIUS VON WALTERSHAUSEN.

WALTHAM wŏl'tham. A city in Middlesex Co., Mass, 10 miles west of Boston; on the Charles River and on the Boston and Maine Railroad (Map: Massachusetts, E 3). It is situated on both banks of the river and is well laid out. Among the institutions of the city are the Waltham Nurses' Training School, which is widely known for its development of the district-nursing system, the Waltham Hospital, the Massachusetts School for the Feeble Minded, the Waltham New Church School, Notre Dame Normal Training School, and the Leland Home for Aged Women. There is a public library with 27,000 volumes. The city has also several public parks, the largest of which is Prospect Hill The Norumbega Tower is of interest. Waltham is chiefly an industrial city, and is especially noted for its watch-making interests, one of its watch factories, the American Waltham, being among the largest concerns of its kind in the world. There are also extensive manufactories of canoes. Other important establishments are iron and brass foundries and manufactories of watch tools, dials, church organs, aeroplanes, automatic machinery, automobiles, buckle-factory products, cotton cloth, bicycles, etc. According to the census of 1909 the invested capital in all industries was $12,871,000 and the output was valued at $7,814,000. Pop., 1900, 23,481; 1910, 27,834; 1915 (State census), 30,154; 1920, 30,915. Until separately incorporated as a town in 1738, Waltham formed a part of Watertown. It was chartered as a city in 1884. Consult Rutter, *Historical Address* (Waltham, 1877), and Hurd, *History of Middlesex County* (Philadelphia, 1890).

WALTHAM (wŏl'tam) **ABBEY,** or WALTHAM HOLY CROSS. A market town in the county of Essex, England, on the Lea, 12 miles north of London (Map: London, A 8). The town takes its name from the Abbey of the Holy Cross, founded by King Harold, who is buried there. Of the magnificent Norman church only the nave remains, but this is held to be one of the finest specimens of this style in England. The reconstructed Temple Bar, which from 1670 to 1880 stood at the west end of Fleet Street, London, marks one of the entrances to Theobald's Park. The government gunpowder and flour mills, operated by the water power of the Lea, the celebrated government Enfield factory for rifles, etc., at Enfield Lock, and large cordite factories at Quinton Hill just outside the town, are the chief industrial establishments. Pop., 1901, 6547; 1911, 6795. Consult Stubbs, *Foundation of Waltham Abbey* (London, 1860).

WALTHAMSTOW, wŏl'tam-stō. A town in Essex, England, 6 miles northeast of St.

Paul's, London (Map: London, C 8). It is mainly a residential suburb of London and brewing is its chief industry. It contains a number of educational institutions, the most important of which is Forest School, a large public school for boys. Pop., 1901, 95,125; 1911, 128,051

WALTHER, väl'tĕr, CARL FERDINAND WILHELM (1811–87) An American Lutheran theologian, born at Langenchursdorf, Germany He studied at Leipzig (1829–33), held a pastorate at Braunsdorf (1837–38), and in 1839 came to the United States. Settling in Missouri, he became pastor of the Lutheran congregation at St. Louis in 1841, and in 1847 founded the Lutheran Synod of Missouri, of which he was president. In 1849 Walther became directing professor of the Synod's theological seminary, which was then transferred to St Louis. He edited *Der Lutheraner* (1844–87) and *Lehre und Wehre* (1855–87), and was author of *Die rechte Gestalt einer vom Staate unabhangigen evangelisch-lutherischen Ortsgemeinde* (1863); *Amerikanisch-lutherische Evangelien-Postille* (1871; 9th ed., 1883); *Amerikanisch-lutherische pastoral Theologie* (1872), *Lutherische Brosamen* (1876); *Kasual Predigten und Reden* (1889).

WALTHER, väl'tĕr, WILHELM (1846–) A German Evangelical theologian, born at Cuxhaven. Educated at Erlangen, Marburg, and Göttingen, he was pastor in his native place in 1870–95, and thenceforth held the chair of the history of theology at Rostock. His writings include: *Luther im neuesten romischen Gericht* (4 parts, 1884–92); *Die deutsche Bibelubersetzung des Mittelalters* (3 parts, 1889–91); *Melanchthon als Retter des wissenschaftlichen Sinnes* (1897); *Adolf Harnacks Wesen des Christentums fur die christliche Gemeinde gepruft* (1901, 5th ed., 1904); *Das Erbe der Reformation in Kampfe der Gegenwart* (3 parts, 1903–09); *Deutschlands Schwert durch Luther geweiht* (1914); *Friedenswunsche* (1915).

WALTHER VON DER VOGELWEIDE, väl'tĕr fŏn dĕr fō'gel-vī'de (c.1165–c 1230). A Middle High German minnesinger. Under Reinmar der Alte Walther learned the art of Minnesong (see MINNESINGER) at Vienna, where he seems to have remained till the confusion that followed the death of the German Emperor Henry VI in 1197 and of the Austrian Duke Frederick the Catholic in 1198, made him a wandering singer. Walther became a partisan of Philip, Duke of Swabia, who had been chosen King in March, 1198. After Philip's assassination (1208) he was for a while in the service of the Landgrave Hermann of Thuringia, and he was influenced deeply by St. Elizabeth of Hungary. By his songs he continued to influence the art and politics of his time, till at length Frederick II, in recognition of his services to the German national cause, granted him an estate near Wurzburg (1220). It was for this Emperor's long postponed Crusade that Walther wrote (c.1227) his noble *Kreuzlied* He may have taken part in the Crusade of 1227–28. He died at Wurzburg, where his grave is still shown. In his poetry Walther passed from a period of introspective analysis, through a protest against the artistic conventions of traditional Minnesong to a virile criticism of literary sentimentality and social degeneracy, so that his maturer work is prevailingly ethical, politically or religiously didactic. His patriotism was broadly German. He appears at his best in the *Sprüche*, models of didactic compactness. But he is also a master of the pure lyric. Of these *Under der linde an der heide* is the most noted. His opponents called him a demagogue, and he certainly was a political agitator of unflinching courage, but he was also Germany's greatest lyric poet before Goethe.

Walther's *Works* are edited by Lachmann (Berlin, 1827), Wackernagel and Rieger (Giessen, 1862), Pfeiffer (Leipzig, 1864), Paul (Halle, 1882), and Wilmanns (ib., 1883). There are modern German versions by Simrock (Berlin, 1833), Schroter (Jena, 1881), and Menzel (Plauen, 1888); and *Lives* by Uhland (Stuttgart, 1822), Menzel (Leipzig, 1865), Wilmanns (Bonn, 1882), Schönbach (Berlin, 1895), Burdach (Leipzig, 1900); Hentschel (Vienna, 1908). Consult the *Bibliography* by W. Leo (i.e., Baron von Lutgendorf) (Vienna, 1880), and Hornig, *Glossarium* (Quedlinburg, 1844).

WALTON, wal'ton. A village in Delaware Co., N Y., 17 miles southwest of Delhi, on the Delaware River and on the New York Ontario and Western Railroad (Map: New York, E 6). There are a large condensed-milk plant and manufactories of children's carriages and toys, and iron castings. Pop., 1900, 2811; 1910, 3103.

WALTON, wal'ton, BRIAN (1600–61). The editor of Walton's polyglot Bible. He was born, probably at Seymour, Yorkshire, studied at Cambridge, was ordained in 1623, and became rector of St. Martin's Orgar, London, 1628; and also of Sandon in Essex, 1636. He was deprived of his rectories by Parliament; but, undismayed, he planned the famous polyglot Bible, for which £9000 was subscribed. It was published in London in 1654–55. (See POLYGLOT) He had various learned helpers, but the editorship devolved on himself. At the Restoration Walton regained his preferments, and was consecrated Bishop of Chester in 1660. Consult his memoirs by Todd (London, 1821).

WALTON, FREDERICK PARKER (1858–). A Canadian legal scholar. He was born at Nottingham, England, and graduated at Oxford, Edinburgh, and Marburg universities. He was admitted to the Scottish bar in 1886, was lecturer on Roman law at Glasgow University (1894–95), and was joint editor of the *Juridical Review*. Removing to Canada, he served as dean of the law faculty of McGill University from 1897 to 1912, when he was appointed one of the legal advisers to the British administration in Egypt. He published *The Workmen's Compensation Act, with Commentary* (1910).

WALTON, GEORGE (1740–1804). An American lawyer. He was born in Frederick Co., Va., began his career as a carpenter's apprentice, but devoted his leisure to study, and was admitted to the Georgia bar in 1774. He was very active in opposing the policy of the English government towards the Colonies, was a delegate to Congress, 1775, was a colonel of militia, and was wounded and taken prisoner when Savannah was captured by the British in 1778. He was released in 1779 and was elected Governor of Georgia; he was Chief Justice of that State, 1783–93, was a justice of the United States Supreme Court in 1793, and United States Senator 1795–96. He was one of the signers of the Declaration of Independence. He died at Augusta, Ga., in 1804.

WALTON, IZAAK (1593–1683). An English author He was born in the Parish of St. Mary, Stafford, Aug. 9, 1593, and seems to have gone to London about 1611. The belief almost universally expressed by biographers until recent

years that he was a sempster or a linen draper is contradicted by the records of the Ironmongers' Company, which show that Walton was made a member of that company in 1618; and the license for his first marriage in 1626 describes him as an ironmonger. He was living in Fleet Street, London, in 1624, and the books of St. Dunstan's Parish show that from 1628 to 1644 his home was in Chancery Lane, where Dr. John Donne was his friend and neighbor. After a few years (until 1651) spent partly at Stafford and partly in visiting the families of the eminent clergymen of England, of whom he was much beloved, he took up his residence probably at Clerkenwell, where he was living in 1653, when the first edition of *The Compleat Angler* appeared. When the Restoration was effected he made his home for the most part with Bishop Morley of Winchester and Bishop Ward of Salisbury, and died at Winchester, Dec. 15, 1683

The earliest of Walton's writings that we have is "An Elegie," added to the 1633 edition of Donne's poems When Donne's sermons were published in 1640 they were prefaced by a *Life* from Walton's pen, revised and separately published in 1658. The affectionate intimacy of its tone, and its artless blending of simplicity, piety, and humor, well show why Walton was so lovingly regarded by Wotton, Hales, Drayton, and other famous contemporaries, and give ample credence to Boswell's statement that the book was a favorite of Dr. Johnson's. Similar in spirit are his biographies of Sir Henry Wotton (1651); of Richard Hooker (1665), which was prefixed the following year to Hooker's *Ecclesiastical Polity;* of George Herbert (1670); and of Robert Sanderson (1678). All save the last appeared in one volume in 1670. The work for which Walton is best known and loved is *The Compleat Angler, or the Contemplative Man's Recreation,* of which Lamb said, "It would sweeten a man's temper at any time to read it." It is a rambling dialogue—such at least in the first edition, though the 1655 edition sustains the conversation with three characters—on all that pertains to the angler's art, charming in its pastoral freshness and the archaic quaintness of its style, and full of the gentle, kindly, sincere spirit of the man. It is of little value now in its intended function of a treatise, but it will always survive as a fishing idyll of great beauty.

Appearing in five editions in Walton's lifetime, it has since been published more than 100 times; and the demand for "Waltoniana" has given a high value to the earlier copies. A supplement upon fly-fishing, by his close friend, Charles Cotton, was added to the fifth edition and now forms the second part of the work. Consult: R. B. Marston, *Life of Izaak Walton* (London, 1888); Westwood and Satchell, *Bibliotheca Piscatoria* (ib., 1883); R. B. Marston, *Walton and Some Earlier Writers on Fish and Fishing* (ib., 1894); Edward Marston, *Thomas Ken and Izaak Walton* (New York, 1908).

WALTON-LE-DALE. A cotton-spinning town in Lancashire, England, a suburb two miles southeast of Preston (q.v.) (Map: England, D 3). Pop., 1901, 11,271; 1911, 12,350.

WALTON-ON-THAMES. A favorite pleasure, angling, and residential resort in Surrey, England, 17 miles southwest of London. Pop., 1901, 10,329; 1911, 12,856.

WALTZ (Ger. *Walzer,* round dance, roller, from *walzen,* OHG. *walzan,* AS. *wealtan,* obsolete Eng. *walt,* to roll). A round dance, originally of French origin, but so modified in Germany as to belong really to that country It became popular on the Continent at the beginning of the nineteenth century, and was introduced into England in 1812. It is danced to music of $\frac{3}{4}$ time by any number of couples, who wheel rapidly round on an axis of their own, advancing at the same time round the room. The great composers of the waltz are the two Johann Strausses (father and son). Waltzes written by some classical masters are not intended for dancing. They are high-art forms, having little relation to the dance other than the $\frac{3}{4}$ time. Chopin is the originator of this form of waltz. Many other composers have cultivated this form, generally adding some adjective to the title, as "valse noble," "valse characteristique," "valse mélancholique" Consult B. Weigl, *Geschichte des Walzers* (Langensalza, 1910).

WALTZ, välts, JEAN JACQUES (1873–) A French writer and cartoonist, who used the pseudonym "Onkel Hansi." He was born at Kolmar, Alsace, and studied at the Beaux-Arts, Paris. He became a contributor to the journal *Durchs-Elsass,* and was made a chevalier of the Legion of Honor. For publishing a volume called *Mon Village* (he made Kolmar his home), with text and quaint pictures satirizing German characteristics, he was condemned by the German authorities in July, 1914, to a year in prison, but he escaped to France. During the European War he served in the French army. His *L'Histoire d'Alsace racontée aux petits enfants d'Alsace et de France* (1913), which, from an anti-German point of view, gives a history of Alsace for children, had an enormous sale in France. He published also a volume of caricatures and cartoons under the title *Professeur Knatschké: œuvres choisies du grand savant allemand et de sa fille Elsa* (1915).

WALTZEMÜLLER, MARTIN. See WALDSEEMÜLLER.

WALWORTH, wąl'wŭrth, REUBEN HYDE (1789–1867). An American lawyer. He was born at Bozrah, Conn., and early taught school. At 17 he began the study of law and in 1809 was admitted to the bar. In 1810 he settled at Plattsburg, N. Y., and in 1811 was made master in chancery. During the War of 1812 he served in the New York militia in the vicinity of Plattsburg. He was a member of Congress (1821–23), a justice of the United States Circuit Court (1823–28), and for 22 years chancellor of New York. His decisions are reported in the New York cases of Hill, Wendell, Denio, Barbour, and Page. He published *Rules and Orders of the New York Court of Chancery* (1829), and an elaborate genealogy of the Hyde family

WAMBAIS, wäm'bīs *or* wŏm'bās. See GAMBESON.

WAMBAUGH, wŏm'bą, EUGENE (1856–). An American legal scholar. He was born at Brookville, Ohio, and was educated at Harvard (A.B., 1876; LL.B., 1880). Admitted to the Ohio bar in 1880, he practiced law at Cincinnati until 1889. He was professor of law at the State University of Iowa in 1889–92, and thenceforth at Harvard. In 1906–13 he was a member of the board of editors of the *American Political Science Review,* and in 1908–12 served as special attorney of the United States Bureau of Corporations. He was honored by the degree of LL.D. from several universities. His publi-

cations include *The Study of Cases* (1892, 2d ed., 1894); *Cases for Analysis* (1894), *A Selection of Cases on Agency* (1896); *A Selection of Cases on Insurance* (1902); *Littleton's Tenures* (1903); *A Selection of Cases on Constitutional Law* (4 vols., 1914–15).

WAMPANOAG, wŏm'pa-nō'ăg (people of the eastern country). An important Algonquian tribe, sometimes known as Pokanoket from their principal village, formerly holding the eastern shore of Narraganset Bay, in the present Rhode Island and Massachusetts Their principal village, Pokanoket or Sowams, was at the present Mount Hope, near Bristol. They also ruled over several smaller tribes east and south, including Marthas Vineyard. When the English first settled at Plymouth in 1620 the Wampanoag were said to have 30 villages, and they had several thousand warriors before the great pestilence of 1617, which nearly depopulated the southern New England coast In King Philip's War (see PHILIP, KING) the Wampanoag and Narraganset were practically exterminated, and the survivors fled to the interior or to Canada. Many were sold into slavery. The few spared were settled with some friendly Indians at Saconnet, near Compton, R. I.; the entire body became extinct about 1800.

WAMPUM, wŏm'pŭm (from Algonquian *wompi,* white). A name adopted from the New England tribes to designate the aboriginal shell beads (see SHELL MONEY) used everywhere east of the Mississippi for dress ornamentation, for weaving into symbolic belts, and as a currency medium. The beads were of two colors, white and purple, the latter being the more valuable. They were drilled, shaped, and polished with great care, and were sewn upon shirts, moccasins, belts, and other garments in various ornamental designs. Having a fixed value and being of convenient carriage and in constant demand, they came to be recognized as a regular aboriginal currency among all the Eastern tribes as well as by the early colonists, who by various governmental enactments gave them a legal value in comparison with the English and Dutch coins then in circulation.

Perhaps the most important use of wampum was in the symbolic record belts and strings which gave the stamp of authority to every intertribal transaction. No message from one tribe or council to another was considered official without the delivery at the same time of a string or belt of wampum, which was thenceforth preserved by the recipients as the proof and reminder of the negotiation, the belt being handed over to the keeping of the hereditary or chosen custodian of the records. Such belts usually had the beads arranged in symbolic figures more or less suggestive of the transaction thus ratified. Wampum belts were used in the ratification of every important treaty negotiated with the Eastern tribes from the early Colonial period down to the great intertribal treaty of Prairie du Chien in 1825. In 1843, at the intertribal council at Tahlequah, the Cherokee produced the belts which attested the peace made with the Iroquois before the Revolutionary War. The Iroquois themselves still preserve several of their ancient record belts, and others of historic importance are preserved among the archives of New York State at Albany and elsewhere.

Wampum, as commonly understood, seems to have been unknown among the tribes of the plains and mountains, but shell ornaments of various kinds were made and used on the Pacific coast for decoration and as a currency medium.

WAMPUM SNAKE. See HOOP SNAKE.

WANAMAKER, wŏn'a-māk'ĕr, JOHN (1838–1922). An American merchant and cabinet officer, born in Philadelphia, Pa. He received a common-school education, and for a time was an errand boy In 1856 he entered mercantile life in Philadelphia and gradually built up an enormous retail business. In 1896 he reopened the department store founded in New York by A. T. Stewart He was president of the Young Men's Christian Association in Philadelphia from 1870 to 1883, was one of the founders of the Christian Commission at the time of the Civil War, and was the founder of Bethany Sunday school, of which he was for many years the superintendent From 1889 to 1893 he was Postmaster-General in President Harrison's cabinet

WANDALA, wan-dà'là. A negro kingdom of Africa. See MANDARA.

WANDEL, vän'dĕl, CARL FREDERIK (1843–). A Danish naval officer and explorer. He was director of the Naval Archives (1889–99), and became rear admiral (1899) and vice admiral (1905). He commanded the *Ingolf* surveying expedition to Davis Strait (1896) and participated in the Agassiz Deep-Sea Expedition. From 1890 he was a member of the Greenland Commission, of which in 1895 he was appointed chairman. Wandel gained distinction by his able administration of the scientific explorations of Greenland (q.v.), which were conducted on a grand scale, with such consistent success and judgment as to add enormously to arctic knowledge. The results were published, *passim,* in more than 50 volumes of the *Meddelelser om Grönland* (consult especially vols. v, vi, vii, and xvi). In 1896 Wandel's scientific work was honored by the Danish gold medal of merit. He retired in 1911.

WANDERING CELL. See PHAGOCYTE.

WANDERING JEW, THE. A legendary Jew doomed to wander over the earth until the Day of Judgment. According to the usual version of the story, which is probably ultimately Oriental in origin, Christ, while on his way to Calvary, stopped to rest for an instant before the door of a man named Joannes Buttadeus. This man drove the Saviour away, striking him and saying in mockery: "Go, why dost thou tarry?" At these words Christ, looking sternly on him, replied: "I go, but thou shalt tarry till I come." In consequence Buttadeus became undying, for at the end of each century he suffers a sickness which rejuvenates him to the age of 30. By the doom pronounced upon him his entire character was changed. Not only did he become gifted with supernatural wisdom, but his cruelty was turned to repentance, and in his journeys through every land he exhorted men to be mindful of their sins, and thus avoid the wrath of God.

The legend of the Wandering Jew is based apparently upon the account in John xxi. 21–23, where Christ says of John: "If I will that he tarry till I come, what is that to thee?" This passage is then confused with the account of the servant of the high priest, Malchus, whose ear was cut off by Peter for laying hands upon the Lord on the night of the betrayal (John xviii. 10; Matt. xxvi. 50–51; Mark xiv. 46–47). According to the Italian legend of the fifteenth century, however, Malchus was doomed to circle

forever beneath the earth about the pillar to which Christ had been bound when scourged. The legend is a comparatively recent one. The earliest mention of it is in the English chronicle of Wendover, who died in 1236. According to him, an Armenian archbishop, who visited St. Albans in 1228, had eaten and conversed many times with a certain man baptized as Joseph, but once known as Carthaphilus or Cartaphilus, who had been the doorkeeper of Pontius Pilate The same story is told by Matthew Paris and by the Flemish chronicler Philip Mouskes (about 1243). The name of Carthaphilus, however, is practically unknown, the Jew being called almost universally in the Latin versions Joannes Buttadeus, or John the God-smiter. In Provence he was called Boutedieu, in Brittany Boudedes, in Belgium Isaac Laquedem, in Saxony Bedeus; but in Spain Juan Espera-en-Dios, and in Portugal João de Espera-em-Deos, or John Hope-in-God, the latter form of the name indicating a change in the point of view from which the legend was regarded. Here he bears a black fillet and a flaming cross which consumes his brain as fast as it is renewed. Although the wanderings of the Jew are vaguely stated to be world-wide, he resided, according to the version reported by the chronicler of Wendover, in Armenia. Italy seems, however, to have been his usual place of abode. In 1267 he was at Forli, and in 1400, according to the chronicle of Sigismondo Tizio, he passed through Siena. In 1542 Paul von Eitzen, the Bishop of Schleswig, declared that he had seen the Wandering Jew in the Church of Hamburg, where he said that he had been a shoemaker. In 1602 he was in Lübeck. He was also in Nuamburg, and early in the eighteenth century he visited France, Hungary, Holland, and England. In Germany his name is changed to Ahasuerus, and his wanderings are made to symbolize the wanderings of his people for their rejection of Christ. The legend gained wide currency in Germany through the publication in 1602 at Leyden of a chapbook entitled *Kurtze Beschreibung und Erzahlung von einem Juden mit Namen Ahasverus*. The belief in the legend has survived until a comparatively recent time, especially in Germany, France, Belgium, Denmark, and Sweden, and is doubtless yet held in some of the remoter districts.

The legend of the Wandering Jew has been an attractive theme in literature. In Germany may be mentioned the epic fragment *Der ewige Jude* of Goethe in 1774, and *Die Wanderungen des Ahasverus* (also fragmentary) by Zedlitz (*Gedichte*, 5th ed., Stuttgart, 1855) Other poetic versions have been made by Mosen (Dresden, 1838), Giseke (1864), Heller (2d ed., Leipzig, 1868), Hamerling (*Ahasver in Rom*, 23d ed., Hamburg, 1892), and Carmen Sylva (*Jehovah*, Leipzig, 1882); besides a large number of briefer poems. Dramatic versions are the tragedy *Ahasverus* by Klingemann (Brunswick, 1827); the *Jerusalem* by Herrig (Leipzig, 1874); and *Der ewige Jude* by Haushofer (ib., 1886). In France, Quinet wrote a remarkable mystery *Ahasvère* (Paris, 1833), while the novel of Eugène Sue, *Le Juif errant* (ib., 1845), has won a world-wide reputation.

Consult: J. G. T. Grässe, *Der Tannhäuser und ewige Jude* (Dresden, 1861); F. Bässler, *Ueber die Sage vom ewigen Juden* (Berlin, 1870); Friedrick Helbig, *Die Sage vom ewigen Juden* (ib., 1874); C. Schoebel, *La légende du Juif errant* (Paris, 1877); G. Paris, *Le Juif errant* (ib., 1880); M D. Conway, *The Wandering Jew* (London, 1881); L. Neubaur, *Die Sage vom ewigen Juden* (2d ed., Leipzig, 1893), Josef Seeber, *Der ewige Jude* (Freiburg, 7th ed., 1899), Johann Prost, *Die Sage vom ewigen Juden in der neueren deutschen Literatur* (Munich, 1904): Albert Soergel, *Ahasver-Dichtungen seit Goethe* (Leipzig, 1905), Theodor Kappstein, *Ahasver in der Weltpoesie* (Berlin, 1906).

WANDERING JEW, THE. A work by EUGÈNE SUE See JUIF ERRANT, LE.

WANDEROO, wŏn'dĕr-o͞o' (Singhalese *vandurā*, monkey, Hind. *bandar, bānar*, monkey, from Skt. *vānara*) The name of several species of monkey, usually applied to the purple-faced langur (*Semnopithecus cephalopterus* or more correctly *Pygathrix cephaloloptera*) of Ceylon. It feeds chiefly on the berries and buds of trees, and is seldom seen on the ground Twenty or 30 are generally found together in a troop. When alarmed, they display marvelous agility in leaping, or rather swinging from branch to branch, using their powerful arms alternately. In captivity the wanderoo is remarkable for the gravity of its demeanor, and for an air of melancholy in its expression and movements which is completely in character with its snowy beard and venerable aspect. Its disposition is extremely gentle and affectionate; it is intelligent and docile, and very cleanly in its habits. The long-tailed monkey (*Macacus silenus* or *Pithecus albibarbatus*) of western India is often called wanderoo. See LANGUR; LION-TAILED MONKEY.

WAND OF MERCURY. See DIVINING ROD.

WANDSBEK, vänts'bĕk. A town of the Province of Schleswig-Holstein, Prussia, three miles northeast of Hamburg, of which city it is practically a suburb (Map: Germany, G 4). It has breweries, distilleries, oleograph establishments, and a large horse market. Pop., 1900, 27,966; 1910, 35,212.

WANG AN-SHIH (fl.1021–86). A Chinese economic reformer, who, after he became state councilor in 1069, instituted measures for nationalization of agrarian resources. A state monopoly in commerce was intended to dispose of the crops, lighten the burden of the farmer, and bring in a revenue to the government. A loan to farmers, which they would be forced to accept, was to bring the government interest at the rate of 2 per cent, and taxation of land was to be in proportion to fertility. Wang's policies, unpopular generally, were reversed by his successor.

WANKS, wänks. See SEGOVIA.

WANTAGE, wŏn'tāj. A market town in Berkshire, England, 13 miles southwest of Oxford, and 60 miles west of London (Map: England, E 5). It is noted as the birthplace of Alfred the Great, and of Bishop Butler. It has a fine statue of King Alfred by Count Gleichen, erected in 1877. Pop., 1901, 3766; 1911, 3628.

WAPAKONETA, wä'pä-kŏn-ĕt'ä. A city and the county seat of Auglaize Co, Ohio, 84 miles south by west of Toledo; on the Auglaize River, and on the Cincinnati, Hamilton and Dayton, and the Toledo and Ohio Central railroads (Map: Ohio, B 4). The chief manufactures are wheels, chairs, refrigerator machines, furniture, hollow ware, cigars, and acetylene lighting machines. Wapakoneta was once a well-known Indian village. Pop., 1900, 3915; 1910, 5349.

WAPATO, or **ATFALATI.** See KALAPUYA.

WAPENTAKE, wŏp'en-tāk'. In English law, an equivalent of the word hundred, meaning a

subdivision of a county Originally it signified a gathering of the male citizens of a district to prepare for a military expedition or defense, the word itself being derived from two Saxon words meaning to take or touch weapons. By popular usage the term was later applied to a district from which a certain number of men capable of bearing arms were raised. The term was also applied to a Saxon court held at regular intervals by the chief men of a hundred. The wapentake is obsolete as a subdivision of a county, although the word is sometimes used as a matter of description in speaking of a district Consult Stubbs, *Constitutional History of England* (6th ed., Oxford, 1897), and Pollock and Maitland, *History of English Law* (2d ed., Cambridge, 1909).

WAPITI, wŏp'ĭ-tĭ (from Cree Indian, *wapitik*, white deer) A large North American deer (*Cervus canadensis*), closely allied to the European red deer (see DEER), but considerably exceeding it in size, being five feet in height at the shoulder and sometimes weighing 1000 pounds It is a native of North America, and formerly was found all over the continent from the Carolinas to Alaska. But it has been so persistently slaughtered that it is now confined mainly to the northern Rocky Mountain region in the United States, and northward to the middle of Alberta. It is yellowish brown on the upper parts; the sides gray; a pale yellowish or white patch on each buttock, bounded by a black line on the thigh; the neck, a mixture of red and black, with long, coarse, black hair, falling down from it in front like a dewlap; a black mark at each angle of the mouth. The hair is crisp and hard, but there is a soft down beneath it. The antlers are large, much like those of the stag, but the first branch bends down almost over the face. The wapiti is usually called elk in America, although very different from the moose. (See ELK; MOOSE.) This fine deer was an inhabitant of plains and prairies rather than of the forest regions. It feeds upon grass rather than upon leaves. Its general habits resemble those of the gregarious deer, and it was accustomed in the autumn in the West to gather in bands in the foothills of the mountains, where it spent the winter, pawing down through the snow when necessary to get at the dried grass. These bands would join others until herds numbering many thousands would move about in company until spring. The animal was of great importance to the Indians as food, and its hide was used as material for covering their lodges. See Plate of DEER OF NORTH AMERICA; and consult authorities cited under DEER.

WAPPÄUS, vä-pā'ŭs, JOHANN EDUARD (1812–79). A German geographer and statistician, born at Hamburg He was educated at the universities of Göttingen and Berlin, interrupting his studies in 1833–34 for a trip to the Cape Verde Islands and South America. Wappäus was the first to impress upon his countrymen the possibilities of South America as a field for national enterprise In 1845 he was made professor extraordinary, and in 1854 professor, at Göttingen. His publications include: *Untersuchungen über die geographischen Entdeckungen der Portugiesen unter Heinrich dem Seefahrer* (1842); *Die Republiken von Südamerika* (1843); *Deutsche Auswanderung und Kolonisation* (2 parts, 1846–48); *Allgemeine Bevölkerungsstatistik* (2 vols., 1859–61); *Einleitung in das Studium der Statistik* (published posthumously by Gandil, 1881). The great work of Wappäus's life was the editing in 1847–71 of the seventh edition (10 vols) of the monumental *Handbuch der Geographie und Statistik* by Stein and Horschelmann. He himself contributed the introductory volume on universal geography (1849) and the three volumes devoted to the American continents (1855–67)

WAPPERS, väp'ĕrs, GUSTAVE, BARON (1803–74). A Belgian historical and genre painter. He was born at Antwerp, and studied in the Academy there, and under Van Bree and Herreyns. He then went to The Hague, Amsterdam, and Paris, where he studied the old Flemish, Dutch, and Venetian masters. At Paris he fell for a time under the classical influence, and in 1823 painted a "Regulus" in that manner. Upon his return to Antwerp in 1830 he exhibited "Burgomaster van der Werff at the Siege of Leyden" (Utrecht Museum), a picture which in its color and fullness of life showed the influence of the old Flemish masters, and he was hailed as the deliverer of Belgian art from French bondage. In 1832 he became professor and in 1840 director of the Antwerp Academy, and from 1846 to 1853 was president of the National Museum. In 1859 he removed to Paris, where he died. His "Episode of the Belgian Revolution of 1830" (1834, Brussels Museum) confirmed him as the leader of the reaction against classicism, a position corresponding to that of Delacroix in France. His fame has since declined. His pictures are chiefly to be found in the museums of Holland and Belgium. Aside from subjects illustrating historical events of the Netherlands he painted "Charles I Taking Leave of His Children," "Execution of Anne Boleyn," etc.

WAPPINGER, wŏp'ĭn-jĕr. See MANHATTAN INDIANS.

WAPPINGERS (wŏp'ĭn-jĕrz) **FALLS.** A village in Dutchess Co., N. Y., 7 miles south of Poughkeepsie, on the Hudson River (Map: New York, B 1). Interesting features are the old Mesier Homestead, the Grinnell Library, and Mesier Park. The manufactured products include overalls, print cloths, dyes, sheets and pillow cases, etc. Pop., 1900, 3504; 1910, 3195; 1915 (State census), 3742.

WAPPING (wŏp'ĭng) **OLD STAIRS.** An English sailor's song of the eighteenth century, by John Percy.

WAR. Definition. All definitions of war, in the sense of international law, may be said to agree in one fundamental essential, that war is a public and state act as distinguished from the acts of private individuals. The Supreme Court of the United States, in an oft-quoted sentence, laid down the following definition: "Every contention by force between two nations in external matters, under the authority of their respective governments, is not only war, but public war." (*Bas* v. *Tingy*, 4 Dallas, 37) It is a contest between the armed public forces of independent states for the purpose of asserting rights or securing desired advantages. Where society does not exist—where there is no such institution as that which we call government—individuals, being strictly independent persons, may carry on war against each other. But whenever men are formed into a social body, war cannot exist between individuals. The use of force among them is not war, but a trespass, cognizable by the municipal law. War, then, whatever is done in the prosecution

of it, must be the act of a nation "War," says Vattel, "is that state in which a nation prosecutes its right by force." The right of making war belongs to the sovereign power. Individuals cannot control operations of war, nor commit any hostilities (except in self-defense), without the sovereign's order. "The generals," adds that writer, "the officers, the soldiers, the partisans, and those who fit out private ships of war, having all commissions from the sovereign, make war by virtue of a particular order. And the necessity of a particular order is so thoroughly established, that even after a declaration of war between two nations, if the peasants themselves commit any hostilities, the enemy, instead of sparing them, hangs them up as so many robbers or banditti." (*United States* v. *The Active*, 24 Fed. Cas., 755.) These statements apply to hostilities between sovereign and independent nations, but they fail to include armed contention between different parts of the same nation, as in the case of the Civil War in the United States. A third decision, arising out of the circumstances of the Civil War, will supplement and complete the fundamental conception of war. "That they [the Confederates] were liable to be regarded as enemies is undoubtedly true. This implies the existence of war But every forcible contest between two governments, de facto or de jure, is war. War is an existing fact and not a legislative decree Congress alone may have power to declare it beforehand, and thus cause or commence it. But it may be initiated by other nations or by traitors, and then it exists whether there is a declaration of it or not. It may be prosecuted without any declaration; or Congress may, as in the Mexican War, declare its previous existence. In either case it is the fact that makes enemies, and not any legislative act." (*Dole* v. *Merchants' Mutual Marine Ins. Co.*, 51 Maine, 465; *Prize Cases*, 2 Black, 665) A mere insurrection, however, is not war; to entitle the armed forces to the rights and privileges of belligerents it would seem that they should possess at least the power to make the issue doubtful, and that the government which they serve must be organized so as to be in a position to meet the duties necessarily resting upon belligerents, viz., to maintain law and order within the regions subjected to their control, and to carry on war on a large scale on land or sea. The parties to a civil war, such as the Civil War in the United States, have equal claim to the protection accorded by the modern law of war.

If the elements indicated are absent, the uprising is treated as a rebellion, and rebels as such have no rights. Within recent years, however, there has been developing a doctrine of insurgency, "a condition," as Lawrence calls it, "midway between belligerency and mere unauthorized and lawless violence." Such, e.g., are the periodic revolutionary outbreaks in certain Latin-American states. Those who struggle for political ends and respect the laws of war cannot be branded as outlaws or pirates, and hence the necessity for according a recognition of insurgency, which, while not relieving the parent state of responsibility for the acts of the insurgents, puts the contest upon a more regular basis and brings into operation the neutrality laws of the recognizing states.

Causes. The more obvious causes of war include economic, political, racial, and religious factors, and with these are psychological factors less readily analyzed. War may be due primarily to a desire for independence, as in the case of the American Revolution, for more complete nationality, as those preceding the formation of the German Empire or the Kingdom of Italy; to stamp out rebellion, as the American Civil War; to acquire colonies or zones of political and commercial influence, as the Italian war on Tripoli; to conquer and annex territory; to secure reparation for injuries suffered; to protect weaker peoples; or to maintain the prestige and independence of the sovereign state In former times wars were due chiefly to racial or religious animosities or the ambitions of autocratic dynasties, but, even behind these, philosophical historians have frequently found the play of important economic interests At the present time it is generally held that trade privileges and opportunities, especially trade restrictions and intensified commercial competition, are fundamental factors in modern wars. But with these are correlated intensified nationalism and the ease with which a blind patriotism may be aroused in the average citizen.

The social effects of war have been much discussed by students of sociology. Herbert Spencer has set forth the arguments pro and contra in his *Study of Sociology* and *Principles of Sociology*, and many writers since his time have elaborated his theses The general conclusion is, that however war may have worked as a selective agency in the development of superior races, the system of conscription, with its resultant economic repression, retards the progress of civilization, without bringing permanent profit to any. Even the doctrine that war results in economic advantages, especially in the acquisition of colonies and areas of preferential trade, is attacked on the ground that all commercial advantages are by their very nature mutual and reciprocal, and that exploitation or repression are ultimately injurious to both parties.

The various classifications of wars given by publicists are practically worthless. War is a fact; its existence is proved as a fact, and both parties to the contest, whether equal or unequal in size, legally or illegally existing, enjoy equal rights. Examples of this are the Civil War, the South African War, the Balkan War of 1912–13, and the European War begun in August, 1914.

It is likewise immaterial whether the war begins formally with a declaration, or informally by an act of hostility. It is necessary, however, to fix the exact date of the outbreak; for the effect of war when once existing is wide reaching both as regards the belligerents and neutral nations. A nation may formally declare war, as in the case of the Transvaal ultimatum to Great Britain in 1899, or the German ultimatum to Russia in 1914. The nations may drift into war, as was the case with China and Japan in 1894; or the date of the war may be fixed by act or proclamation subsequent to the outbreak of hostilities, as was done by the Act of Congress of April 25, 1898. By Article 1 of the Hague Convention relative to the opening of hostilities, the contracting powers recognized that, before the actual commencement of war, there should be explicit warning "in the form either of a reasoned declaration of war or of an ultimatum with conditional declaration of war." See DECLARATION OF WAR.

The history of warfare is at best a sorry tale. In ancient times contending armies literally devastated with fire and sword the countries they overran, and either killed or enslaved their captives. The wars of the Middle Ages continued a scourge notwithstanding the doctrines of Christianity As Sir Henry Maine says· "The Reformation brought with it a new fury of fighting, and the wars of religion were among the most ferocious that mankind had waged. Armies did not then so much consist of rival potentates, as of hosts in which each individual detested every man on the other side as a misbeliever. This ferocity is generally believed to have culminated in the storming of Magdeburg," when the whole town, with the exception of the cathedral and about 140 houses, was burned to the ground, and 30,000 of its 36,000 inhabitants were butchered without regard to sex or age. The Thirty Years' War fills us with horror, but a better day was dawning and the hour and the man were at hand In 1625, in the very midst of this contest, Grotius (q.v.) published his immortal work, *De Jure Belli et Pacis*, at once a protest and a guide, in which he outlined the permissible and the infamous with a firm and masterly touch. Basing himself on the Scriptures, the principles of morality, and a supposed law of nature, he subjected the history of warfare to a careful examination, separated humane from ferocious precedents, and digested in an incomplete but admirable way the principles to be derived from their study. The weight of his influence gave to the result something of the consistency and the authority of a code. "The effects of the *De Jure Belli et Pacis*," continues Maine, "both in respect of its general influence and of the detailed propositions which it laid down, were exceedingly prompt and have proved extremely durable At about the middle of his reign Louis XIV of France adopted two measures by which he was thought to have carried the severity of war to the furthest point. He devastated the Palatinate (q.v.), expressly directing his officers to carry fire and sword into every corner of the province, and he issued a notice to the Dutch, with whom he was at war, that, as soon as the melting of the ice opened the canals, he would grant no more quarter to his Dutch enemies. The devastation of the Palatinate has become a proverb of savageness with all historians, though 50 years earlier it might at most have been passed as a measure of severity, or might even have been defended; but the proclamation to the Dutch called forth a burst of execration from all Europe, and the threat to refuse quarter was not acted upon. The book of Grotius was making itself felt, and the successors of Grotius assure us that it was his authority which deterred the French King and the French generals from the threatened outrage." (*International Law*, p. 23.)

The book not only made its own way, but its principles were popularized by Grotius' successors, particularly Pufendorf, Bynkershoek, and Wolf. To Vattel, however (see VATTEL, EMMERIC DE), belongs the supreme merit of supplying a text which at the present day is appealed to by theorist as well as practitioner. Indeed, it is almost impossible to overestimate his services as a popularizer of a system of international law to which he contributed but little. Very slowly and laboriously, with the growth of international relations, the rules of warfare began to reflect the growing spirit of humanitarianism. Instead of the ruthless and wanton slaughter or indiscriminate capture of entire populations more and more weight was given to the distinction of soldier and civilian. The former when captured acquired the rights of a prisoner of war, and the latter an increasing immunity both of his person and his property.

At the present day the theory and practice of modern civilized nations in their dealings with one another regard useless slaughter as murder, and consider all slaughter useless, if not indispensable to the end in view, viz., the fair, manly, and open conduct of war in the interest of its speedy termination. To this end, cruel and pain-giving instruments are forbidden, for the purpose of the combatant is to wound or incapacitate rather than to kill if there be a choice of means, as in battle there can rarely be Poisoning of streams and food supplies; the killing of non-combatants generally, not to speak of innocent women and children; the refusal to give quarter, even in the heat of battle, except as retaliation—have long been given over as barbarous and unworthy of men in any state of civilization. Nevertheless stratagems and deceits are allowable, if not involving perfidy. The entire world, however, was shocked by the reports of barbarities committed by different belligerents in the Balkan wars, by the Germans in Belgium, and by the Turks upon the Armenians in 1914–15. Modern opinion, moreover, has required that civilized nations in their military operations against uncivilized peoples or groups not yet included in the family of nations be governed by the rules of civilized warfare, as shown by Japan's treatment of China in 1894 and America's treatment of Filipinos.

As regards the prosecution of hostilities, war is waged on land and sea and in the air, and the difference in the elements necessarily gives rise to differences in the methods and means by which it is carried on. The usages, customs, and agreements of civilized nations formulate as it were a code or system of laws of war, the violation of which would convict the offending country of barbarism. Such laws are found in the convention respecting the laws and customs of war on land formulated by The Hague Conferences of 1899 and 1907, in the consensus of judicial opinion in leading countries, and in practices uniformly followed by military forces.

The United States, it would seem, was the first power to codify these various rules and regulations in the form of a manual, and the previously referred to *Instructions* of Dr. Lieber —known in army circles as *General Orders No. 100*—have been the basis of all subsequent codifications of the laws of land war. These were reissued in 1898 for the guidance of officers in the war with Spain, and required but slight modification to meet the purposes of the Hague Conference of 1899. The official book of the Prussian General Staff is *Kriegsbrauch im Landkriege* (trans. by J. H. Morgan, *The War Book of the German General Staff*, New York, 1915), and similar codifications have been issued by other countries. In June, 1900, the Navy Department issued a Naval Code—known as *General Orders No. 551*—prepared by Captain Charles H. Stockton. Article 54 of this enlightened work explains the relation between the land and naval codes, and the supplemental nature of the latter.

For the successive steps by which the mitigation of the hardships incidental to the conduct of war has been brought about and the

means and instruments of war have been changed, see GENEVA CONVENTION, RED CROSS SOCIETIES; ST PETERSBURG, DECLARATION OF; and PEACE MOVEMENT. Under these appropriate headings it will be seen that the medical corps service on land has been neutralized; that the principles of the Geneva Convention establishing the immunity of hospital and medical corps on land have been extended to hospital ships on sea; and that the restrictions in the case of deadly weapons and explosives formulated in the Declaration of St Petersburg have been further extended by the humanitarian spirit pervading the Hague Conferences.

The outbreak of war produces an immediate and widespread effect. In the first place, treaties of all kinds contemplating peaceful relations are suspended, while provisions in contemplation of war come into effect. Treaties intended to set up a permanent state of affairs, such as boundary stipulations, revive on the close of war; but it seems to be generally admitted that commercial treaties are wiped out of existence by war and do not revive on its termination unless there be a particular clause to that effect in the treaty of peace. (An interesting table showing the effect of war on treaties is given by T. J. Lawrence in his *Principles of International Law*, p 365. See TREATY.) Ambassadors and diplomatic agents are recalled or dismissed; and all trade ceases between the belligerents, as trading would not only embarrass military or naval operations, but would enable the enemy to carry on the war itself. War makes the contending nations enemies, and their respective subjects or citizens share this quality, as do alien residents for the purpose of war. The same quality infects the products of enemy soil, as well as houses of trade, whether principal or branch. Consult the *Prize Cases*, 2 Black, 671, and *Bentzen* v. *Boyle*, 9 Cranch, 191.

A theory dating from Portalis would confine the enemy character to actual combatants. "War," he said in 1801, "is a relation of state to state, and not of individual to individual. Between two or more belligerent nations the private persons of whom those nations are composed are only enemies by accident; they are not so as men, they are not so as citizens, they are so only as soldiers. By Article 1 of the Hague Regulations of 1907 combatants must meet the following requirements: (1) command by a person responsible for his subordinates; (2) wearing of a distinctive mark, fixed and recognizable at a distance; (3) carrying of arms openly; and (4) conformity in all operations to the laws and customs of war. In earlier times private citizens were murdered, or enslaved, and their property pillaged and devastated without dishonor to the invading army; but to-day the inoffensive individual is as little disturbed in his private relations as the necessities of war permit. The combatant may be killed in battle, but if he throw down his arms he is entitled to quarter; he may be captured and held prisoner but is entitled to the honorable treatment accorded prisoners of war. The noncombatant may not be killed unless he resorts to military acts; he is then not entitled to quarter nor to the treatment of a prisoner of war but incurs the risk of the death penalty. Four classes of belligerents have been distinguished: (1) regular armies; (2) auxiliary forces; (3) organized civilians; and (4) individuals. The first two of these are everywhere considered lawful combatants. Moreover it is a matter for each state to determine what shall constitute its authorized forces. Even after war has begun a state may call a general levy of the entire population, and such would be entitled to combatant character if organized under responsible authority and otherwise meeting the conditions above mentioned Volunteer troops raised on the spur of the moment, and acting without military commission or organization are not entitled to the privileges of regular soldiers according to the *Instructions* But the Hague Regulations of 1899 as modified in 1907 extended the laws, rights, and duties of war to a population rising spontaneously to defend itself and its property, the levée en masse. The Regulations provided that, "The population of a territory not yet occupied, who, on the approach of the enemy, spontaneously take up arms in order to resist the invaders, without having had time to organize themselves in accordance with Article 1 (see above), shall be regarded as belligerents provided they carry their arms openly and respect the laws and customs of war" (Art. 2) The *Kriegsbrauch* however contends that regardless of the suddenness of an invasion, the resisting population is not entitled to combatant character unless organized under responsible leaders. Volunteer vessels, if captured, are entitled to treatment as prisoners of war, provided they had been acting under responsible military authority. The wounded, in all cases, whether in the land or naval forces, and of either belligerent, are entitled under the Geneva Convention and the Hague Conventions to hospital service and medical treatment.

Undefended places are by the Hague Regulations (Art. 25) exempted "from bombardment or attack by any means whatsoever." This clearly includes aërial attack and is the only provision in the Hague Conventions applicable to aërial warfare. By Article 26 "The commander of an attacking force, before commencing a bombardment, except in case of an assault, should do all he can to warn the authorities of what is about to happen." In sieges and bombardments every care must be taken to avoid the destruction of "edifices devoted to religion, art, science, and charity, historical monuments, hospitals, and places where the sick and wounded are collected, provided they are not used at the same time for military purposes" (Art. 27). These rules are accepted by the *Kriegsbrauch*. Public property of one belligerent situated within the territory of the other is occupied, if it be realty, and administered for the benefit of the local state. If it be public movable property it is subject to confiscation and usually is confiscated. Private property of one enemy within the territory of the other may, indeed, by strict international law be confiscated; but this is usually no longer done and in the United States it may not be done except by positive legislative enactment to that effect. By the sixth convention of the 1907 Hague Conference "it is desirable" that merchant vessels found in enemy ports at the commencement of war be allowed a reasonable period in which to depart. A reciprocal agreement to this effect was arranged between Great Britain and Austria in 1914; Germany did not agree and her vessels in British ports were seized. But such vessels may not be confiscated.

They may be used or destroyed but compensation must be given. This convention does not apply to auxiliary cruisers Cargoes are accorded the same right as vessels. By the *Naval Code* (Art. 15) enemy merchantmen in port when war begins are allowed 30 days in which to depart. Moreover enemy vessels that have already departed may proceed unmolested, unless they carry contraband (Consult the cases of the *Buena Ventura*, 175 U. S., 384, and the *Panama*, 176 U. S., 535.) Even if they have sailed for an American port before war is declared they may enter, discharge their cargo, and depart to an unblockaded port. Coastwise but not deep-sea fishing vessels are granted immunity under the general principles of international law as well as by specific Hague convention, provided they are not in any way furthering the purposes of war. (Consult the *Paquette Habana*, 175 U. S., 677) For the general status and conduct of naval and aërial warfare see INTERNATIONAL LAW.

Public debts due enemy citizens are never confiscated and the interest thereon is payable even during the war according to the practice of the United States in the war with Spain; private debts, i.e., debts due enemy citizens by private citizens, are, indeed, confiscable; but the weight of authority is against the exercise of this harsh right. They may not be collected during the continuation of hostilities, but may be after the termination of the war. In contradistinction, however, to debts or executed contracts, executory contracts, in which time is essential, do not revive at the end of the war. An insurance policy, e.g., on which premiums cannot be paid by reason of the existence of war, lapses under this rule, unless otherwise provided for in the contract of insurance, subject to the right of the insured to the equitable value of his policy with respect to the premiums already paid. (*New York Life Insurance Co.* v. *Statheni*, 93 U. S., 24)

The conqueror is a usufructuary of the realty, but private property is commonly not liable to seizure. This is, perhaps, stating the matter too broadly, for private property may be seized by way of contribution if in money; by requisition if in kind. In both cases receipts or quittances are given by the military commander, so that the dispossessed citizen may collect the property or its equivalent from his proper sovereign upon the return of peace. (See CONTRIBUTION; REQUISITIONS.) This appears clearly from Articles 31–39 of *Instructions*, but receives international formulation in the Hague Conferences of 1899 and 1907. "Art. 46. Private property cannot be confiscated. Art 47. Pillage is formally forbidden. Art. 48. If, in the territory occupied, the occupant collects the taxes, dues, and tolls imposed for the benefit of the state, he shall do so as far as is possible, in accordance with the rules of assessment and incidence in force. . . . Art. 49. If . . . the occupant levies other money contributions in the occupied territory, this shall only be for the needs of the army or of the administration of the territory in question." Article 50 prohibits the infliction of any penalty, pecuniary or otherwise on the population for acts for which they are not collectively responsible. Article 51 requires that all contributions must be ordered by the commander in chief, must be levied in accordance with tax laws, so far as is possible; and must be acknowledged by receipt to each payer. "Art 52. Requisitions in kind and services shall not be demanded from municipalities or inhabitants except for the needs of the army of occupation They shall be in proportion to the resources of the country, and of such a nature as not to involve the inhabitants in the obligation of taking part in military operations against their own country." "Art. 53. An army of occupation can only take possession of the cash, funds, and realizable securities which are strictly the property of the state, depots of arms, means of transport, stores, and supplies, and generally all movable property of the state which may be used for military operations. All appliances, whether on land, at sea, or in the air, adapted for the transmission of news, or for the transport of persons or things, exclusive of cases governed by naval law, depots of arms, and, generally, all kinds of ammunition of war, may be seized, even if they belong to private individuals, but must be restored and compensation fixed when peace is made." "Art. 55. The occupying state shall be regarded only as administrator and usufructuary of public buildings, real property, forests, and agricultural estates belonging to the hostile state, and situated in the occupied country It must safeguard the capital of these properties, and administer them according to the rules of usufruct. Art 56. The property of municipalities, that of institutions dedicated to religion, charity, and education, the arts and sciences, even when state property, shall be treated as private property. All seizure, destruction of, or willful damage done to institutions of this character, historic monuments, works of art and science, is forbidden, and should be made the subject of legal proceedings."

"In war," said Mr. Chief Justice Waite, "the capture of property in the hands of the enemy, used or intended to be used for hostile purposes, is allowed by all civilized nations, and this whether the ownership be public or private. The title to movable property in hostile use, captured on land, passes to the captor as soon as the capture is complete; i.e., as soon as the property is reduced to possession. The absolute title to immovable public property owned by the enemy does not pass until the war is ended and peace restored. Then, unless provision is made to the contrary by the treaty of peace or otherwise the ownership is changed if the conquest is complete." (*Kirk* v. *Lynd*, 106 U. S., 315.) A fundamental difference, however, between property captured on land and sea is admirably stated by the late Justice Gray in *Oakes* v. *United States*, 174 U. S., 778: "By the law of nations, as recognized and administered in this country, when movable property in the hands of the enemy, used, or intended to be used, for hostile purposes, is captured by land forces, the title passes to the captors as soon as they have reduced the property to firm possession; but when such property is captured by naval forces a judicial decree of condemnation is usually necessary to complete the title of captors."

Public property on the high seas, i.e., vessels of war and public vessels generally—except those engaged in purely charitable or scientific pursuits, in voyages of discovery, or as hospital ships (*Naval Code*, Art. 13)—are always liable to capture. Enemy merchant vessels as well as enemy property thereon are likewise confiscable; but the title thereto only passes to the individual captor after adjudication in a

prize court. (*Naval Code*, Arts 9–11; 14; 46–50.) (See PRIZE.) Enemy merchant vessels engaged in coast fishing "innocently employed" are exempt from capture (*Naval Code*, Art. 14), but this exemption does not apply to deep-sea fisheries. The transfer of an enemy merchant vessel to a neutral flag is always scrutinized and, if made to escape the consequences of war, is not considered valid in Anglo-American practice. Some states, notably France, do not admit the validity of any transfer made during hostilities, as was shown in the condemnation of the American ship *Dacia* by the French prize court, August, 1915.

On the outbreak of war trade of all kinds stops between enemies, that is to say trade across the lines, for a domiciled enemy may trade with the citizen untrammeled by any regulation. While the Hague Regulations are silent regarding such a resident, custom, and even the positive law in some states, permit him to remain. He owes temporary allegiance, and in consequence has the rights and privileges of other alien residents not incompatible with his enemy character. That is to say, he may carry on business; may sue and be sued as if war did not exist, for his enemy character is merged in that of a resident. An act of unfriendliness may lead to expulsion, and aid or comfort given to the enemy, that is his home government, is treason. While his temporary allegiance secures him protection, he may not be compelled to serve in the armed forces of his country of residence, for no government could well compel him to commit treason against the country of his paramount allegiance. In the great war the common practice was the internment of such aliens until the close of the war. It likewise follows that the resident enemy's property on the high seas bears the character of his residence or domicile and is seizable by the authorities of his home country as enemy property. Internal trade is thus assimilated to trade of citizens and does not depend upon enemy character. Foreign trade, i.e., trade beginning within one enemy country and crossing into the country of the other, is trading across enemy lines, and is strictly and absolutely prohibited. This inhibition may be removed by a general or particular license to trade, granted by the sovereign powers of the respective belligerents. Such a permission eliminates the war for the purposes of trade. But otherwise all contracts made between belligerents during the war are ipso facto void on the principle that an alien enemy does not possess the right to sue. "A state in which contracts cannot be enforced, cannot be a state of legal commerce. If the parties who are to contract have no right to compel the performance of the contract, nor even to appear in a court of justice for that purpose, can there be a stronger proof that the law imposes a legal inability to contract?" (Sir William Scott, later Lord Stowell, in *The Hoop*, 1 C. Rob., 196.) For a full and accurate account of this important subject, see the two leading cases of *The Sea Lion*, 5 Wallace, 630, and *Kershaw* v. *Kelsey*, 100 Mass., 561. For a short summary of the influence of war on trade in its various branches, see INTERNATIONAL LAW.

There are, however, some relations into which belligerents are permitted to enter. Indeed, these relations can only arise in war; and if provided for during peace, the agreements concerning them are made in contemplation of war. These matters pertain to flags of truce, passports, safe-conducts and safeguards, cartels, armistices, capitulations, and ransom bills. Negotiations between hostile forces are opened up by a flag of truce—a white flag—borne by a member of the opposing force who advances to the enemy. A passport is a permission in writing to an enemy subject to travel generally within belligerent territory from which he would otherwise be excluded. A safe-conduct, as also a license, differs from a passport in that it is a special permission to an enemy subject or vessel or goods to travel or pass within defined points; while a safeguard, as its name implies, is a guard granted for protection to enemy property or his person. Article 86 of the *Instructions* says, "All intercourse between the territories occupied by belligerent armies, whether by traffic, by letter, by travel, or in any other way, ceases. This is the general rule, to be observed without special proclamation. Exceptions to this rule, whether by safe-conduct, or permission to trade on a small or large scale, or by exchanging mails, or by travel from one territory to the other, can take place only according to agreement approved by the government, or by the highest military authority. Contraventions of this rule are highly punishable." Cartels are more formal matters, and, according to the most eminent authority of the day, they are "a form of convention made in view of war or during its existence in order to regulate the mode in which such direct intercourse as may be permitted between the belligerent nations shall take place, or the degree and manner in which derogations from the extreme rights of hostility shall be carried out. They provide for postal and telegraphic communication, when such communication is allowed to continue, for the mode of reception of bearers of flags of truce, for the treatment of the wounded and prisoners of war, for exchange and the formalities attendant upon it, and for other like matters." (Hall, *International Law*, § 193.) The term is most familiar in the form of cartel ships, and in this connection signifies a vessel sailing to defined points under a safe-conduct for the exchange of prisoners of war. The purpose and the safe-conduct exempt such vessel from capture; but the slightest hostile act, or engaging in an otherwise forbidden act, such as trade, forfeits the privileged character.

The Hague Regulations define an armistice as a suspension of military operations by mutual agreement between belligerents. "If its duration is not fixed, the belligerent parties can resume operations at any moment, provided always that previous notice, of such length as has been agreed upon, has been given to the enemy" (Art. 36). In case of violation of the conditions of the armistice the other party may denounce the offender or even renew hostilities without notice. As regards naval operations the provisions of the *Naval Code*, Articles 51–52, accord with the Hague Regulations. "Art. 51. A truce or capitulation may be concluded, without special authority, by the commander of a naval force of the United States with the commander of the forces of the enemy, to be limited, however, to their respective commands. A general armistice requires an agreement between the respective belligerent governments. Art. 52. After agreeing upon or signing a capitulation the capitulator must neither injure nor destroy the vessels, property,

or stores in his possession that he is to deliver up, unless the right to do so is expressly reserved to him in the agreement or capitulation." In addition to these more formal and indefinite suspensions of hostilities, truces for short periods are entered into for the burial of the dead.

As previously explained, war renders enemy property with certain specific exceptions liable to capture on the high seas (See PRIVATEERING; PRIZE.) Just what constitutes enemy property is not always easy to determine. How, e.g., is the property of a neutral domiciled in one of the belligerent countries to be considered, when found by the other belligerent upon the high seas in an enemy vessel? What shall determine its character—domicile or nationality? Anglo-American practice adheres to the former principle, that of some other states to the latter. No preference was indicated in the Declaration of London, it being content with saying that "the neutral or enemy character of goods found on board an enemy vessel is determined by the neutral or enemy character of the owner." (See ALIEN; ENEMY.) On the time within which and the conditions upon which enemy property will, if recaptured, be restored to the original owner, see RECAPTURE.

Upon the termination of war, however brought about, the belligerents cease to be enemies, and the residents of both countries resume their peaceful pursuits as if the war had never happened. All rights and obligations existing at the outbreak of war may now be enforced, provided their nature is not such as to render their performance through lapse of time or change of circumstances useless or impossible. Statutes of limitation cease to run at the outbreak of war, and on the declaration of peace they begin again as at the time of the beginning of the war. In this way the war, legally speaking, is simply wiped out. Otherwise to hold would be manifest injustice; for one can hardly be blamed for not enforcing his right during the time of the statute when the court is closed to him. Official relations between the belligerents are resumed, for war of course puts an end to diplomatic intercourse. During the continuance of war it is customary for a neutral to offer its services so that the interests of the particular belligerent may not unduly suffer. In this way American ministers in Germany, Belgium, Turkey, and elsewhere served various nations in the European War of 1914.

War may terminate in three ways: by treaty; by cessation of hostilities; by conquest. The treaty is the usual method and is the best; for the parties to the war can, do, and should thus settle by a careful and formal document the various issues that caused the war, and provide for peaceful and harmonious relations in the future. In cases of war indemnity and cession of territory, a treaty is well-nigh indispensable. It should be said that, for purposes of public right or sovereignty, the treaty speaks from its signature; but private rights determine or vest from date of ratification. (*Haver* v. *Yaker*, 9 Wallace, 32.) See TREATY.

The cases of mere cessation of hostilities are exceedingly rare; for it is hard to conceive how nations willingly choose to go on after, as before, the war, with no precise and formal settlement of the outstanding difficulties or causes of the war. "The war between Sweden and Poland in 1716, and also the war between France and Spain in 1720, came to an end in this way. The war between Spain and her American colonies ceased in 1825, but no diplomatic relations were established with them till 1840, and the independence of Venezuela was not recognized till 1850. After the hostilities between France and Mexico (1862–67) no diplomatic relations were entered into till 1881" (Wilson and Tucker, *International Law*, p. 271) In justice to neutrals, an official statement of the termination of hostilities should be made; otherwise the uncertainty of the exact status will seriously interfere with neutral trade If, however, no treaty or declaration be made, peace may be established as a fact and dates from the last warlike act As regards conquest made during the war, the principle of uti possidetis obtains, i.e., each belligerent retains what it holds or occupies at the conclusion of hostilities. If territory is thus occupied and possessed, the laws and customs remain in force until changed by the new sovereign, and the same is true in case of a treaty unless specific rules and regulations are agreed upon and incorporated into the document. In the case of conquest, the conquered state or territory is absorbed in the conqueror, and, succeeding to its rights and merits, the latter likewise assumes its debts and obligations. If part of a state or province be absorbed, the rights and duties are usually apportioned between the belligerents. In general, obligations that are personal to the ceding state remain with it, while local obligations, such as liens on the customs duties of certain ports, pass with the territory transferred. One of the articles of the Treaty of London in 1914, after the First Balkan War, provided for an international commission to meet at Paris to apportion the financial obligation resting upon the territory Turkey was ceding to the Balkan allies.

While the parties to a contest are more intimately concerned by its effects, third parties or neutrals are nevertheless interested. Their trade is necessarily interrupted and at times suspended; for military and naval operations do not accord well with trading and peaceful pursuits. The theory of neutrality is that the stranger to the contest takes no part whatever in it, and prevents its subjects directly or indirectly so far as possible from aiding either belligerent. Nor should it allow its ports to be used as a basis for hostile operations, supply stations, or ports of shelter. A neutral may, however, trade with either belligerent or both, in all articles except those denominated contraband of war. (See CONTRABAND OF WAR, INTERNATIONAL LAW.) The neutral should not seek to enter a blockaded port of a belligerent, for by so doing it interferes with military or naval operations and furnishes the blockaded port with supplies and articles of trade. (See BLOCKADE; INTERNATIONAL LAW.) To see that neutral vessels do not carry articles of contraband and that such neutral vessels are not destined for a blockaded port, belligerents possess and exercise the right to visit and search neutral vessels. This is strictly a war right and does not exist in peace. See SEARCH, RIGHT OF; NEUTRALITY; LONDON, DECLARATION OF.

For embargo, reprisal, retorsion, pacific blockades, military commissions, and martial law, see these articles.

Prisoners of War. "A prisoner of war is a public enemy armed or attached to the hostile army for active aid, who has fallen into the

hands of the captor . . . by individual surrender or by capitulation. All soldiers, of whatever species of arms, all men who belong to the rising en masse of the hostile country [not already occupied by an invading army, Art 52]; all those who are attached to the army for its efficiency and promote directly the object of the war . . . ; all disabled men or officers on the field or elsewhere, if captured; all enemies who have thrown away their arms and ask for quarter [which may not be refused except in great straits or in retaliation; Arts. 60–66], are prisoners of war and as such exposed to the inconveniences as well as entitled to the privilege of a prisoner of war." (*Instructions*, Art. 49; similarly Hague Regulations, Arts. 4 to 20.) In addition, sutlers, editors, reporters of journals, or contractors may be made prisoners of war (Art. 50). Chaplains, officers of the medical staff, apothecaries, hospital nurses, and servants are not prisoners of war (Art. 53). Hostages, rarely given and accepted to-day, are treated as prisoners (Arts. 54–55); the Hague Regulations do not mention hostages, and most opinion is against the practice of taking them, but German experts advocate it because usually successful.

The recognized naval forces are as follows: "The officers and men of the navy, naval reserve, naval militia, and their auxiliaries; the officers and men of all other armed vessels cruising under lawful authority." (*United States Naval War Code*, Art. 9) The personnel of all public unarmed vessels owned or in the enemy's service; the personnel of merchant vessels, who in self-defense and in protection of the vessel resist attack, as well as "the personnel of the armed forces or armed vessels of the enemy, whether combatants or non-combatants, are entitled to receive the humane treatment due to prisoners of war" (Art. 10). Hospital ships and their personnel if strictly neutral are not liable to capture (Arts. 21–25), and the religious, medical, and hospital personnel of any vessel captured during hostilities are inviolable, and on leaving ship may carry with them articles and instruments of surgery which are their private property (Art. 26).

In battle, the enemy may be wounded or killed; unresisting he has the right to quarter; as prisoner of war, his life, person, and property are placed under the protection of the captor. This applies to soldier and sailor; to the able-bodied, sick, wounded, or shipwrecked. The captured enemy is deprived of his arms and thus loses his enemy character. By the Hague Regulations he may not be treated as a criminal or kept in close confinement unless this be necessary for the safety of prisoner or captor. He may be required to work, if able-bodied, but must be paid at the same rate as a soldier of the captor country engaged similarly and cannot be employed on military work. He has a right to food, clothing, and quarters equal to those of soldiers of the captor country. He may be shot if he tries to escape and punished for breaches of discipline. The Regulations provide for the establishment by each belligerent of bureaus for the transmission of letters, money orders, and postal parcels to prisoners of war in other countries free of all charges. They should be treated with humanity and the sick and wounded receive medical treatment, according to the ability of the medical staff. By the Geneva Convention of 1906 it was provided that no distinction should be made in the treatment accorded by a commander to his own and to enemy sick and wounded Moreover, robbing or molesting wounded lying on the field of battle is punishable as a crime of war

The status of prisoner, once established, continues as long as the captor retains control of the person It may end by successful escape: or by exchange, officer for officer of equal rank, private for private, and a stated number. of inferior for superior officers, according to the cartel or formal agreement of the belligerents. Or the prisoners may be paroled, i e., set free, upon an express promise not to serve in a military capacity against the captor during the continuance of the war. Only an officer may pledge his honor, i e., give his word or parole for himself and soldiers; if the parole thus given be rejected by his government, officers and soldiers must return to the enemy. Violation of the parole is punishable, on recapture, by death. An escaped prisoner who joins his army is not punishable if subsequently captured. It should be noted that armed bands acting without commission or authorization of any kind are not treated as prisoners, but as highway robbers or pirates.

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WAR, COUNCIL OF. See COUNCIL OF WAR.

WAR, DECLARATION OF. See DECLARATION OF WAR.

WAR, DEPARTMENT OF. An executive department of the United States government, created

by Act of Congress of Aug. 7, 1789. It has at its head a secretary appointed by the President by and with the advice and consent of the Senate for a period of four years. He ranks third among the cabinet members in the line of succession to the presidency and receives a salary of $12,000 per year. He has charge of all matters relating to military affairs, subject to the direction of the President, the distribution of stores, the signal service, the survey and improvement of harbors, and the administration of the insular possessions. He is required to make an annual report of the conduct of the department showing the number and distribution of the military forces together with a statement of the expenditures, of contracts for supplies and services, river and harbor improvements, the administration of the insular territories, etc. The business of the War Department is distributed among a number of subdivisions or bureaus, each of which is under the supervision of a chief and under the general supervision of the chief of staff. These include: the headquarters of the army, through which the orders of the President are issued by the chief of staff; the office of the adjutant-general, which conducts the army correspondence, supervises the recruiting and enlistment service, receives reports from army officers, issues commissions, and preserves the records of the army, the office of the inspector-general; the office of the quartermaster-general; the commissary department; the office of the surgeon-general; the office of the paymaster-general; the office of the chief of engineers; the ordnance department, the signal office; the office of the judge-advocate-general, the record and pension office; and the Bureau of Insular Affairs. The last is charged with supervision of the administration of the recently acquired insular territories. Since 1890 the Secretary of War has been aided by an Assistant Secretary.

WAR, HONORS OF See HONORS OF WAR

WAR, LAWS OF. See WAR.

WAR, SOCIAL. See SOCIAL WAR.

WAR AND PEACE. An historical novel by Tolstoy (1865–68). The plot is laid in the reign of Czar Alexander I.

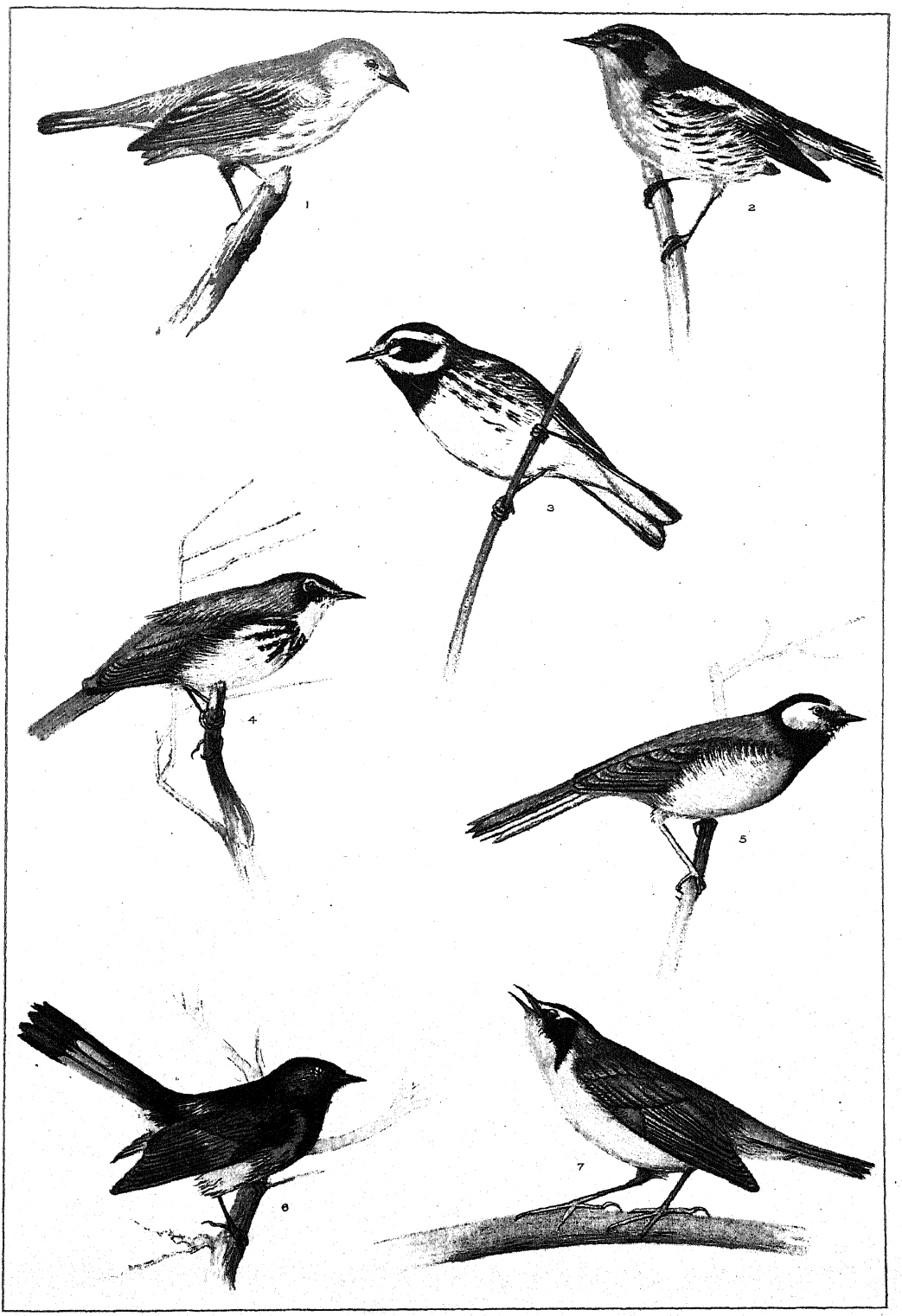
WARASDIN, vär'az-dēn (Hung. *Varasd*). An Episcopal city of Croatia-Slavonia, 150 miles southwest of Budapest, on the left bank of the Drave (Map: Austria, E 3). The town has manufactures of tobacco, liquors, acetic acid, and anchors. Pop., 1900, 12,930; 1910, 14,752.

WARBECK, wär'bĕk, PERKIN (?1474–99). A pretender to the English throne, born at Tournay. In 1491 he went to Cork and agreed at the instigation of opponents of Henry VII to set up a claim that he was Richard, Duke of York, second son of Edward IV. For a while he received some support, especially among foreign powers hostile to England and Henry VII. James IV of Scotland even gave him his own cousin, Catherine Gordon, as wife in 1495. In 1497 he made an expedition into England, but was captured. He confessed his imposture and was allowed considerable liberty, but when he engaged in new conspiracies he was condemned to death and executed at Tyburn on Nov. 23, 1499. Consult James Gairdner, *Richard III* (London, 1898), and Henes and Briner, *A Historical Sketch of Perkin Warbeck* (New York, 1902). See HENRY VII.

WARBLE FLY. Any one of several species of flies of the family Œstridæ, which lay their eggs upon different animals, and whose larvæ eventually form a swelling or warble under the skin. The name "ox warble" is specifically applied to the swellings made by the bot fly of the ox (*Hypoderma lineata*), and the bot fly of the rabbit (*Cuterebra cuniculi*) produces similar warbles under the skin of rabbits. See BOT.

WARBLER (from *warble*, from OF. *werbler*, from Ger *wirbeln*, to warble, whirl, turn, frequentative of MHG., Ger. *werben*, OHG. *werban*, to turn, twist) A small song bird, properly one of either of two passerine families, viz., the American Mniotiltidæ and the Old World Sylviidæ. The former includes the warblers of North and Middle America, numbering about 200 species, according to Ridgway, few of which are as much as six inches long. With few exceptions they are woodland birds, wholly insectivorous, and prettily if not gorgeously colored. The males are much more brilliantly colored than the females except in a few cases. They are highly migratory, and of the 60 or more species found in the United States all but one or two winter south of the Mason and Dixon's line and nearly all spend the coldest months in the tropics. As many of the species breed in the far north, they are the most striking feature of the migrations in many parts of the United States. They are extremely active birds, and only a few species resort to the ground for food Although several species sing well, most have weak voices and make no pretense of singing. A few warblers are specially notable. Perhaps the most beautiful species is the prothonotary (*Protonotaria citrea*), the male of which has the whole of the head, neck, and under parts rich orange and the back greenish yellow. It is rarely seen north of Washington and winters in the tropics. The genus *Helminthophila* formerly included about 10 species known as the swamp warblers (q.v.), some of which are beautifully colored. The genus has recently been split up by some authors. The genus *Dendroica* is the largest group. The best known is the common yellow or summer warbler (*Dendroica æstiva*), familiar in orchards throughout nearly all North America. It is five inches long, bright yellow dimly streaked with rufous; it has a sweet, trilling song, and makes a nest of hempen materials, lodging it in an upright fork of the branches of a shrub or small tree Another familiar and widely distributed species is the redstart (*Setophaga ruticilla*), black and red, or in the female black and orange-yellow, which is notable for its lively manner and gay dress, and sings well. Very brilliant also is the orange, black, and white Blackburnian warbler (*Dendroica blackburniæ* or *fusca*), seen in passing to and from its Canadian breeding home Townsend's warbler is a Pacific coast representative of this genus. Another noteworthy Western warbler is the hermit (*Dendroica occidentalis*), which breeds in the high mountains of California, forming an exquisite nest out of graybeard moss hanging from spruce boughs. The Maryland yellowthroat (q.v.) (*Geothlyphis trichas*) and its handsome relative the Kentucky warbler (*Oporornis formosus*) are similar in habits and method of nest making, keeping close to the ground. The striking manner in which yellow and black are often contrasted in the plumage of these charming birds is well displayed in the genus *Wilsonia*, two species of which are displayed on the accompanying Colored Plate of WOOD WARBLERS. See also CHAT; OVEN BIRD; REDSTART; ETC.

AMERICAN WOOD-WARBLERS



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1 SUMMER YELLOWBIRD (DENDROICA ÆSTIVA)
2 BLACKBURNIAN WARBLER (DENDROICA FUSCA)
3 TOWNSEND'S WARBLER (DENDROICA TOWNSENDI)
4 CANADA WARBLER (WILSONIA CANADENSIS)
5 HOODED WARBLER (WILSONIA CITRINA)
6 REDSTART (SETOPHAGA RUTICILLA)
7 KENTUCKY WARBLER (OPORORNIS FORMOSUS)

The warblers of the Old World are small birds of the family Sylviidæ, closely related to the thrushes and kinglets and gnatcatchers; many are known by separate popular names, as blackcap, nightingale, hedge sparrow, robin redbreast, redstart, whitethroat, etc (qq v.). About 100 species are catalogued—all belonging to the Old World, except one in Alaska. The best-known European species are the following. Grasshopper warbler (*Locustella nænia* or *locustella*), found in most parts of the centre and south of Europe. It is of a greenish-brown color, the centres of the feathers dark brown, producing a spotted appearance; the lower parts pale brown. It is a shy bird, hiding in hedges and bushes, but active, often darting out like a mouse from the bottom of the hedge, and receives its name from its chirping, grasshopper-like note. The sedge warbler (*Acrocephalus schœnobœnus*) is the most common British species, and is generally found where aquatic herbage is thick and strong. It is brown, with the chin and throat white and the under parts buff. The great reed warbler (*Acrocephalus arundinaceus*) is found in summer in marshy situations in many parts of Europe, and its range extends to the north of India. It is a uniform pale brown, with a tinge of chestnut: the chin and throat white; the under parts pale buff color. Its nest is remarkable; it is attached to the stems of three or four reeds, and formed by winding the branches of their panicles together with a little wool; it is conical and deep, so that the eggs or young may not be shaken out by the wind. The wood warbler or wood wren (*Phylloscopus sibilatrix*) is common in wooded districts of England in summer, particularly in old oaks and beeches. It is olive green, tinged with yellow, the wings brown, the primaries and secondaries edged with bright yellow, the tertials with a broader edge of yellowish white; the lower parts yellow and white The willow warbler or wren (*Phylloscopus trochilus*) is common in the south of England in the summer. It frequents woods and bushes and builds its nest on the ground. It is of dull olive-green, the wing and tail feathers dark brown, the under parts whitish. The only American representative of this family is an Asiatic species (*Phylloscopus* or *Acanthopneuste borealis*), which regularly visits Alaska in summer, and is known to American ornithologists as Kennicott's willow warbler. See Plate of WRENS, WARBLERS; ETC.

The warblers are uniformly active birds and as such are extremely destructive to injurious insects, especially do they protect forest and orchard trees from the attacks of harmful Lepidoptera and Coleoptera. Their presence in a given locality during migration seems to be determined largely by the number of insects or insect larvæ abundant there. The Maryland yellowthroat feeds largely upon leaf hoppers and cankerworms, while the common black and white warbler eats various beetles. The yellow warbler prefers harmful caterpillars and the black-throated green warbler, grasshoppers. Thus practically each species has a slightly different diet of harmful insects.

For general references consult Newton, *Dictionary of Birds* (London, 1893–96), and other authorities cited under BIRD for the Sylviidæ; for the Mniotiltidæ, consult American ornithologies, especially Ridgway, *Birds of North and Middle America*, part ii (Washington, 1902), and Coues, *Birds of the Colorado Valley* (ib, 1878) For the economic importance, see Forbush, *Useful Birds and their Protection*, published by the Massachusetts Board of Agriculture (Boston, 1913). For the most recent monographic studies and researches consult F. M. Chapman, *The Warblers of North America* (New York, 1907), for Mniotiltidæ, and H. E. Howard, *The British Warblers* (London, 1907–14), for the Sylviidæ.

WARBURG, vär'bur-y', KARL JOHAN (1852–). A Swedish writer, born at Goteborg. He took his Ph.D. at Upsala in 1877 and became professor at Goteborg (1891), librarian at the Nobel Library of the Swedish Academy, Stockholm (1900), and in 1909 professor in that city. Warburg wrote numerous essays on Swedish and foreign authors, and with Henrik Schuck he wrote the important *Illustrerad Svensk Litteraturhistoria* (2 vols., 1896–97; 2d ed., 5 vols., 1912–16). In 1905–08 he was a member of the Riksdag.

WARBURG, wär'bûrg, PAUL MORITZ (1868–). An American banker and financier, born in Germany. He graduated from the Realgymnasium at Hamburg, studied two years in France and two years in England, traveled extensively, and in 1894 became a member of his father's Hamburg banking house, M. M. Warburg and Company. In 1902 he became a partner in Kuhn, Loeb, and Company, New York, and was the representative of his firm in the five-power group that conducted unsuccessful negotiations for a Chinese loan in 1911–12. Warburg was a leader in the agitation for a central banking system for the United States, and his appointment by President Wilson to the newly created Federal Reserve Board in 1914 aided in gaining the approval of the great financial interests to the new currency scheme. He published *Essays on Banking Reform in the United States* (1914).

WARBURG'S TINCTURE. TINCTURA ANTIPERIODICA. A well-known preparation of quinine, the original formula of which contained over 60 ingredients, many of which are now not obtainable, once in great repute in India. The preparation now called by that name (after Carl Warburg, an Austrian physician in the English service) contains only 17 of the original ingredients, among them quinine, camphor, aloes, opium, and rhubarb. Warburg's tincture is given in the more chronic forms of malaria. See QUININE.

WARBURTON, ALEXANDER BANNERMAN (1852–). A Canadian political leader. He was born at Charlottetown, Prince Edward Island, and graduated at King's College, Windsor, N. S., in 1874. He was called to the bar in 1879, practiced his profession in Charlottetown, was elected a Liberal member of the Provincial Legislature in 1891, and was Premier in 1897–98. He was judge of Queen's County Court in 1898–1904, and was elected to the Dominion House of Commons in 1908.

WARBURTON, wär'bŭr-tŭn, BARTHOLOMEW ELLIOTT GEORGE (1810–52). An Irish miscellaneous writer, generally known as Eliot Warburton, born near Tullamore, King's County. He was educated at Queens' College and Trinity College, Cambridge, was admitted to the Irish bar at King's Inns in 1837, and in 1843 traveled extensively in Turkey and through Syria, Palestine, and Egypt. In 1851 he was sent by the Atlantic and Pacific Junction Company as its representative to make a treaty or come

to friendly understanding with the Indians of the Isthmus of Darien, and to carry on explorations there. On the way to perform this commission he met his death by the burning of the steamer *Amazon*. He edited the *Memoirs of Horace Walpole and his Contemporaries* (2 vols, 1851) and wrote: *The Crescent and the Cross* (2 vols., 1844, but dated 1845), descriptive of his Eastern travels; *Zoe: An Episode of the Greek War* (1847); *Memoir of Prince Rupert and the Cavaliers* (1849); *Reginald Hastings* (1850), a novel; and *Darien, or the Merchant Prince* (3 vols., 1852), also a novel Consult the *Fortnightly Review*, vol. xvii (London, 1872).

WARBURTON, Peter Egerton (1813–89). An English traveler in Australia, born near Norwich and educated at Orléans and Paris. He traveled through the northwestern part of Australia on camel back and several times was near to starvation in the desert He wrote *Major Warburton's Diary* (1866) and *Journey across the Western Interior of Australia* (1875).

WARBURTON, William (1698–1779). An English prelate and author. He was born at Newark and was educated at the school of his native town, and afterward at Oakham in Rutlandshire, which he left in the year 1714, returning home to prepare for the profession of law. He practiced as an attorney at Newark for some years, but his natural bent was towards literature and theology. He took orders in 1723, and in 1728 became rector of Brant-Broughton, in the diocese of Lincoln, where he remained for many years. He issued, in 1736, a treatise entitled *The Alliance between Church and State, or the Necessity and Equity of an Established Religion and a Test Law.* In January, 1737–38, it was followed by the first volume of the celebrated work, *The Divine Legation of Moses, Demonstrated on the Principles of a Religious Deist, from the Omission of the Doctrine of a Future State of Rewards and Punishments in the Jewish Dispensation.* In 1739 a new and revised edition of the first part of the work appeared. This was followed in 1741 by the publication of the second part. The third and concluding section was published posthumously in 1788 (10th edition of entire work, 1846). Becoming involved in the controversy which followed the appearance of Pope's *Essay on Man,* Warburton won the warm friendship of the poet by a series of seven letters, entitled *A Vindication of Mr. Pope's Essay on Man, by the Author of the Divine Legation* (1739–40).

In 1757 he was promoted to the deanery of Bristol, and in 1760 Pitt bestowed on him the bishopric of Gloucester. In the later years of his life his mind became impaired; and he was utterly prostrated by the loss of his only son, whom he did not long survive. He founded the Warburtonian lectures for the proof of religion by prophecy.

Warburton exhibits a keen and fertile mind, with an arrogance of tone, which tends, in his treatment of adversaries, to degenerate into truculence and scurrility. His scholarship was never deep or accurate, though he had wide reading and undoubted intellectual vigor. A complete edition of his works, in 7 volumes, was published in 1788 by his friend, Bishop Hurd, who prefaced it with a biography (new edition, 12 vols., 1811). Consult his biography by Watson (London, 1863); also an essay in Mark Pattison, *Essays* (Oxford, 1889).

WAR COLLEGE, United States Army A military institution situated at Washington Barracks, Washington, D. C, and under the immediate supervision of the Secretary of War and the General Staff The War College aims to make a practical application of knowledge already acquired, not to impart academic instruction, and to direct and coordinate military education in the army and in civil schools and colleges at which officers of the army are detailed as instructors, as well as to extend opportunities for investigation and study in the militia of the United States. A further object is to provide facilities for and to promote advanced study of military subjects and formulate the opinions of the college body on the subjects studied for the information of the Chief of Staff The permanent personnel of the War College consists of a president (a general officer of the General Staff) and one director. House Resolution 12,766 (signed June 3, 1916), "To increase the Efficiency of the Military Establishment of the United States," made some changes in the organization of the college. The "War College Division" of the General Staff was abolished, but the college itself remained "fully subject to the supervising, coördinating and informing powers . . . of the General Staff Corps," from which officers for duty as instructors, attachés, or students could be freely drawn, but, if so drawn, the director excepted, they should cease to be members of the General Staff. Student officers may be detailed to follow the courses (lasting one year) in such numbers and under such conditions as the Secretary of War may approve. The Navy and Marine Corps may also send one officer each. This courtesy may also be extended by the Secretary of War to a selected militiaman.

The Naval War College, a similar advanced institution, is situated at Newport, R. I. See Naval Schools of Instruction.

WARD. An infant who has been legally placed under the care of a guardian, who stands in loco parentis. (See Guardian.) So a ward in chancery is an infant under the direct supervision of the chancellor. The term "ward" is also employed to denote a subdivision of a city. It originated in the idea of warding or protecting a hundred under the old English law, and was formerly applied only to certain districts with reference to police protection. However, to-day most cities are divided into wards for many civic purposes, as convenient election districts, police districts, and for convenience in describing the location of property for taxation, etc.

WARD, Sir Adolphus William (1837–). An English dramatic historian, born at Hampstead, London. He was educated at Peterhouse, Cambridge, of which he was elected fellow in 1861; and he also studied in Germany. In 1866 he was appointed professor of history and English literature in Owens College, Manchester, and from 1890 to 1897 he was its principal. In 1900 he became master of Peterhouse. From 1911 to 1913 he served as president of the British Academy and in the latter year he was knighted. His *History of English Dramatic Literature to the Death of Queen Anne* (2 vols., 1875; rev. ed., 1899) is the standard work on this subject. Besides this book and numerous essays and appreciations, he published: a translation of Curtius' *History of Greece* (5 vols., 1868–73); *Chaucer* (1880) and *Dickens* (1882),

in the "English Men of Letters Series"; editions of Pope's *Poetical Works* (1869), Marlowe's *Doctor Faustus*, Greene's *Friar Bacon* (1878), and the *Poems of John Byrom* (1894–95), *Life of Sir Henry Wotton* (1897); *Great Britain and Hanover*, Ford Lectures at Oxford (1899), *The Electress Sophia and the Hanoverian Succession* (1903). He was (1902) made one of the editors of the *Cambridge Modern History* and (1907) of the *Cambridge History of English Literature*. The definitive ("Knutsford") edition of Mrs. Gaskell (1906), with its admirable critical introductions, is his.

WARD, ARTEMAS (1727–1800). An American soldier and jurist, born at Shrewsbury, Mass. He graduated at Harvard in 1748, served first as a major and then as a lieutenant colonel in the French and Indian War, and on May 19, 1775, soon after the outbreak of the Revolution, was appointed to the chief command of the Massachusetts forces. Until the arrival of Washington, he conducted the siege of Boston, and on June 17, 1775, was appointed by Congress first major general in the Continental army, next in rank to Washington, but ill health forced him to resign at the close of 1776. He became Chief Justice of the Court of Common Pleas at Worcester in 1776, served as President of the Massachusetts Executive Council in 1777; was for 16 years a member of the Massachusetts Legislature; and was a member of Congress from 1791 to 1795.

WARD, ARTEMUS. See BROWNE, CHARLES FARRAR.

WARD, BERNARD (NICOLAS) (1857–1920). An English Roman Catholic churchman, born at Old Hall, Hertfordshire He was educated at St. Edmund's College, Old Hall (1868–75), and at Oscott College, Birmingham (1879–82). Ordained a priest, he was a master at St. Edmund's (1882–85), established and superintended a new mission at Willesden (1885–88), and held a mastership at Oscott (1888–90). He then served as vice president of St Edmund's till 1893, and thereafter as its president. In 1895 he was domestic prelate to the Pope, and in 1903 Roman Catholic canon of Westminster. His publications include: *History of St. Edmund's College* (1893); *Commentary on St. Luke's Gospel* (1899); *Life of St. Edmund of Canterbury* (1903); *St. Edmund's College Chapel* (1903); *Catholic London a Century Ago* (1905); *The Dawn of the Catholic Revival* (1909); *The Eve of Catholic Emancipation* (3 vols., 1911–12); *The Sequel to Catholic Emancipation* (2 vols., 1915).

WARD, EDGAR MELVILLE (1839–1915). An American genre painter. He was born in Urbana, Ohio, and studied at the National Academy of Design in New York and in Paris under Cabanel. In 1883 he became a member of the National Academy and afterward was made a professor there. His paintings, which are soundly realistic in execution, include "Breton Washwomen" (1876); "The Sabot Maker" (1878); "The Collar Shop" and "The Quilting Party" (1892); "The Coppersmith" (Metropolitan Museum, New York).

WARD, EDWARD MATTHEW (1816–79). An English historical painter. He was born at Pimlico, London, and studied in the schools of the Royal Academy, at Rome (1836–38), and fresco painting at Munich under Cornelius. In 1839 he exhibited "Cimabue and Giotto," at the Royal Academy. In 1853 he painted eight historical pictures for the corridor of the House of Commons and in 1855 he became a member of the Royal Academy. In 1859 he was commissioned by the Queen to paint "Napoleon III Invested with the Order of the Garter" and the "Visit of Queen Victoria to the Tomb of Napoleon I." Other paintings include: "Dr Johnson in the Anteroom of Lord Chesterfield" (1845), "South Sea Bubble" (1847), both in the National Gallery, London, "Charles II and Nell Gwyn" (1848, South Kensington Museum), "Dr Johnson's First Interview with John Wilkes" (1865). His son LESLIE WARD was illustrator on the staff of *Vanity Fair* (1873–1909), under the pseudonym "Spy," and became well known also for his clever representations of well-known contemporary celebrities in the *World*.

WARD, ELIZABETH STUART PHELPS (1844–1911). An American philanthropist and author, the daughter of Austin and Elizabeth Stuart Phelps and granddaughter of Moses Stuart (qq.v.). She was born in Andover, Mass., where she lived until her marriage to Herbert D. Ward (q.v.) in 1888. She was widely known for her work in temperance reform as well as for her many books, often of a religious trend. Among her publications are: *Ellen's Idol* (1864); *Mercy Gliddon's Work* (1866); *The Gates Ajar* (1868); *Men, Women, and Ghosts* (1869); *Hedged In* (1870); *The Silent Partner* (1871); *Poetic Studies* (1875); *The Story of Avis* (1877); *An Old Maid's Paradise* (1879); *Doctor Zay* (1882), *Beyond the Gates* (1883); *Songs of the Silent World* (1884); *Jack the Fisherman* (1887); *The Gates Between* (1887); *The Struggle for Immortality* (1889); with her husband, *Come Forth* (1891); *A Singular Life* (1895); *The Story of Jesus Christ* (1897); *Within the Gates* (1901); *Trixy* (1904); *Walled In* (1907), *The Empty House and Other Stories* (1910).

WARD, FREDERICK TOWNSEND (1831–62). An American military adventurer, born at Salem, Mass He was educated at the high school in his native town, became a sailor, fought with the French in the Crimea, and was with Walker in Nicaragua. He then became for a time a ship broker in New York, but went to China during the Taiping Rebellion. Having organized an irregular force of about 100 desperadoes, Ward offered his services to the local Chinese authorities, and for a reward of $200,000 recaptured Sungkiang, and garrisoned it. Having received a commission from the Chinese, he began drilling natives with foreign adventurers as officers, increased his following to nearly 4000, the nucleus of the force later known under Gordon as the Ever Victorious Army. Gordon succeeded to Ward's command after the latter's death. But it was the organization and discipline introduced by Ward, who was possessed of great military talents, which gave Gordon the necessary foundation for conquering the Taipings. This force, developed by Ward, was of great assistance to the British and French admirals in protecting Shanghai, and maintaining a neutral belt of 30 miles around the city. During a skirmish near Ningpo Ward was killed; he was buried at Sungkiang, where a shrine was erected to his memory in 1875.

WARD, GENEVIÈVE, COUNTESS DE GUERBEL (1838–1922). A singer and actress. She was born in New York, but from childhood lived much abroad, studying music both in New York and in Italy. After her romantic and unhappy marriage to the Russian officer Count Constan-

tine de Guerbel (1854), she made her début as an opera singer at Milan in 1856 under the name of Madame Guerriabella. She met with great success both on the Continent and in England. Soon after she came to America in 1862 she lost her voice through illness, and for a time gained a livelihood by teaching singing while she studied for the theatre. Her appearance as Lady Macbeth, at Manchester, England, in 1873, proved the beginning of her fame in many tragic rôles, among them Lucrezia Borgia, Queen Katharine, and especially Stephanie, in *Forget-Me-Not*. She first appeared on the American stage in 1878. In 1893 she was Queen Eleanor in the production of *Becket* by Irving at the Lyceum, and she continued with him till 1897, afterward residing in England In 1910 she joined F. R. Benson's company, appearing in a repertory of Shakespearian plays Consult· Wickoff, *Memoir of Ginevra Guerriabella* (New York, 1863); Gustafson, *Genevieve Ward* (Boston, 1882); W. Winter, *Shadows of the Stage* (New York, 1892).

WARD, HARRY MARSHALL (1854–1906). An English botanist born at Hereford, and educated at Owens College, Manchester, and at Christ's College, Cambridge. In 1880–82 he was cryptogamic botanist to the Ceylon government. He was professor of botany in the school of forestry of Cooper's Hill College, Egham, from 1885 to 1895, when he became professor at the University of Cambridge. His works include. *A Popular Introduction to Forest Botany* (1892), *Timber and Timber Trees* (1894); *Grasses* (1901); *Trees: Handbook of Forest Botany for the Woodlands and the Laboratory* (5 vols., 1904–09). Aside from his general works on botany, his chief interest was plant pathology, in which field he was one of the pioneers.

WARD, HENRY AUGUSTUS (1834–1906). An American naturalist, born at Rochester, N. Y. He attended Williams College and the Lawrence Scientific School, Harvard, where he was an assistant of Louis Agassiz. He traveled in Egypt, Arabia, and Palestine; studied for several years at the Jardin des Plantes, the Sorbonne, and the School of Mines in Paris, and at the universities of Munich and Freiberg; and afterward traveled in West Africa and the West Indies, making natural history collections. After his return to the United States in 1860 he was professor of natural science at the University of Rochester until 1865, and in 1871 was naturalist to the United States Commission to Santo Domingo. He then devoted himself entirely to the work of making natural history collections, and founded at Rochester, N. Y., Ward's Natural Science Establishment, a pioneer enterprise of its kind, which collected specimens, especially zoölogical, from all parts of the world, and then mounted and sold them to colleges and museums. He published· *Notices of the Megatherium Cuvieri* (1863), and *Description of the Most Celebrated Fossil Animals in the Royal Museums of Europe* (1866).

His wife (1845–1924), whose maiden name was Lydia Avery, was the widow of John C. Coonley, when she was married to Mr. Ward in 1897. Long resident in Chicago, she was president of the Chicago Woman's Club in 1895–96. Mrs. Coonley-Ward wrote: *Under the Pines, and Other Verses* (1895); *Singing Verses for Children* (1897); *Love Songs* (1898); etc.

WARD, HERBERT (?–). A British sculptor, traveler, and author. He early became familiar with Africa, and was one of the survivors of Stanley's Emin Pasha (q.v.) relief expedition (1888). Later he became known especially for his bronzes of African natives, whom he had grown to understand and sympathize with. Among such sculptures are "The Idol Maker" and "Détresse." In Paris, where Ward made his residence, his work is represented in the Luxembourg. He became Chevalier of the Legion of Honor and a member of the Society of British Sculptors. In 1916 he lectured in the United States for the benefit of the work in Europe of the American War Relief He published. *Five Years with the Congo Cannibals* (1890); *My Life with Stanley's Rear Guard* (1891), *A Voice from the Congo, Comprising Stories, Anecdotes, and Descriptive Notes* (1910).

WARD, HERBERT DICKINSON (1861–). An American author, born at Waltham, Mass, son of William Hayes Ward (q.v.). He graduated from Amherst in 1884, and married Elizabeth Stuart Phelps (see WARD, ELIZABETH S. P) in 1888. He wrote extensively for newspapers and periodicals, and was author of *The New Senior at Andover* (1890); *A Republic without a President, and Other Stories* (1891), *The Captain of the Kittiewink* (1892); *A Dash to the Pole* (1893); *The White Crown, and Other Stories* (1894); *The Burglar Who Moved Paradise* (1897); *The Light of the World* (1901), and joint author with his wife of *A Lost Hero* (1889); *The Master of the Magicians* (1890), *Come Forth* (1891).

WARD, (THOMAS) HUMPHRY (1845–). An English author and journalist. He was born at Hull, and studied at Brasenose College, Oxford, where he became a fellow in 1869, and a tutor in 1870. He contributed editorials to the London *Times*, edited *The English Poets* (4 vols., 1880), a notable anthology, *Men of the Reign* (1885); *The Reign of Queen Victoria* (1887); *English Art in the Public Galleries of London* (1888), and *Men of the Time* (12th ed.), and wrote alone *Humphry Sandwith, a Memoir* (1884), and jointly *The Oxford Spectator* (1868) and *Romney* (1904) For his wife see WARD, MRS HUMPHRY.

WARD, MRS. HUMPHRY; maiden name, MARY AUGUSTA ARNOLD (1851–1920). An English novelist, daughter of Thomas Arnold (1823–1900), granddaughter of Thomas Arnold (1795–1842), and niece of Matthew Arnold (qq.v.). She was born at Hobart in Tasmania. After attending schools in the Lake district and at Clifton, she began her literary career at Oxford. In 1872 she was married to Thomas Humphry Ward (q.v.). In 1880 they settled in London. Mrs. Ward contributed four biographical introductions to the first volume of her husband's *English Poets* (1880–81), and in 1885 she published a translation of *Amiel's Journal* (see AMIEL, HENRI). Her first great success was *Robert Elsmere* (1888), probably the best religious problem novel that had so far appeared in English. It caused a great sensation at the time because of its attack on Evangelical Christianity. Subsequently Mrs. Ward took up other phases of contemporary thought in religion and politics. Her concern with ethical problems is often so obvious as to detract from the artistic value of her work; but her characters are graphically drawn and the workmanship is of high order. After *Robert Elsmere* came: *The History of David Grieve* (1892); *Marcella* (1894); *The Story of Bessie Costrell* (1895); *Sir George*

Tressady (1896), *Helbeck of Bannisdale* (1898), *Eleanor* (1900); *Lady Rose's Daughter* (1903), *The Marriage of William Ashe* (1905); *Fenwick's Career* (1906); *The Testing of Diana Mallory* (1908); *Marriage à la Mode* (1909); *Canadian Born* (1910); *Lady Merton, Colonist* (1910); *The Case of Richard Meynell* (1911); *The Coryston Family* (1913); *Delia Blanchflower* (1914); *Eltham House* (1915). With C. E. Montague she wrote a memoir of her brother, *William Thomas Arnold, Journalist and Historian* (1907). In harmony with the scheme set forth in *Robert Elsmere*, Mrs. Ward took an active part (1890) in founding University Hall, a settlement among the poor of London. In 1916 she published *England's Effort, Letters to an American Friend.* Consult: Henry James, *Essays in London and Elsewhere* (New York, 1893); W L. Phelps, *Essays on Modern Novelists* (ib, 1910); A. G. Gardiner, *Pillars of Society* (London, 1913).

WARD, JAMES (1769–1859). An English animal and genre painter and engraver. He was born in London, at the age of 12 was apprenticed to J. Raphael Smith, after which he studied for nine years with his brother, William Ward, a mezzotint engraver He also studied painting, exhibiting his first picture in 1790, and afterward received the official title of painter and mezzotint engraver to the Prince of Wales. Ward's early paintings were principally genre pictures in the manner of his brother-in-law, George Morland, but he won high distinction in animal subjects, by the exhibition of his "Bull-Baiting" (1797) and the "Lioness" (1816). His paintings are treated in an original and vigorous style, and show a strong but peculiar feeling for color. Among the principal are the "Alderney Bull, Cow, and Calf," painted in rivalry with Paul Potter's "Bull," and a "Cattle Piece" (1807), in the National Gallery; the "Fighting Bulls" and "Donkey and Pigs," in South Kensington Museum. A very characteristic painting is his portrait of himself, painted when he was 79 years old (National Portrait Gallery). Among the best of Ward's plates are the "Centurion Cornelius," after Rembrandt; "Daniel in the Lion's Den," after Rubens; "Juvenile Retirement," after Hoppner; and "Mrs. Billington," after Reynolds. Ward was elected an Academician in 1811. A complete set of his engravings is in the British Museum. Consult his *Autobiography* (London, 1853).

WARD, JAMES (1843–1925). An English psychologist and metaphysician. He was educated at Berlin, Göttingen, and Trinity College, Cambridge, and worked for a short time in the physiological laboratory at Leipzig. He studied originally for the Congregational ministry. Ward rose to be lecturer of Trinity in 1881 and professor of mental philosophy in Cambridge University in 1897. Cambridge, Edinburgh, and Oxford gave him honorary degrees, and among other distinctions he received was election as corresponding member of the French Institute (1913). Besides numerous articles in the *Journal of Physiology, Journal of Speculative Philosophy, Mind, British Journal of Psychology, Journal of Education,* and other periodicals, he published: *Naturalism and Agnosticism* (1899; 4th ed., 1915); Gifford lectures at Aberdeen; *The Realm of Ends, or Pluralism and Theism* (1911; 2d ed., 1912), Gifford lectures at St. Andrews; *Heredity and Memory* (1913), Henry Sidgwick memorial lecture at Newnham College. His work shows the influence of Leibnitz and Lotze, and of the biological theory of evolution. Experience, accordingly, is interpreted as a unitary continuum in which distinctions take place gradually by the action of selective attention (conation). For list of Ward's writings through 1911, consult Titchener and Foster, *American Journal of Psychology,* vol. xxiii (Worcester, 1912).

WARD, JOHN QUINCY ADAMS (1830–1910). An American sculptor. He was born at Urbana, Ohio. He began the study of law, but in 1850 took up sculpture in Brooklyn, under H K. Brown, with whom he worked for seven years, assisting in many important works, chief among which was the equestrian statue of Washington in Union Square, New York. In 1857–59 he worked in Washington, D. C, where he executed the busts of Alexander Stephens, and other prominent men, and in 1861 he opened a studio in New York City, where he soon achieved success. For the purpose of studying the American Indians, he visited the Western frontier in 1863, and the following year completed his "Indian Hunter," the first statue erected in Central Park. Other works by him in Central Park are the "Freedman" (1865), the "Private of the Seventh Regiment" (1868), "Shakespeare" (1870–71), and the "Pilgrim" (1885). Other public works of this early period are: the fine equestrian statue of General Thomas (1878, Washington); Lafayette statue (1883, Burlington, Vt); the colossal George Washington (1883, Treasury Building, New York); the Garfield Monument (1887, Washington); Horace Greeley (1890, long in front of the Tribune Building, New York; placed in City Hall Park, 1916); and the H. W. Beecher statue (1891), in front of Borough Hall, Brooklyn. He also executed the successful "Crowning Group of Victory" for the Naval Arch, erected in New York City (1899) for Admiral Dewey's reception. Later works include: the bronze bust of George William Curtis (1903, New York Public Library); the marble pediment of the New York Stock Exchange (1903); the Soldiers' and Sailors' Monument in Syracuse (1907); an equestrian statue of General Sheridan (Washington, 1908); and the bronze equestrian statue of General Hancock (unveiled 1911, Fairmount Park, Philadelphia). His work is strong and virile, conceived along broad, simple lines. Throughout his long career it showed no diminution of force, or loss of technical excellence, though lacking, perhaps, in skillful surface manipulation. Ward was one of the founders of the National Sculpture Society (1893) and president from its incorporation (1896); a member of the National Academy of Design (1863), of which he was president in 1874; and a member of the American Academy of Arts and Letters (1898), the Architectural League of New York, and the American Institute of Architects. He took an active part in various art associations, federations, and civic societies Consult Lorado Taft, *History of American Sculpture* (New York, 1905); Adeline Adams, *J Q. A. Ward, An Appreciation* (ib., 1911).

WARD, LESTER FRANK (1841–1913). An American geologist, paleontologist, sociologist, and philosophical writer. Born at Joliet, Ill., his early life is obscure. After serving in the Federal Army during the Civil War he was graduated from Columbian (now George Wash-

ington) University in 1869, and two years later from the Law School of the same university. After seven years of work in the United States Treasury Department he became an assistant geologist under the United States Geological Survey, and after 1888 was a paleontologist of the Survey. Already for many years Ward had been deeply interested in the broader aspects of evolution, and especially in the problems of social evolution. Accepting in its broader outlines the philosophy of Spencer, he nevertheless vigorously opposed its laissez faire conclusions as a basis for social policy In 1883 he published a large work in two volumes, entitled *Dynamic Sociology*, in which he outlined a complete system of cosmic philosophy, and set forth the possibilities to be realized by the conscious direction of social evolution. The psychological character of all social phenomena and the superiority of intelligence to nature were again expounded in *The Psychic Factors of Civilization* (1893; 2d ed., 1906). His social theories were summarized in *Pure Sociology* (1903) and *Applied Sociology* (1906). He was America's most distinguished sociologist; and in 1903 served as president of the Institut International de Sociologie. His last great work was his intellectual history, *Glimpses of the Cosmos: a Mental Autobiography* (8 vols., vols. i–iv, 1912–15) A bibliography of his writings includes more than 600 titles. Among his more important contributions to geology and paleontology are: *The Flora of Washington* (1881); *Sketch of Paleontological Botany* (1885); *Synopsis of the Flora of the Laramie Group* (1886); *Types of the Laramie Flora* (1887); *Geographical Distribution of Fossil Plants* (1889).

WARD, Lydia Avery Coonley. See Ward, Henry Augustus.

WARD, Nathaniel (c.1578–1652). An American Colonial clergyman and pamphleteer, born in Haverhill, England, best known as the author of the *Simple Cobbler of Aggawam*, published under the pseudonym of Theodore de la Guard. He graduated at Cambridge, studied theology, and in 1618 became chaplain to English merchants at Elbing, Prussia. Returning to England he lectured in London, and in 1628 was appointed rector of Stondon Massey, Essex. His pronounced Puritanism deprived him of his living in 1633, and he went to New England in 1634, and served as colleague to Rev. Thomas Parker at Ipswich, where he took a leading part in the compilation of the first code of laws, *The Body of Liberties* (1641). His notorious book, *The Simple Cobbler*, begun in 1645, printed in January, 1647, and speedily followed by three other editions, with important additions and changes (reedited 1718 and 1843), and, with introductory essay by T. Waters, in 1905 (Ipswich Historical Association), was a partisan pamphlet and one of the most interesting productions of the Colonial period. In 1646 Ward left the Colony for England, and was made minister of the church at Shenfield (1648). He held that office till his death. For a good account of his fantastic book, which is full of extravagant satire, see Tyler's *History of American Literature*, vol. i.

WARD, Nathaniel Bagshaw (1791–1868). An English botanist, born in London. The principle of the Wardian case (q.v.) was suggested to him by noticing some seeds which had sprouted in a bottle. By means of these sealed cases plants were sent from one part of the world through extremes of temperature without being injured. Robert Fortune sent 70,000 tea plants from Shanghai to the Himalaya, sufficiently proving the utility of the cases. He published *On the Growth of Plants in Closely Glazed Cases* (1842).

WARD, Robert Plumer (1765–1846). An English politician, jurist, and novelist, born in Mayfair, London, and educated at Westminster School and at Christ Church, Oxford From 1785 to 1790 he studied, with some interruptions devoted to travel, at the Inner Temple and at 30 had made a name by his *Inquiry into the Foundation and History of the Law of Nations in Europe* (1795). He sat in Parliament for many years, and held various important government offices. For years he kept a political diary, valuable because of Ward's close relations to Spencer Perceval (q.v.). Among Ward's works of fiction, *Tremaine; or the Man of Refinement* (anonymous, 1825) and *De Vere; or the Man of Independence* (1827) were long popular for brilliant style, good character analysis, and serious purpose. He also wrote *A Treatise of the Relative Rights and Duties of Belligerents and Neutral Powers* (1801) and *An Historical Essay on the Real Character and Amount of the Precedent of the Revolution of 1688* (1838). Consult Phipps, *Memoirs of the Political and Literary Life of Robert Plumer Ward, Esq.*, with selections from the diary (London, 1850).

WARD, Wilfrid Philip (1856–1916). An English essayist and biographer, born at Old Hall, Ware, a son of William George Ward (q.v.). He was educated at St. Edmund's College, Ware, Ushaw College, Durham, and the Gregorian University in Rome. He was lecturer in philosophy at Ushaw College in 1890, examiner in the Royal University of Ireland in 1891–92, and in 1901 was made a member of the Royal Commission of Irish University Education. In 1915 he lectured before Lowell Institute, Boston. He published, notably: *William George Ward and the Catholic Revival* (1893; 2d ed., 1912), *Witnesses to the Unseen* (1894), *The Life and Times of Cardinal Wiseman* (1897), *Aubrey de Vere: a Memoir* (1904), *Ten Personal Studies* (1908), *Life of John Henry, Cardinal Newman* (1912), *Men and Matters* (1914). In addition, he edited the *Dublin Review*, and contributed to the *Edinburgh, Quarterly, Contemporary*, etc.

WARD, William George (1812–82). An English philosopher and Roman Catholic theologian, born in London. He studied at Winchester College (1823–29), at Christ Church, Oxford (1830–33), and then at Lincoln College. He showed marked ability in mathematics and became famed as a debater in the Union Club. His theological views were ill-defined until he made the personal acquaintance of Newman, against whom he had previously been prejudiced, but who now by the single argument that the Catholic church of the third or fourth century could never have developed from anything resembling modern Protestantism made him an ardent Tractarian and a bitter assailant of Anglican Protestantism. He became a deacon in 1838, a priest in 1840, editor of the Tractarian organ, the *British Critic*, in 1839, and, after 1841, when he openly defended Newman's *Tract xc*, and was deprived of his lectureship at Balliol, an open advocate of union with Rome. His position was definitely stated in 1844 in *The Ideal of a Christian Church Considered in Comparison with Existing Practice*. The book was censured by the

Convocation of Oxford, and Ward was deprived of his degrees This was in February, 1845, and in September of the same year he joined the Roman Catholic communion. He settled at St. Edmund's College, Ware, became professor of moral philosophy there in 1852, and held this chair until 1858. He was made Ph.D. by the Pope in 1854. In 1861 he returned to St Edmund's. In the preceding year he had published *On Nature and Grace*, an able attack on agnosticism. He was editor of the *Dublin Review* in 1863–78, and a leader of the Ultramontanists and Infallibilists. His breadth of vision and sympathy is indicated by his place as a founder of the Metaphysical Society (1869), and a fellow member in it of Huxley, Martineau, and Tennyson; and by his friendship with Archbishop Tait, his antagonist even in university days, with Newman and Manning, in spite of the difference between his mental mold and theirs, and with John Stuart Mill, though their views were so divergent His son, Wilfrid Philip Ward, wrote *William George Ward and the Oxford Movement* (London, 1889) and *William George Ward and the Catholic Revival* (ib., 1893; 2d ed., 1912). See OXFORD MOVEMENT.

WARD, WILLIAM HAYES (1835–1916). An American clergyman, editor, and Orientalist, born at Abington, Mass. He graduated at Amherst College in 1856, and at Andover Theological Seminary in 1859, and was pastor of a Congregational church at Oskaloosa, Kans., in 1859–60. From 1865 to 1867 he served as professor of Latin in Ripon College, Wis. Joining the editorial staff of the New York *Independent* in 1868, he became superintending editor in 1870, was editor in chief from 1896 to 1913, and honorary editor thereafter. He gave special attention to Oriental studies, and was director of the Wolfe expedition to Babylonia. He was lecturer on Assyriology at Yale University in 1878–79, and president of the American Oriental Society from 1890 to 1894 and again in 1909–10. His works include: *The World's Christmas Hymns* (1883), with his sister, Susan Hayes Ward, *Report of the Wolfe Expedition to Babylonia* (1885); *Biography of Sidney Lanier* (1885); *Cylinders and Other Ancient Oriental Seals in the Library of J. Pierpont Morgan* (1909); *The Seal Cylinders of Western Asia* (1910); *What I Believe and Why* (1915). For his son, see WARD, HERBERT D.

WARDE, FREDERICK B. (1851–). An American tragedian, born at Wardington, Oxfordshire, England. His first stage appearance was at Sunderland, England, in 1867, and he then played successive seasons at Glasgow, Leeds, and Manchester. Coming to the United States in 1874, he was leading man at Booth's Theatre, New York, for three years, and after 1881 starred especially in Shakespearean tragedies. From 1893 to 1903 he was in partnership with Louis James. After 1907 he lectured frequently on dramatic subjects. He published *The Fools of Shakespeare: An Interpretation of Their Wit, Wisdom, and Personalities* (1913).

WARDEN (OF. *guardain, gardain,* Fr. *gardien,* from *garde, warde,* guard, from *garder, guarder, warder,* to guard, from Ger. *warten,* Eng. *ward*). In England, an officer appointed for the naval or military protection of some particular district of country. In order to keep the districts of England adjoining Scotland and Wales in an attitude of defense, great officers, called lords wardens of the marches, were appointed, to whom the duty of protecting the frontier was committed The custodian of Dover Castle was created by William the Conqueror, Warden of the Cinque Ports (q.v.) and guardian of the adjacent coast, an office originally comprising extensive jurisdiction, civil, naval, and military, the greater part of which was taken away by act of Parliament in 1855.

WARDEN, CHURCH. An official of the parishes of the Anglican communion. In the Church of England the churchwardens are a corporation intrusted with the care and arrangement of the goods belonging to the church of the parish. As a rule, two are elected in each parish; one usually is selected by the incumbent and one elected by the parishioners. Their principal duties are to see to the making of church rates, the levying of voluntary contributions for church purposes, to arrange for the seating of the congregation, to enforce orderly behavior in church and churchyard during service, to take care of the benefice during a vacancy, and to make presentments to the Bishop of the diocese in the event of the misconduct of the clergy. The wardens of parishes of the Episcopal church of the United States, two in number, are elected by the congregation at its annual meeting, and are ex officio members of the vestry. Their special duties are to see that all things required for the services of the church are provided, and in the absence of the rector or a vacancy in the rectorship that a clergyman is secured to conduct the services.

WARDEN, DAVID BAILLIE (1778–1845). An antiquary, born in County Down, Ireland. He studied theology at Bangor, but after taking part in the attempted insurrection of the Orangemen in 1796–98 emigrated to America, where he studied and taught. About 1805 he went to Paris as secretary of the United States Legation and afterward became consul. He had difficulty with the home government on two or three occasions, and was definitely replaced in 1814, but continued to live in Paris. He was an ardent antiquary. His chief publications are: *A Statistical, Political, and Historical Account of the United States of America* (1819); *Bibliotheca Americana Septentrionalis* (1820); *L'art de vérifier les dates, chronologie de l'Amerique* (1826–44); *Bibliothèque américaine* (1831); *Recherches sur les antiquités de l'Amérique* (1844).

WARDHOLDING (from *ward,* AS. *weard,* OHG. *warta,* watch, guard, from *wartēn,* to watch, guard + *holding*). In the Scottish feudal system, military tenure of land by which a vassal held of a superior lord on condition of rendering military services when required by the latter. When such lands descended to an heir who had not attained his majority, and who therefore could not render satisfactory military services, the lord was allowed the guardianship of his person and possession of his lands during his minority. This right was sometimes waived in consideration of an annual tax. The lord of such vassal was also entitled to the payment of a sum of money upon the marriage of the latter. The vassal could not alienate his fee without the consent of the lord, and the estate was forfeited if he attempted to do so. This form of tenure was abolished in 1747 by statute.

WARDIAN CASE. A nearly air-tight glass case in which plants are either grown for ornament or are transported upon long sea voyages. They protect plants from frost, salt spray, and

injurious gases, and conserve moisture, demanding little attention. It was found impossible to ship cinchona seedlings from South America to India until these cases were used. These cases were invented by N. B. Ward (q.v.) about the year 1836.

WARD/LAW, ELIZABETH, LADY (1677–1727). A Scottish poet. She was born at Pitfirrane, Fifeshire, and was married (1696) to Sir Henry Wardlaw, of Pitcruivie. There was published in 1719 a ballad entitled "Hardyknute," which had been previously circulated by her as the copy of an ancient manuscript found in a vault at Dunfermline. The authorship of this work has never been satisfactorily settled, but as no one ever saw the original manuscript and certain of Lady Wardlaw's friends stated positively that it was of her own composition, it seems probable that such was the case. Even if a forgery, "Hardyknute" is a remarkably fine imitation of the genuine ballads. "Sir Patrick Spens" has also been ascribed to Lady Wardlaw's pen, but this attribution is untenable, though it is possible that she amended a copy of it as well as certain other ballads, such as "Gilderoy." Consult Child, *English and Scottish Popular Ballads* (Boston, 1882–96).

WARD/LAW, RALPH (1779–1853). A Scottish Congregational minister. He was born at Dalkeith, in Midlothian, and studied theology in the school of the Associate Secession church. At the end of his course he became a Congregationalist. In 1800 he began to preach, and in 1803 settled in Glasgow as pastor of an independent church. In 1811 he was appointed professor of theology to the Congregational body in Scotland, and held the position, with his pastorate, till his death. Wardlaw was a voluminous author, often involved in theological controversy, and a prominent actor in the public religious and philanthropical movements of the day. The most important of his works are: *Essays on Assurance of Faith, and on the Extent of the Atonement and Universal Pardon* (1830); *Discourses on the Sabbath* (1832); *Christian Ethics* (1833); *Discourses on the Nature and Extent of the Atonement of Christ* (1843); *Congregational Independency* (1847); *Lectures on Systematic Theology* (1856–57). Consult the *Life and Correspondence of Ralph Wardlaw*, by Alexander (Edinburgh, 1856).

WARDLE, MR. See PICKWICK CLUB.

WAR/DROP'S OPERATION. See ANEURISM; BRASDOR'S OPERATION.

WARDSHIP AND MARRIAGE. An incident of a feudal tenure by knight service, consisting in the right of the lord to receive the income of the estate of a minor heir out of which the heir is supported, and to arrange the heir's marriage. See TENURE.

WARE. A market town in Hertfordshire, England, 2½ miles northeast of Hertford (Map: England, G 5). Malting and brewing are the chief industries. Ware is celebrated in Cowper's poem of John Gilpin, and at Rye House, 4 miles distant (the scene of the Rye House Plot in 1683), removed from one of the inns of the town, is still to be seen the famous bed of Ware mentioned in Shakespeare's *Twelfth Night*. Pop., 1901, 5573; 1911, 5842.

WARE. A town in Hampshire Co., Mass., 28 miles west of Worcester, on the Ware River, and on the Boston and Albany and the Boston and Maine railroads (Map: Massachusetts, C 3). Manufacturing is the most important industry, the leading products being cotton and woolen goods, and boots and shoes. Grenville Memorial Park is of great beauty. Pop., 1900, 8263, 1910, 8774, 1915 (State census), 9346. Settled about 1716, Ware became a parish in 1742 and a town in 1761. Consult Gay, *Gazetteer of Hampshire County* (Syracuse, 1888).

WARE, EUGENE FITCH (1841–1911). An American lawyer and poet, born at Hartford, Conn. When a boy he removed with his parents to Iowa. He served in the Civil War, rising to be captain, and was admitted to the bar at Fort Scott, Kans., in 1871. He won rapid recognition in his profession and took an active part in Republican State politics, serving for five years as a member of the State Senate (1879–84). In 1902–05 he was United States Commissioner of Pensions. He became widely known as a contributor to the magazines, particularly through the verse written under the pseudonym "Ironquill." His publications include: *Rhymes of Ironquill* (1885, 13th ed., 1908); *The Rise and Fall of the Saloon* (1900); *The Lyon Campaign in Missouri* (1907); *The Indian Campaign of 1864* (1908); *From Court to Court* (4th ed., 1909); *Ithuriel* (1909).

WARE, HENRY (1764–1845). An American Unitarian clergyman. He was born at Sherburne, Mass., and graduated at Harvard in 1785. He was pastor of the First Church in Hingham, Mass., from 1787 to 1805, when he was called to the Hollis professorship of divinity at Harvard College. This event precipitated the separation of Unitarians and Congregationalists, and led to the founding of Andover Seminary. Dr. Ware carried on a controversy with Dr. Leonard Woods, whose *Letters to Unitarians* he answered in *Letters Addressed to Trinitarians and Calvinists* (1820); *Answer to Dr. Woods's Reply* (1822); and *Postscript to an Answer, etc.* (1823). He also published *Foundation, Evidences, and Truths of Religion* (1842).

WARE, HENRY (1794–1843). An American Unitarian clergyman. He was born at Hingham, Mass., son of Henry Ware (1764–1845). He graduated at Harvard in 1812; was an instructor in Phillips Exeter Academy (1812–14); studied theology under his father, and in 1817 was settled over the Second Church (Unitarian) in Boston. He played a prominent part in organizing his denomination. He was professor of pulpit eloquence and pastoral care in the Harvard Divinity School (1830–42), and was one of the editors of the *Christian Disciple*, afterward the *Christian Examiner*, a Unitarian periodical (1819–22). Among his works are *Hints on Extemporaneous Preaching* (1824) and *Life of the Saviour* (1832). His select writings were edited by Chandler Robbins (4 vols., Boston, 1846–47). Consult his memoir by his brother John (Boston, 1846).

WARE, WILLIAM (1797–1852). An American romancer, born at Hingham, Mass. He graduated at Harvard, 1816, studied for the Unitarian ministry, and preached mainly in New York (1821–36), and later in Massachusetts. From 1839 to 1844 he edited the *Christian Examiner*. His reputation was chiefly gained by his historical romances, *Zenobia, or the Fall of Palmyra* (first published as *Letters from Palmyra*, 1836 and 1837), and *Aurelian* (first entitled *Probus*, 1838). *Julian, or Scenes in Judea*, appeared in 1841. Also among his writings are the *Life* of Nathaniel Bacon in Sparks's *American Biography* (1848) and *Lec-*

tures on Washington Allston (1852) His *Writings* were published in 1904

WARE, WILLIAM ROBERT (1832–1915). An American architect, born at Cambridge, Mass., and educated at Harvard in the college and the Lawrence Scientific School He studied architecture in the office of Richard M. Hunt (q.v.), and practiced in Boston from 1861 to 1881, in partnership with Henry Van Brunt after 1865 In 1866 he was commissioned to organize a school of architecture in the Massachusetts Institute of Technology in Boston. This, the first school of its kind in America, was opened in 1867, under Ware as its professor of architecture, in which capacity he directed the school until 1880. In 1881 he was called by Columbia College (now Columbia University) to establish a department of architecture, which he organized and directed until his retirement in 1903 He attained a high reputation in the conduct of important architectural competitions between 1883 and 1900. He was for 50 years a member of the American Institute of Architects, and was an honorary corresponding member of the Royal Institute of British Architects. His most notable designs were the First Church in Boston, Memorial Hall (Harvard), and the American School of Classical Studies at Athens, Greece. He wrote: *Modern Perspective* (1883); *The American Vignola* (1904); *The Georgian Period* (1904); *Architectural Shades and Shadows* (1912). He died at Milton, Mass.

WARE'HAM. A town in Plymouth Co., Mass, 50 miles south by east of Boston, on the Wareham River and on the New York, New Haven, and Hartford Railroad (Map· Massachusetts, F 5). The growing of cranberries and the manufacture of steel, horseshoes, and nails constitute the chief industries. Pop., 1900, 3432; 1910, 4102; 1915 (State census), 5176.

WAREHOUSEMAN. One engaged in the business of storing goods for compensation. The distinction between a warehouseman and an ordinary bailee of goods is to be observed both in regard to the degree of care and responsibility and in regard to the nature of the lien on the goods stored. A bailee in general has no lien for storage except by agreement, or for work done on the actual goods held, known as a workman's lien. Warehousemen having been held by the courts to exercise a public function in the same way as hotel keepers and carriers and to be subject to regulation by the legislatures of the several States, they have been given by statutes the right to a lien on the merchandise in their custody.

In law the degree of care to be exercised by a bailee is governed by the circumstances of the bailment, while that of the warehouseman is presumed to be somewhat greater, especially in the case of a public warehouseman, but is generally less than that required of a common carrier or hotel keeper. Thus, if the baggage is left at a station or depot for a certain time after it has reached its destination, the responsibility of the railroad becomes that of a warehouseman and is no longer that of a common carrier. He is not liable as insurer of the goods but is bound to exercise ordinary care. A receipt given by a warehouseman that he holds goods in storage is what is known as a warehouse receipt. At common law they were not negotiable, but they were assignable in the same manner as contracts, and delivery of the receipt had the same effect as delivery of the goods themselves. By statute in a number of States such receipts have been declared negotiable.

The method of enforcement of a lien of a warehouseman is usually fixed by statute. It consists in a public sale of goods after a certain period of time to meet delinquent storage charges. Any proceeds remaining over belong to the owner.

Public warehousemen are those who hold themselves out to the public as engaged in that particular business.

Bonded warehouses are usually private enterprises conducted under the direct supervision of a government storekeeper They are in the United States designated by the United States Treasurer as depositaries for goods until the payment of duties. Goods are sent to them either at the request of the importer or during the determination of the amount of duties, but may be released under a bond to the government even before such determination or payment of duties. The government assumes no responsibility as bailee, that resting with the individual warehouseman. See BAILMENT.

WAREHOUSE RECEIPT. A memorandum given by a warehouseman acknowledging the delivery of goods and chattels to him for storage, and usually containing the terms upon which he receives them. In the absence of statute such receipts are not technically negotiable instruments but in spite of this fact an innocent purchaser for value would take the receipt free from any special or collateral agreement which might exist between the bailor and the warehouseman. By statute, generally known as the Warehouse Receipts Act, such documents are made negotiable in California, Colorado, Connecticut, Illinois, Iowa, Kansas, Louisiana, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Nebraska, Nevada, New Jersey, New Mexico, New York, Ohio, Oregon, Pennsylvania, Rhode Island, South Dakota, Tennessee, Utah, Vermont, Virginia, Washington, Wisconsin, Alaska, District of Columbia and the Philippines. This statute ordinarily requires the receipt to state among other things: the location of the warehouse; the date of issue of the receipt, the rate of storage charges; a description of the goods; statement of any lien claimed by the warehouseman. If the receipt states that the goods are deliverable to a certain person it is not negotiable and if to bearer or order it is negotiable. Ordinarily the words "negotiable" or "not-negotiable" should be marked on the face of the receipt and if the warehouseman neglects to do this the purchaser may impose upon the warehouseman the same obligations as though it were negotiable.

As far as concerns the property interest in goods deposited with a warehouseman, the purchaser of the receipt only takes such property as the depositor had at the time of deposit. Hence if a thief deposits goods the claim of the true owner is paramount to that of the innocent purchaser of the negotiable warehouse receipt. Warehouse receipts are frequently delivered as collateral for loans of money. See BAILMENT, and consult the authorities there referred to.

WAREHOUSING SYSTEM. A plan for permitting the importer or manufacturer of goods which are subject to customs or excise duties to postpone the payment of such duties until withdrawal of the goods for consumption. Such goods must be deposited in warehouses, either public or private, but under the super·

vision and control of revenue officers. The advantages of such a system to merchant or manufacturer are the saving of interest on the sum of duty charges, the saving of duties on goods destroyed or damaged before withdrawal for consumption, and in the case of imported goods convenience in reexportation. In continental European countries the same end was attained in the eighteenth century by the creation of free ports, where goods might be stored, manufactured, and reexported without paying customs duties, and the same practice is in use in some European countries to-day. In the United States, up to 1842, credit for duties was granted the importer, provided he could furnish satisfactory security that the duties would be paid within a specified time.

The warehousing system was introduced in England and France towards the close of the eighteenth century. In France the system was established on a broad basis in 1832, and has undergone little change Goods are stored in either public or private warehouses, the latter requiring official sanction and official supervision. The importance of the private warehouse in France is relatively far greater than in England or America, owing to the greater prominence of excise duties in French finance To establish public warehouses wherever dutiable articles are manufactured would call for too great a cost to the national treasury. In England, during the latter half of the nineteenth century the warehousing system underwent a great development. The merchant with goods in bonded warehouse has practically the same control over his property as he would have if they were in his own storehouse. Such operations as repacking may be performed in the warehouse, as also bottling of liquors, roasting of coffee, etc. If any waste accompanies such processes, a corresponding deduction is made from the quantity of goods on which duties must be paid.

In the United States the warehousing system was established in 1846, when it was enacted that goods might be deposited in public warehouses for a period not exceeding one year. In 1854 the establishment of private warehouses was permitted. Since 1890 the period within which goods deposited in a public or private bonded warehouse may be withdrawn for consumption without payment of additional duty has been three years. After this period has expired the goods are forfeited and must be sold, the Secretary of the Treasury being authorized to pay the proceeds, over and above the duties and charges and expenses of sale, etc., to the consignee or owner of the goods.

Bonded warehouses for imported goods are classified under six heads. 1. Government bonded warehouses, the buildings being owned or leased by the government, and in the immediate custody of the Collector of Customs. 2. Importers' bonded warehouses—private warehouses, established by the Secretary of the Treasury as a special provision for a large importer. 3. Private bonded warehouses conducted by private parties who carry on a general storage business. Permission from the Secretary of the Treasury is prerequisite to the establishment of such warehouses, and the government retains control over them and the goods stored. 4. Private bonded warehouses consisting of yards or sheds for the storage of bulky products. 5. Private bonded warehouses consisting of bins, etc., exclusively for the storage of imported grain. 6 Private bonded warehouses exclusively for the storage of imported wines and spirits. Recent tariff acts have provided that the manufacture of articles for export from imported materials may be carried on in non-enumerated bonded warehouses This avoids the internal revenue tax on material thus used as well as the import duty. But the manufacture of distilled spirits cannot thus be carried on. Special provision is also made for the smelting and refining of imported metals and ores. All such manufacturing is subject to closest inspection and regulation by treasury officials.

The rise of the internal-revenue system as a result of the Civil War made it necessary to establish warehouses where the home manufacturer might leave his products under bond, becoming responsible for payment of taxes only upon their withdrawal for consumption. The plan was defended largely on the ground that otherwise the importer would have a great advantage over his domestic competitor Bonded warehouses for the storage of distilled liquors were established in 1868, under the name of distillery warehouses. The rise of the manufacture of brandies led to the establishment of special bonded warehouses for the storage of distilled spirits made from fruit. A third class, general bonded warehouses, was established in 1894, to be used exclusively for the storage of spirits distilled from materials other than fruit.

WARENNE, Earl of Arundel and. See Fitzalan, Richard.

WAR'FIELD, Benjamin Breckenridge (1851–1921). An American Presbyterian theologian, born at Lexington, Ky. He graduated from Princeton (1871) and from Princeton Theological Seminary (1876), and then studied at Leipzig. After teaching New Testament literature and exegesis in the Western Theological Seminary from 1878 to 1887, he was appointed professor of didactic and polemical theology in Princeton Seminary. He came to be known as a leader of the conservatives in the Presbyterian church. He published: *The Dvine Origin of the Bible* (1882); *Inspiration* (1882); *Introduction to the Textual Criticism of the New Testament* (1886); *The Idea of Systematic Theology* (1888); *The Right of Systematic Theology* (1897); *The Significance of the Westminster Standard* (1898); *The Lord of Glory* (1907); *The Plan of Salvation* (1915).

WARFIELD, David (1866–). An American actor, born in San Francisco. His first connection with the theatre was as usher. He made his first appearance in 1888 in *The Ticket-of-Leave Man.* Two years later he went to New York, where he appeared at the Casino Theatre and at Weber and Field's Music Hall. In 1901 he was "discovered" by David Belasco who starred him in *The Auctioneer,* in which he played 1400 times, including a revival that extended over several seasons. He remained under the Belasco management. One of his best-known rôles was that of Anton von Barwig in *The Music Master,* which he played from 1904 to 1907, appearing in the part more than 1000 times. He created the title rôle in *The Return of Peter Grimm* in 1911. Warfield's position as a leading American actor in comedy was established by the masterly style in which he portrayed, in each of these plays, a kindly old gentleman who is pathetic in misfortune and amusingly eccentric. In 1916 he appeared in

Van der Decken, a play by Belasco, based on the legend of the Flying Dutchman

WAR GAME. An imaginary military operation conducted upon a map with movable pieces to represent the contending forces. A battle or a campaign, a sea fight or an attack on a fortress or harbor, may be represented. The purpose of the game is to train officers to solve the problems that may occur in a campaign against an enemy whose plans are unknown. The war game, or *Kriegsspiel*, was invented by Herr von Reisswitz and elaborated by his son, an officer of the Prussian artillery. It met with favor among the Germans early in the nineteenth century, and was brought into its modern form by Meckel and Verdy du Vernois (1875–76) After the War of 1866 it was cultivated extensively in Austria, and the War of 1870 opened the eyes of all Europe to its importance. In the United States it was practiced extensively in the army after 1867 and in the navy after 1886. The war game is played upon a topographical plan, with small blocks representing the troops, which are proportioned to the scale of the map and occupy as much space upon it as the troops would occupy in the field. These blocks are moved simultaneously, under the direction of an umpire, and at rates proportioned to the mobility of the different arms which they represent. When the position of the blocks indicates that the hostile troops are within sight and range of each other, they may be supposed to open fire, if the players wish, and in this case it becomes the umpire's duty to decide the result upon the basis of experience. The rules of the game explain to him how to estimate the loss from this fire; e.g., it may have been found that, in similar circumstances, the number of killed and wounded has varied from 10 to 20, by throwing a common die he decides whether to assign a greater or a less result to the case in view. The rules of the game also explain to him under what circumstances troops have been dispersed by the result of fire, and what would be the probable result of a hand-to-hand fight.

Since the time of Von Reisswitz the game has been much modified and has assumed three different forms. The first form is conducted in accordance with a few arbitrary rules based upon general results The second form is especially adapted to the Minor Kriegsspiel, in which but few troops are employed and minute records are kept of the losses of each company or fraction of a company. The third form is conducted by an umpire, who decides each case according to his own judgment. The method which has gradually been developed in the United States service, by the employment of several devices upon the plan itself, dispenses with the necessity of keeping records, while it offers facilities for instantly determining the results of calculations as minute as those of the Minor Kriegsspiel.

The method of playing the game is practically uniform throughout all the countries adopting it. The umpire has a map and each commander has one. Of course one commander is not able to see the map of the other. Each commander is made familiar with any knowledge which would be familiar to both under real conditions, and to each is given information which would be peculiar to the details of his own troops. Then each commander is given orders as to the objects he is supposed to attain. After he issues orders considered necessary to the troops under the circumstances, the game commences. All the different divisions are moved about at a rate proportionate to actual war conditions. Naturally the umpire's position is by far the most important. He must estimate the effectiveness of an artillery attack on a body of infantry or he must discount the effectiveness of a block of cavalry when it is in a woodland or a marsh. Despite the fact that it is hard to approximate real conditions in mimic warfare, it must be admitted that the war game permits the working out of tactical principles learned from a study of military history

For naval operations the strategical game is played upon an ordinary chart and the tactical game upon a large table, the surface of which is divided into squares to facilitate the measurements of distances. The ships are represented in miniature and are moved over the table under the direction of the umpire, who calculates the effect of the gun, the ram, or the torpedo, and decides the result accordingly.

WARGLA. An oasis in the southern part of Algeria, 500 miles south of the city of Algeria in 32° north latitude and 5° east longitude (Map Africa, E 1). The oasis is about 3 miles long and 2½ miles wide and has a population of about 15,000, mostly Berbers and Negroes. There are some Frenchmen, resident, but they are usually compelled to leave in the summer on account of the heat. Wargla, the most important town, has a heavy export trade in dates and other tropical fruits, the trees being fed by over 300 springs It is also important as a junction point of several caravan routes The population of the town is about 4000. Wargla was first occupied by native French troops in 1853. Previous to that time it was under the administration of the Sultan of Morocco. The French administrative buildings, barracks, hospital, etc., are south of the town.

WARHAM, wär'am, WILLIAM (c 1450–1532) An English churchman and statesman. He was born in Hampshire; was educated at Winchester College and New College, Oxford, and then went to London, where he practiced as an advocate and whence he was sent on numerous diplomatic missions to Italy and the Low Countries in a professional capacity In 1493 he was ordained, and from that time pursued the double career of churchman and jurist, in 1494 being appointed Master of the Rolls. From 1496 to 1502 he was Royal Ambassador in several important diplomatic affairs, notably the negotiations for the marriage of Prince Arthur to Catharine of Aragon and for a league with the Emperor Maximilian. In 1502 he was consecrated Bishop of London, and became Keeper of the Great Seal, and in 1504 became Lord Chancellor. Meanwhile, in 1503, he had been translated from the see of London to the archbishopric of Canterbury. He continued to be employed by Henry VIII on diplomatic missions, and throughout his long tenure of office as archbishop did his best to remedy and avoid ecclesiastical abuses. In 1509 he crowned Henry VIII and Catharine of Aragon at Westminster, and in 1515 presented Wolsey with the cardinal's hat as representative of the Pope. The same year he retired from office and was succeeded by Wolsey as Lord Chancellor. In 1527 he was drawn into the inquiry as to the validity of Henry's marriage to Catharine. He was appointed a counsellor to aid the queen in her defense against Henry's action, but did very little to assist her because of fear of Henry's wrath. He even went

so far as to ask Pope Clement VII to agree to Henry's divorce. As Warham grew older he became less and less in favor of the radical reforms which parliament had passed to make the church submissive to the state. As a protest to this policy he wanted Henry to abide by the guarantees pledged to the church by the Great Charter.

Warham was a generous patron of learning and from 1506 was chancellor of the Oxford University. His private life, as described by Erasmus, was simple and abstemious, while he was munificent in his public character. Consult: Campbell, *Lives of the Lords Chancellors* (London, 1845–46, new ed., New York, 1874–75); Dixon, *History of the Church of England*, vols. i and ii (London, 1884–91); Hook, *Lives of the Archbishops of Canterbury*, new series, vol. i (ib., 1868), J. Gairdner, *English Church in the Sixteenth Century* (ib., 1903).

WAR IN EUROPE. See SUPPLEMENT.

WARING, H. J (?– .) A British surgeon, who became surgeon and joint lecturer in surgery at St. Bartholomew's Hospital, London He was appointed a member of the court and council of examiners at the Royal College of Surgeons. After graduating from Owens College, Manchester, he received his medical training in St. Bartholomew's Hospital. His publications include: *Surgical Diseases of the Liver, Gall Bladder, and Biliary System* (1897); *Manual of Operative Surgery* (4th ed., 1912).

WARMAN, Cy (1855–1914). An American journalist and author, born near Greenup, Ill. In 1888 he established the *Western Railway*, a semimonthly magazine, at Denver, and in 1892 the short-lived *Daily Chronicle* at Creede, Colo. General attention was first called to him by the New York *Sun* in 1892, in an article which characterized him as the "Poet of the Rockies"; and subsequently his verse and his railroad stories became widely popular. His publications include: *Tales of an Engineer* (1895); *The Express Messenger* (1897), *Frontier Stories* (1898); *The Story of the Railroad* (1898); *The White Mail* (1899); *Snow on the Headlight* (1899); *Short Rails* (1900); *Werga of Temagami* (1908). A collection of his verse entitled *Songs of Cy Warman* appeared in 1911

WARM-BLOODED ANIMALS. The birds and mammals. See ANIMAL HEAT.

WAR MESS. See CHEVES, LANGDON.

WARMING. See HEATING AND VENTILATION.

WARMING, vär'ming, JOHANNES EUGENIUS BÜLOW (1841–) A Danish scientist, distinguished for his knowledge of Arctic botany and geology. He was born on the island of Manö (North Sea) and lived in Brazil during 1863–66. He studied at Bonn with Hanstein and at Copenhagen (Ph D., 1871), where he became professor of pharmaceutical botany in 1876. In 1882 he was appointed professor at Stockholm, and from 1885 to 1911 was again at Copenhagen as professor and director of the Botanical Garden. He established plant ecology as a primary division of botany and made researches in morphology and taxonomy. His most important works are: *Haandbog i den systematiske Botanik* (1878; Eng. trans., *A Handbook of Systematic Botany*, 3d ed., 1911); *Oversight over Gronlands, Islands, og Faeroernes Flora* (1887); *Plantesamfund* (1895; Eng. trans., *Ecology of Plants*, new ed., 1909); *Dansk Plantevaekstt* (1906 et seq.)

WARMOUTH, or GOGGLE EYE. A small fresh-water bass (*Chænobryttus gulosus*), closely related to the rock bass (see BASS) of the Eastern and Central United States, which is more elongate than the sunfish, very variable in color and markings, and noted for its large mouth and great voracity See Plate of PERCH.

WARMSPRING. A collective designation for several remnant tribes of Shahaptian stock (q.v.) now residing with the Wasco (q.v.) upon the Warmspring Reservation in northern Oregon, upon which they were collected under the terms of a treaty made in 1855. The present divisions are the John Day, Tenino, Tyigh, and Des Chutes. They were originally salmon fishers, root diggers, and berry gatherers It was chiefly by their aid that the Modocs (q.v.) were finally conquered in the war of 1872–73, the Warmsprings pursuing them into their retreat in the rocks of the Lava Beds, where the soldiers were afraid to venture They number now 550

Some of the Apache of Arizona are also designated as the Warmspring band, from their former habitat in the vicinity of Aguas Calientes.

WARMTH. See CUTANEOUS SENSATIONS.

WARNECK, vär'nĕk, GUSTAV ADOLF (1834–1910). A German historian of missions He was born at Naumburg, studied at Halle, and served for many years as pastor and (1885–1901) as secretary of the committee of German missions. In 1897 he became honorary professor in Halle. His writings include: *Missionsstunden* (1878–84; 5th ed., 1907); *Die gegenseitigen Beziehungen zwischen der modernen Mission und Kultur* (1879; Eng trans., 1883; new ed., 1888); *Abriss einer Geschichte der protestantischen Missionen von der Reformation bis auf die Gegenwart* (1882; 10th ed., 1913; Eng. trans., 1884, new ed., 1901); *Die Mission in der Schule* (1887; 10th ed., 1905); *Evangelische Missionslehre* (3 vols, 1892–97, 2d ed., 1897–1905). In 1874 he founded the *Allgemeine Missionszeitschrift.*

WARNER, ANNA BARTLETT (1820–1915). An American novelist, who wrote under the pseudonym "Amy Lothrop" She collaborated much with her more famous sister, Susan Warner (q.v.). For many years Miss Warner and her sister lived on Constitution Island in the Hudson near West Point, and for well-nigh two generations they conducted a Bible Class for the cadets of the United States Military Academy, thus coming to be regarded as almost part of the teaching force of that institution In 1908, with Mrs. Russell Sage, she gave Constitution Island to the government. Her funeral services were conducted with military honors. Among her many books may be mentioned: *Dollars and Cents* (1852); *Stories of Vinegar Hill* (1872); *Blue Flag and Cloth of Gold* (1880); *Cross Corner* (1887); *Patience* (1891); *Up and Down the House* (1892); *West Point Colors* (1903); and a biography, *Susan Warner ("Elizabeth Wetherell")* (1909).

WARNER, ANNE (MRS. FRENCH) (1869–1913). An American author. She was born at St. Paul, Minn., where she was married to Charles Ellis French in 1888. Her writings include: *A Woman's Will* (1904); a series of books dealing with the adventures of a maiden lady, Susan Clegg; *The Rejuvenation of Aunt Mary* (1905), which was also dramatized; *Seeing France with Uncle John* (1906) and *Seeing England with Uncle John* (1908); *The Panther* (1908); *Your Child and Mine* (1909); *Just between Themselves* (1910); *When Woman Pro-*

poses (1911); *The Gay and Festive Clarchouse* (1914); *The Taming of Amorette* (1915).

WARNER, CHARLES DUDLEY (1829–1900). An American author, born in Plainfield, Mass. He graduated at Hamilton College, N. Y., in 1851. After spending a short time in surveying on the Missouri frontier (1853), he returned to the East (1854) to take up the study of law. He graduated at the Law School of the University of Pennsylvania in 1856, and practiced his profession in Chicago until 1860, when he removed to Hartford. Here he became assistant editor and later editor-in-chief of the Hartford *Press*, and in 1867 coeditor of the Hartford *Courant*, with which he was connected till his death. In 1884 he took charge of the department of *Harper's Magazine* called "The Editor's Drawer," and in 1892 succeeded W. D. Howells in "The Editor's Study" of the same periodical. He made several visits to Europe and the East as correspondent of American newspapers and traveled extensively in the United States and Mexico, contributing papers of descriptive and social life to *Harper's Magazine*. Among his best-known books are *My Summer in a Garden* (1870); *Saunterings* (1872); *Backlog Studies* (1872); *Baddeck, and That Sort of Thing* (1874); *Mummies and Moslems* (1876); *In the Levant* (1877), *Being a Boy* (1877); *Washington Irving* (1881); *Captain John Smith* (1881), *A Roundabout Journey* (1883); *Their Pilgrimage* (1886); *On Horseback* (1888); *Studies in the South and West, with Comments on Canada* (1889); *A Little Journey in the World* (1889), a novel; *Our Italy* (1891); *The Golden House* (1895), a novel; and *That Fortune* (1899), a novel. He was also editor of the *American Men of Letters* (1881), a series of biographies, and of the *Library of the World's Best Literature* (1896–97). In conjunction with Mark Twain, one of whose closest friends he was, he wrote (1873) *The Gilded Age* (see CLEMENS, SAMUEL LANGHORNE). Prof. T. R. Lounsbury edited a complete edition of his works in 15 volumes (Hartford, n d). Warner was greatly interested in prison reform and other philanthropic work, and by his travels and genial personality did much to bring North and South to understand each other. He was sympathetic with young authors and was a kindly critic, a refined humorist, and a helpful force in American letters. Consult Annie A. Fields, *Charles Dudley Warner* (Garden City, N. Y., 1904); *passim*, A. B. Paine, *Mark Twain* (3 vols., New York, 1912); Brander Matthews, *Aspects of Fiction* (new ed., New York, 1902).

WARNER, EVERETT LONGLEY (1877–). An American landscape painter and etcher. He was born in Vinton, Iowa, and studied at the Art Students' Leagues in Washington and New York, and in Paris, finally settling in New York. Good examples of his work are to be found in most American public collections, including: "Broadway on a Rainy Evening" (Corcoran Art Gallery, Washington); "A February Day" and "Quebec" (Pennsylvania Academy of Fine Arts, Philadelphia); "A Mountain Village, Tyrol" (St. Louis Museum); "Along the River Front, New York," and six etchings, in the Toledo Art Museum; "December Hillside" (Syracuse Museum). He was elected an associate of the National Academy of Design in 1913, and was awarded medals in Philadelphia (1908), Buenos Aires (1910), and San Francisco (1915).

WARNER, OLIN LEVI (1844–96). An American sculptor. He was born at West Suffield, Conn., and at first worked as a telegrapher. In 1869 he went to Paris, and studied at the Beaux-Arts under Jouffroy, Falguière, and Mercier, and afterward was assistant to Carpeaux. In 1870, on the proclamation of the French Republic, he entered the foreign legion and did good service during the siege of Paris. On his return to New York in 1877 he was unsuccessful in winning public recognition and returned to his father's farm. But through the efforts of his friend Daniel Cottier, the merit of his work was finally recognized, and his success became established. His modeling is severe and simple in style, displaying fine feeling for the yielding elasticity of the flesh, and beauty and suavity of line. In relief he was especially successful. His important works include: two caryatides for a fountain at Portland, Oreg. (1888); the graceful "Diana" in the Metropolitan Museum, New York, which also possesses the portrait busts of J. I Blair, the artist's wife and daughter, and J. Alden Weir; portrait statues of Governor Buckingham (Hartford, Conn.), William Lloyd Garrison and General Devens (both in Boston), and one of the bronze doors for the library of Congress, Washington. Later portrait busts include those of Wyatt Eaton and W. C. Brownell. Warner was one of the five original members of the Society of American Artists and became a member of the National Academy in 1889. He died in New York from a fall from a horse. About a score of his works, including "Dancing Nymph," were exhibited at the Panama-Pacific Exposition, San Francisco, in 1915. Consult Lorado Taft, *History of American Sculpture* (New York, 1905).

WARNER, SETH (1743–84). An American soldier, born at Roxbury, Conn. Removing with his father to Bennington, Vt., in 1763, he there became prominent as a leader of the Green Mountain Boys, opposing New York's claim to the New Hampshire Grants (later Vermont), and being outlawed in consequence by the New York government, in 1771. In 1775 he led the detachment which on May 12 captured Crown Point, and on July 27 became by election lieutenant colonel of the Green Mountain Boys, participating as such in General Montgomery's expedition to Canada. On July 5, 1776, he was appointed colonel in one of the Continental regiments, and on July 7, 1777, was in command at the disastrous battle of Hubbardton (q.v.), subsequently rendering efficient service at the battle of Bennington (q.v.), Aug. 16, 1777. Early in 1782 he was forced by ill health to retire from the army, and returned to Roxbury, where he died. Consult Chipman, *Life of Colonel Seth Warner* (Middlebury, Vt., 1848).

WARNER, SUSAN (1819–85). An American novelist, born in New York, known also under the pen name of Elizabeth Wetherell. Her first novel, *The Wide, Wide World* (1851), won much popularity, and was translated into French, Italian, Russian, Swedish, and Spanish. *Queechy* (1852) was also popular, though not a close second to its immediate predecessor. She next published *The Law and the Testimony* (1853), in which under appropriate headings are grouped the biblical texts establishing the cardinal doctrines of Christianity. This was followed by a story full of scenic description, *The Hills of the Shatemuc* (1856). Of several subsequent

stories the more noteworthy are *The Old Helmet* (1863), *Melbourne House* (1864), and *Daisy* (1868). Miss Warner also collaborated with her sister Anna (Amy Lothrop) in *Say and Seal* (1860) and several other juvenile books, which, most of them, appeared in the series entitled *Mr. Rutherford's Children* or in that called *Karl Krinken and his Christmas Stocking*. (See WARNER, ANNA B.). Several of her works found acceptance in French, German, and Swedish translations, but none approached in merit or popularity *The Wide, Wide World*, which, next to *Uncle Tom's Cabin*, was perhaps the most widely circulated story of American authorship Consult Anna B Warner, *Susan Warner* (New York, 1909)

WARNER, WILLIAM (?1558–1609). An English poet, born in London. He studied at Magdalen College, Oxford, but left without a degree, and settled in London as an attorney. He died March 9, 1609, at Amwell, in Hertfordshire, and was buried there. Warner is chiefly known for *Albion's England* (1586), a long poem in fourteen-syllable lines treating of history and legend from Noah to William the Conqueror Originally in four books, the poem was enlarged in subsequent editions to 16 books, and the history was brought down into the reign of James I (1612; reprinted in Chalmer's *English Poets*, vol. IV, London, 1810). Warner also published a translation of the *Menœchmi* of Plautus (1595) and a collection of tales under the title *Pan His Syrinx* (1585).

WARNING COLORATION. Conspicuous markings upon certain animals to protect them from the attacks of other animals. Most species so marked secrete a repugnant fluid which is either ejected from special glands or which, in the case of insects, gives them a bad taste, so that they are repulsive to monkeys, birds, lizards, or insects Such inedible species are often marked with bright colors, spots, or bands, and such colors are said to warn off intruders, which after their first experience recognize them as unfit to eat. A familiar example is the skunk, whose conspicuous black and white markings render it visible even in a rather dark night. Warning coloration is especially common in insects, especially gaily colored caterpillars and butterflies, like the milkweed butterfly (*Anosia archippus*) The brightly colored caterpillars, like the currant worm and a number of others, when fed to birds are rejected with disgust. Hence they enjoy immunity from attacks by birds Wallace, who first suggested the theory of warning colors, called attention to the fact that while most caterpillars are edible and also protectively marked (see PROTECTIVE COLORATION AND RESEMBLANCE), the gaily colored ones are distasteful to birds. This has since been experimentally proved. Whether, however, the colors have been actually acquired, as Wallace supposes, as a warning of inedibility, still remains to be proved. It should be remembered that the bright red and blue colors of caterpillars and of butterflies are deep-seated and formed from the waste products of the blood, and that their deposition is a chemico-physical or physiological process quite independent of attacks of birds, etc.

WARNSDORF, värns'dörf. A town in Bohemia, Austria, 59 miles north by east of Prague (Map: Austria-Hungary, D 1). It is especially known for its large cotton manufactures. Woolen and linen goods, velvet, cement, and machinery are also produced. Pop., 1900, 21,150, 1910, 22,970.

WAR OF 1812, GENERAL SOCIETY OF THE An hereditary patriotic society organized in Philadelphia, Pa., Jan. 8, 1891, by representatives of the Association of the Defenders of Baltimore in 1814 (organized in 1842), which became the State Society of Maryland, and by representatives of the Pennsylvania Association of the Defenders of the Country in the War of 1812 (organized in 1852). It has for its object the preservation of the memories and victories of the War of 1812. It admits to membership any lineal descendant of one who served in the War of 1812, in the army, navy, revenue marine, or privateer service of the United States. Since the formation of the national society, State organizations have been established in Massachusetts, Connecticut, Ohio, District of Columbia, New York, New Jersey, and Delaware, distributed among which is a total membership of about 1000

WAR OF 1812, MILITARY SOCIETY OF THE A patriotic society instituted in New York City on Jan 3, 1826, by officers of the War of 1812, and consolidated with the Veteran Corps of Artillery (organized in New York City as an independent military organization on Nov 25, 1790, by officers and soldiers of the War of the Revolution), on Jan. 8, 1848. This society was incorporated as a military society on Jan. 8, 1892 Its insignia consists of a Maltese cross of gold and blue enamel, superimposed by an eagle in gold, on the breast of which is an anchor in black and the legend 1812, pendant from a ribbon of red and blue. The society admits to membership acceptable male descendants of any commissioned officer of honorable record in the War of 1812. The membership is about 100, and the annual meeting is held on January 8, the anniversary of the battle of New Orleans.

WAR OF 1812, THE. See UNITED STATES

WAR OF JENKINS EAR. See JENKINS EAR, WAR OF.

WARPING (from *warp*, AS. *wcorpan*, Goth. *wairpan*, OHG *werfan*, Ger. *werfen*, to throw; connected with OChurch Slav. *vrĕsti*, Skt, *varj*, to throw, and possibly with Gk. *ῥίπτειν, rhiptein*, to throw). A mode of improving land by flooding, practiced where rivers bring down large quantities of mud, or where mud is brought up from estuaries by the tide. It has long been practiced in Italy and some of the valleys of the Alps, the rich soil brought down by the mountain streams being arrested and made to increase the fertility of fields A similar process, known as colmatage, is used in France. Warping has also been practiced in England, especially on lands adjacent to the Humber estuary, but is perhaps less common now than formerly. The process is considered most beneficial on sandy and peaty soils. Consult especially F. H. Storer, *Agriculture*, vol. iii, p. 258 (New York, 1897), and James Stephenson, *Warping* (Jour. Roy. Agr. Soc. England, 73 (1912), p. 104).

WAR PLANE. See MILITARY AËRONAUTICS and Plate.

WARRANT (OF. *warant, guarant, garant*, warrant, protector, from OHG. *giwerĕn*, Ger. *gewahren*, to grant). A writ issued by a judicial officer, directed to a sheriff, a constable, or other executive officer, requiring him to arrest a person named therein and bring him before the official who issued it. A warrant is usually

issued only upon the oath of a complaining witness as to the probable or actual guilt of the person to be apprehended The matter of the arrest of a person suspected of crime is regulated by statute in each State, but, in general, where a crime does not come to the actual notice of a peace officer a warrant should be issued for the arrest of a suspected person. Furthermore, only the person whose name appears on the warrant can be apprehended thereunder, and the old English practice of issuing blank warrants has never been adopted in the United States. In some States a person who is thus arrested may demand to see the warrant. See SEARCH WARRANT; ARREST; HABEAS CORPUS, ETC; also consult the authorities referred to under CRIMINAL LAW.

WARRANT OF ATTORNEY. In law an instrument by the terms of which one person is empowered or authorized to do some act for another, such as to transact his business, execute a deed, or to collect rents or debts. The expression is practically synonymous with power of attorney. A warrant of attorney to sue or defend was in English law a special warrant from the crown authorizing a person to name an attorney to bring suit or defend for him. See ATTORNEY.

WARRANT OFFICER. A noncommissioned officer in the United States army or navy. In the army the company noncommissioned officers, corporals and sergeants, are appointed by the regimental or battalion commander on the recommendation of the company commander. The regimental noncommissioned staff is appointed by the regimental commander on the recommendation of the battalion commander. Each noncommissioned officer receives a certificate or warrant of rank signed by the appointing officer and countersigned by the adjutant. In the navy a warrant officer holds his position by virtue of a warrant issued by the Secretary of the Navy. Warrant officers rank next below midshipmen and consist of boatswains, gunners, carpenters, sailmakers, machinists, and pharmacists After six years service, warrant officers are, after passing an examination, commissioned as chief boatswains, chief gunners, etc., with the rank of ensign. For the pay and allowances of warrant officers, see PAY AND ALLOWANCES. See CORPORAL; SERGEANT; BOATSWAIN; GUNNER; ETC.

WARRANTY (OF. *warrantie*, guarantee; Fr. *garantir*, to warrant). At law, an assurance of a fact together with an agreement to indemnify. Although used commonly as interchangeable with guaranty, and derived from the same word, the latter means properly the binding promise of a third person. With reference to the sale of chattels the term is used in regard to title or quality (see SALE; CONTRACT). At common law title in the seller was not presumed, but if the sale was made in the open market the purchaser was protected. To-day possession of the vendor implies a warranty of title. For example, there is an implied warranty by the innocent vendor of stolen goods on which recovery may be had against him by the purchaser. As to quality the general rule of *caveat emptor* (let the buyer beware) applies. Hence the law is that a purchaser has only a reasonable time for inspection of the goods and rejection. If he retain them he is presumed to accept them. Thus if he delays examining the goods he loses his right of returning them. It is otherwise with regard to hidden defects, but the circumstances of each case govern and the general rule of reasonableness applies. Statutes and decisions in various States have to a certain extent modified the general law that there is no implied warranty of quality. Thus there is an implied warranty that food sold by a retailer to his customers is wholesome and sound, while in sales between dealers there is none. Where goods are to be manufactured for a distinctly stated purpose the law will imply a warranty that they are fit for that purpose A warranty being an agreement to indemnify an assurance of fact and collateral to the contract of sale, the purchaser has two remedies, either to reject the goods and treat them as not sold or to retain them and claim on the agreement to indemnify. In the first case the question is the performance or compliance with the terms of the contract. Such would be questions as to fraudulent representations and sales by sample, and the warranty may be treated as a condition precedent. In the second he affirms the contract and rests on the collateral agreement of warranty. Like other contracts in law there must be a consideration and a meeting of the minds usually expressed. The breach of the warranty and the actual damages suffered constitute the basis of a claim, the general law of contracts applying. A warranty must be clear and distinct. General praise of the goods by the vendor is not binding. It should be distinguished from an inducement. In insurance law a warranty has a special significance and is a statement or promise which must be strictly true or complied with, while a representation need be only substantially correct. There has always been considerable confusion in law as to the principle of warranty and decisions have been anomalous. This is because the same assurance of fact may be treated either as a representation or inducement for making the sale, as a condition precedent of the sale or as a warranty. With reference to real estate the term warranty is used in connection with the deeds and relates to covenants of title. In these the warranty must be express and is strictly construed. The distinction is usually made between Full Covenant of Warranty Deeds and Quit Claim Deeds (q.v.), the latter being the release of any possible interest with no warranty and the former containing a binding agreement to defend or indemnify the vendor as to superior claims of title.

WARREN, wŏr'ĕn. A town in Worcester Co., Mass., about 22 miles (direct) east of Springfield, on the Boston and Albany Railroad (Map: Massachusetts, C 4). There are manufactories of steam pumps, woolen goods, power presses, and machine-shop products. Pop., 1900, 4417; 1910, 4188.

WARREN. A city and the county seat of Trumbull Co., Ohio, 52 miles by rail southeast of Cleveland, on the Mahoning River, and on the Pennsylvania, the Erie, and the Baltimore and Ohio railroads (Map: Ohio, J 3). Warren has steel plants, electric apparatus and supply works, shovel works, electric lamp factories, and manufactories of fire extinguishers, bath tubs, automobiles, boilers, storage tanks, steel ranges, etc. There is a public library here. Pop., 1900, 8529; 1910, 11,081; 1915, 12,810; 1920, 27,050.

WARREN. A borough and the county seat of Warren Co., Pennsylvania, 66 miles east-southeast of Erie, at the confluence of the Al-

legheny River and the Conewango Creek, and on the Pennsylvania and the New York Central railroads (Map: Pennsylvania, C 2). It is the seat of the State Hospital for the Insane, and has the Jefferson Memorial and Struthers libraries. The borough is engaged in oil refining, and the manufacture of furniture, iron and steel, chemicals, boilers, gas engines, etc. Pop., 1900, 8043; 1910, 11,080; 1915, 14,391; 1920, 14,256

WARREN. A town in Bristol Co., R. I., 8 miles by rail northwest of Fall River, Mass., on Narragansett Bay, and on the New York, New Haven, and Hartford Railroad (Map: Rhode Island, C 3). It has the George Hail Free Library. Manufacturing is the leading industry, the most important products been cotton goods, twine, and braid. Oyster fishing is also carried on. Warren occupies the site of the Indian village Sowams, the home of Massasoit (q.v.), and was settled by the whites, at least temporarily, as early as 1635. Until 1746, when it was incorporated by Rhode Island and named in honor of Admiral Sir Peter Warren, it was a part of Swansea, Mass. From it, in 1770, Barrington was taken. Pop., 1900, 5108; 1910, 6565, 1915 (State census), 7241. Consult: Tusten, *A Discourse, May 8, 1845* (Providence, 1845); Baker, *The History of Warren, 1776–83* (Warren, 1901).

WARREN, Francis Emroy (1844–). An American legislator, born at Hinsdale, Mass. He served in the Forty-ninth Massachusetts Volunteers in 1862–63, moved to Wyoming in 1868, and there became active in Republican politics. He was president of the council (1873–75) and a member of the council (1884–86) of the Wyoming Territorial Legislature, treasurer of Wyoming Territory (1876–77, and 1879–85), mayor of Cheyenne (1885), and Territorial Governor (1885–86, and 1889–90). In 1890 he was elected the first Governor of the State of Wyoming, but resigned that office before the end of the year in order to become United States Senator. He was reëlected to the latter office for the fourth time in 1913.

WARREN, Frederick Morris (1859–). An American French scholar, born at Durham, Maine. After graduating from Amherst in 1880, he studied at the Sorbonne, Paris (1884–86) and took his Ph.D. in 1887 at Johns Hopkins. Here he taught till 1891, then for 10 years was a professor at Adelbert College, and from 1900 occupied a chair at Yale. He was president of the Modern Language Association of America in 1908 and became an editor of *Modern Philology*. His writings, which show sound scholarship and are characterized by a vigorous and incisive style, include *A History of the French Novel Previous to the Seventeenth Century* (1895) and *Ten Frenchmen of the Nineteenth Century* (1904), besides numerous contributions on French literature, published in leading literary and linguistic journals.

WARREN, Gouverneur Kemble (1830–82). An American soldier, born at Cold Spring, N. Y. He graduated at West Point in 1850, and took part as chief topographical engineer in the Sioux Expedition of 1855 and participated in the action of Blue Water. From 1859 to 1861 he was assistant professor of mathematics at West Point, but in May of the latter year he accepted a lieutenant colonelcy in the Fifth New York Volunteers. He took part in the battle of Big Bethel on June 10, and in August he was commissioned colonel of his regiment. He took part in the Peninsular campaign, and later commanded a brigade of the Army of the Potomac during the Maryland campaign. A few days after the battle of Antietam he was commissioned brigadier general of volunteers, but in February, 1863, he was relieved of his brigade, and was appointed chief topographical engineer of the Army of the Potomac, a position which he filled at the time of the battle of Fredericksburg. In May, 1863, he was promoted to be a major general of volunteers, and soon afterward was appointed chief engineer of the Army of the Potomac. At the battle of Gettysburg he was the first to recognize the importance of Little Round Top, and for his promptness and gallantry in securing possession of it he was brevetted colonel in the regular army. From March, 1864, to April, 1865, he commanded the Fifth Corps and participated in the important battles of the Richmond campaign. After the battle of Five Forks he was relieved of his command by General Sheridan. A court of inquiry relieved his reputation of any stain. In May, 1865, he resigned his commission in the volunteer service, and during the following years he was employed on surveys and harbor improvements. He published several books, including *Explorations in the Dacota Country* (1855–56); *Preliminary Report of Explorations in Nebraska and Dacota in the Years 1855–57* (1858), and *An Account of the Fifth Army Corps at the Battle of Five Forks* (1866). Consult the *Biographical Memoirs of the National Academy of Sciences*, vol. ii (Washington, 1886).

WARREN, Henry (1794–1879). An English water-color painter. He was born in London, first studied sculpture with Nollekens, and afterward painting in the schools of the Royal Academy. In 1835 he joined the new Society of Painters in Water Colors, of which he was president from 1838 to 1873. He was a member of the Royal Commission for the Paris Exhibition in 1855. He illustrated Wordsworth's *Pastoral Poems*, Moore's *Paradise and the Peri*, Lockhart's *Spanish Ballads*, and "The Happy Valley" from *Rasselas*.

WARREN, Henry White (1831–1912). An American Methodist Episcopal bishop and author, brother of William Fairfield Warren. He was born at Williamsburg, Mass., and graduated in 1853 at Wesleyan University, Middletown, Conn. He taught ancient languages at Wesleyan Academy, Wilbraham, Mass. (1853–55), and then entered the New England Conference (1855). After serving churches about Boston he was transferred to the Philadelphia Conference (1871), and was elected Bishop (1880). In 1863 he was a member of the Massachusetts Legislature. He published: *Sights and Insights* (1874); *The Lesser Hymnal* (1877); *Studies of the Stars* (1878); *Recreations in Astronomy* (1879); *The Bible in the World's Education* (1892); *Among the Forces* (1898); *Fifty-two Memory Hymns* (1908). He was editor of *The Study* (1896–1900).

WARREN, Sir (Thomas) Herbert (1853–) An English educator, scholar, and author. He was born at Bristol, and was educated at Clifton College and at Balliol College, Oxford. From 1877 to 1885 he was fellow and tutor of Magdalen College, of which thenceforth he was president. Subsequently he served also as vice chancellor of Oxford University (1906–10) and then was professor of poetry. Warren identified himself prominently with British edu-

cational progress. In 1914 he received the K.C.V.O. His publications are, notably: *Plato's Republic* (i–iv, 1888, and several times reprinted), with introduction and notes, *Education and Equality* (1895); *By Severn Sea and Other Poems* (1897), *Poems of G. J. Romanes* (ed. with introd., 1896); *Life of Prince Christian Victor of Schlesuig-Holstein* (1903); *Magdalen College, an Historical Sketch* (1907); *Essays of Poetry and the Poets* (1909); *Tennyson's Poems* (1910); *Oxford and Poetry* (1911); *Robert Bridges, Poet Laureate* (1913); *R. D. Blachmore's Lorna Doone* (1914); *War and Poetry* (1915).

WARREN, JOHN (1753–1815). An American surgeon, brother of Joseph Warren, and father of John Collins Warren (1778–1856) (qq v.) He was born at Roxbury, Mass., graduated at Harvard in 1771, attended the wounded at the battle of Bunker Hill, and afterward accompanied the American army to New York and New Jersey as hospital surgeon. From 1777 to the close of the war he superintended the military hospitals in Boston. In 1783 he was one of the founders and the first professor of anatomy and surgery in the newly established medical school at Harvard He was the first president of the Massachusetts Medical Society (1804–15). Consult his life by James Jackson (Boston, 1915).

WARREN, JOHN BYRNE LEICESTER, third and last Baron de Tabley (early pseudonym, WILLIAM LANCASTER) (1835–95). An English poet, born at Tabley House, in Cheshire, England. He was educated at Eton, and at Christ Church, Oxford, graduating in 1859. In 1860 he was called to the bar at Lincoln's Inn, but never followed the law. In 1887 he came to his title. Being of sensitive temperament, he passed most of his life in seclusion, enjoying, however, the intimate friendship of several distinguished contemporaries, among whom were Gladstone and Browning. His volumes of verse comprise notably: *Præterita* (1863); *Eclogues and Monodramas* (1864); *Studies in Verse* (1865); two dramas, *Philoctetes* (1866) and *Orestes* (1868), his strongest works; *Rehearsals* (1870); *Searching the Net* (1873); and a long tragedy, *The Soldier's Fortune* (1876). Though admired by the few, his poetry won no recognition with the public. In 1893 Warren issued *Poems Dramatic and Lyrical* (followed by a second series in 1895), comprising old and new pieces, and at once met his full meed of praise. He also wrote on numismatics, botany, and book plates. Consult A. H. Miles, *Poets and Poetry of the Nineteenth Century*, vol. iv (London, 1891), and the appreciative essay by Edmond Gosse in *Critical Kit-Kats* (New York, 1896).

WARREN, JOHN COLLINS (1778–1856). An American surgeon, son of John Warren (q.v.), born in Boston. He graduated at Harvard in 1797, studied medicine with his father and in London and Paris, began practice in Boston in 1802, and at Harvard was assistant professor of anatomy and surgery (1806–15), and professor of surgery, succeeding his father (1815–47). He was one of the founders and long an editor of the *Boston Medical and Surgical Journal* (1828). He was also one of the founders of the McLean Asylum for the Insane, and of the Massachusetts General Hospital of which he was long chief surgeon. In 1846 he performed the first public operation on a patient anæsthetized by ether, in the Massachusetts General Hospital, Dr. W. T. G. Morton (q.v.) being the anæsthetist He was a pioneer in the excision of bones and joints, and introduced an operation for fissure of the soft palate. Warren made a fine collection of specimens in anatomy, osteology, and paleontology, now known as the Warren Museum, to which he bequeathed his own skeleton. In 1849 he served as president of the American Medical Association. Among his works are· *Diseases of the Heart* (1809); *Comparative View of the Sensorial System* (1820); *Surgical Observations on Tumors* (1837); *Etherization* (1848); and *Mastodon Giganteus* (1855). Consult his *Life, Compiled Chiefly from His Autobiography and Journals* (Boston, 1860), by Edward Warren. See also WARREN, JOHN COLLINS (b 1842).

WARREN, JOHN COLLINS (1842–). An American surgeon, son of John Collins Warren (1778–1856) (q.v.), born in Boston He graduated from Harvard (1863) and from Harvard Medical School (1866), where he taught after 1871 (as professor of surgery from 1893 till his retirement in 1907). In 1908 he became an overseer of Harvard. He was honored abroad as well as at home. From 1873 to 1881 he was editor of the *Boston Medical and Surgical Journal* and in 1896 served as president of the American Surgical Association. He published *Surgical Pathology and Therapeutics* (1895) and edited *International Textbook of Surgery* (1900).

WARREN, JOSEPH (1741–75). An American patriot, born at Roxbury, Mass., June 11, 1741. He graduated at Harvard in 1759, and became a physician in Boston in 1764. In the early disputes between the colonists and the British government he associated himself with Samuel Adams and other ardent Whigs, and was the orator at the second anniversary of the Boston Massacre, March 5, 1772. In 1772 he became a member of the Committee of Correspondence, and throughout the years immediately preceding the Revolution he was a frequent contributor to the patriot press. He drafted the extreme but influential Suffolk Resolves, adopted in September, 1774, by a convention of Suffolk County, and forming the most radical statement of the American position which had up to that time been made. He was a member of the Provincial Congress of Massachusetts, and in April, 1775, was elected president pro tem of that body. In March of that year he was again the orator at the anniversary of the Boston Massacre, refusing to be intimidated by the threats of British officers. He had much to do with the success at Lexington on April 19, and in June was commissioned major general. He opposed the occupation of Charlestown Heights, advocated by Putnam and Prescott, thinking the American supply of ammunition too small. Overruled by a majority of the council, which resolved to fortify Bunker Hill, he went there as a volunteer, refusing to take the chief command, offered him by both Prescott and Putnam. During the battle of June 17 he was instantly killed. A monument to his memory by Paul W. Bartlett was erected in Boston in 1904. Consult Richard Frothingham, *Life and Times of Joseph Warren* (Boston, 1865). For his brother, see WARREN, JOHN.

WARREN, JOSIAH (1799–1874). An American philosophical anarchist, born near Boston. He participated in Robert Owen's communistic

experiment at New Harmony, Ind. (q.v.), in 1825–26. In the following year he opened at Cincinnati, Ohio, a time store, in which goods were sold at cost with 7 per cent added for rent, fuel, etc., and every customer was timed and charged so much an hour for the time of the salesman. In connection with this business Warren issued labor notes, which were used as money. Having demonstrated the feasibility of the experiment, he closed the store Subsequently he established a community in Ohio, and later founded Modern Times, a community on Long Island. Warren is considered by the philosophical anarchists to be, with Proudhon (q.v.), the founder of their system of thought He published *True Civilization* (1846; 5th ed, 1875), and *Equitable Commerce* (1852).

WARREN, Lavinia (1841–) An American dwarf, exhibited by the showman, P. T. Barnum, born at Middleboro, Mass. She was descended from a French family named Bonpasse. Under Barnum's management her name was changed from Mercy Lavinia Bumpus. On Feb. 10, 1863, she was married in Grace Church, New York City, to Charles S. Stratton (q.v.), or Tom Thumb, her sister Minnie Warren, and Commodore Nutt, two other dwarfs, acting as bridesmaid and groomsman Her height was considerably less than 2 feet She traveled and was exhibited in Europe with her husband, and they accumulated a considerable fortune. One child sprang from their union, but died in early infancy. Two years after her husband's death, which occurred in 1883, Lavinia Warren married Count Primo Magri, an Italian dwarf.

WARREN, Leo. See Meding, Oskar

WARREN, Mercy (1728–1814). An American dramatist, poet, satirist, and historian, born at Barnstable, Mass. She was a sister of the patriot orator James Otis, and wife of the Revolutionary leader James Warren. She was one of the most brilliant women of her time, and her intellectual versatility was prized alike by Thomas Jefferson and John Adams. Abigail, wife of John Adams, was her intimate friend through life. Her first dramas, *The Adulator* (1773) and *The Group* (1775), satirized the Massachusetts Tories. *The Squabble of the Sea Nymphs* (1775) was a comic epic on the Boston Tea Party. More conventional are the tragedies *Sack of Rome* and *The Ladies of Castile*, which may be found in her *Poems, Dramatic and Miscellaneous* (1790), a volume of extremely slight merit. She wrote also an elaborate and stilted *History of the American Revolution* (3 vols., 1805), which is important because of her close personal association with many persons prominent at that period. Consult E. F. Ellet, *Women of the Revolution* (New York, 1856; reprinted, 2 vols., Philadelphia, 1900).

WARREN, Minton (1850–1907). An American Latin scholar, born in Providence, R. I. He graduated from Tufts College in 1870, and took his Ph.D. at Strassburg in 1879. He was professor of Latin at Johns Hopkins University until 1899, and thereafter until his death professor at Harvard. He was director of the American School for Classical Studies at Rome, Italy, in 1896–97. In the latter year he held the presidency of the American Philological Association. His writings, which appeared in the learned periodicals, dealt chiefly with epigraphy and Latin comedy. Especially noteworthy is his paper "The Stele Inscription in the Roman Forum," in *American Journal of Philology*, xxvui (Baltimore, 1907).

WARREN, Sir Peter (1703–52). A British naval officer, born at Warrenstown, Meath, Ireland. He entered the navy as a volunteer in 1717, and after seeing service in European and African waters was in 1727 appointed captain of the 70-gun ship *Grafton* The following years he spent mostly in the West Indies and along the coast of North America, and in 1744 he was promoted to the rank of commodore In 1745, as commander of the fleet which cooperated with the colonial troops, he had an important part in the capture of Louisburg (q.v.), and in addition acquired considerable wealth, his squadron having captured many valuable prizes. Two months later he was promoted to be rear admiral of the blue, and in 1747, as second in command under Anson, helped to defeat the French near Cape Finisterre.

WARREN, Samuel (1781–1862). An English clergyman. He entered the ministry of the Wesleyan Methodist Church in 1802, but in 1834 was suspended for opposing the formation of a theological institution at Manchester. His appeal to the Lord High Chancellor was denied in 1835, and in the same year he was expelled from the denomination. Many of his sympathizers, first known as Warrenites, united with the Leeds seceders of 1828 (Protestant Methodists; from 1835 Wesleyan Association Methodists). In 1857 they united with other seceders to form the United Methodist Free church Eventually Warren grew tired of continuous controversy and joined the Church of England, spending the last years of his life as the incumbent of All Souls' Church, Ancoats, Manchester. He was the author of: *A Digest of the Laws and Regulations of the Wesleyan Methodists* (1827), *Sermons on Various Subjects* (1833); *Remarks on the Wesleyan Theological Situation* (1834).

WARREN, Samuel (1807–77). A British legal scholar and novelist. He was born in Denbighshire, Wales, the son of Samuel Warren (1781–1862) (q.v.). He studied medicine at Edinburgh and law at the Inner Temple, London; was called to the bar in 1837; and in 1851 was appointed Queen's counsel He served as Recorder of Hull (1854–74); as member of Parliament for Midhurst (1856–59); and then as master in lunacy. A Conservative in politics and a strong supporter of Lord Derby, it was in the interests of his party that he wrote *Ten Thousand a Year* (1839), a novel which made him famous. It first appeared in *Blackwood's Magazine*, and has retained its popularity in numerous editions and translations His first work, *Passages from the Diary of a Late Physician* (1830–31), also had a new edition as late as 1905. Warren also wrote several valuable legal treatises. A collection of all his writings was issued in five volumes (1854–55).

WARREN, Whitney (185?–). An American architect, born in New York. He studied architecture privately in New York and under Daumet and Girault in Paris. After his return to New York in 1894 he engaged in the independent practice of architecture, and designed the New York Yacht Club building (1899). Later as a member of the firm of Warren and Wetmore he collaborated in the design of the monumental New York Central terminal (Grand Central station) in New York, completed in 1913; of the Belmont and Ritz-

Carlton and other hotels, of the Automobile Club, and of the Chelsea Docks, all in New York, of important residences in New York and Toronto; of the Grand Trunk station in Winnipeg, Canada, the Paul Jones crypt at the Naval Academy, Annapolis, and bronze gates in the Cathedral of St John the Divine, New York, besides many other important works. Warren was awarded a silver medal at the Paris Exposition in 1900, was made a member of the Académie des Beaux-Arts of the French Institute in 1905, received the honorary degree of A.M. from Harvard University in 1913, and was elected to the National Institute of Arts and Letters

WARREN, WILLIAM (1812–88). An American actor, for many years connected with the old Boston Museum He was born in Philadelphia, and there after his father's death in 1832 he made his début in the part of Young Norval, the character in which his father, also an actor, had begun his career upon the stage. He first appeared in New York in 1841, in London in 1845, and in Boston in 1846. The next year he became a member of the company at the Boston Museum, where he remained, with a brief exception, till he retired in 1883. He died in Boston. His semicentennial in 1882 brought out many deserved tributes to an admirable comedian and representative of the best traditions of the stage. He was at his best in such rôles as Dr. Pangloss, Sir Peter Teazle, and Dr. Primrose. Consult McKay and Wingate, *Famous American Actors of To-Day* (New York, 1896).

WARREN, WILLIAM FAIRFIELD (1833–). An American Methodist Episcopal theologian, brother of Henry White Warren. He was born at Williamsburg, Mass., graduated at Wesleyan University, Middletown, Conn. (1853), and studied at Andover Theological Seminary and at Berlin and Halle. He entered the New England Conference in 1855 and was professor of systematic theology in the Methodist Episcopal Missionary Institute at Bremen, Germany (1860–66). He was acting president of the Boston University School of Theology (1866–73), was president of Boston University (1873–1903), and dean of the School of Theology (1903–11), and after 1873 he was also professor of comparative theology and philosophy of religion. He published *The True Key of Ancient Cosmology* (1882); *Paradise Found—the Cradle of the Human Race at the North Pole* (1885); *The Quest of the Perfect Religion* (1886); *In the Footsteps of Arminus* (1888); *The Story of Gottlieb* (1890), *Religions of the World and the World Religion* (1900); *The Earliest Cosmologies* (1909); *The Universe as Pictured in Milton's Paradise Lost* (1915).

WAR'RENSBURG. A city and the county seat of Johnson Co., Mo., 65 miles southeast of Kansas City, on the Missouri Pacific Railroad (Map: Missouri, C 3). It is near mineral springs, which have given the city some reputation as a summer resort. The city is the seat of a State Normal School. Other prominent features are the courthouse, Masonic Temple, and opera house, and the Pertle Springs Park. Warrensburg is a shipping centre and has grain elevators, flouring mills, a packing house, and manufactories of shirts, overalls, and creamery products. Pop., 1900, 4724; 1910, 4689.

WAR'RINGTON, wär'ing-tŭn. A county borough and important manufacturing town of Lancashire, England, on the right bank of the Mersey, at the head of navigation, 16 miles equidistant from Liverpool and Manchester (Map: England, D 3). On the east are situated the Latchford locks of the Manchester Ship Canal, which is spanned by five bridges at Warrington. The town is well built Warrington has owned a municipal free library, museum, and art gallery since 1848. Its chief industrial importance is in iron manufactures of all kinds; it also has breweries, and leather, cotton, glass, chemical, and soap works The *Walintune* of Domesday, it was a place of military importance in the fifteenth century. Pop, 1901, 64,241; 1911, 72,166

WARRINGTON, GEORGE. A stanch friend of the hero in Thackeray's *Pendennis.*

WARRISTON, wŏr'is-tŭn, ARCHIBALD JOHNSTON, LORD (1611–63). A Scottish statesman, born at Edinburgh. With Alexander Henderson he framed the Scots national covenant in 1638 to resist the attempt of Charles I to force the English liturgy upon the Scottish church, and he helped to negotiate the treaties of Berwick (1639) and Ripon (1640), and that with the English Parliament. He resisted the famous engagement into which the Scottish Parliament entered with the King in 1648. In 1658 he was called to serve in Oliver Cromwell's House of Peers. After the Restoration he was hanged on the order of Charles II. Consult *Diary of Sir Archibald Johnston of Warriston* (Edinburgh, 1911), edited by G. M. Paul.

WARRNAMBOOL, war'nam-bōōl. A seaport of Victoria, Australia, 166 miles westsouthwest of Melbourne, on Lady Bay (Map: Victoria, B 6). Among the principal features are the art gallery and museum, a fine race course, Albert Park, and the botanical gardens. Pop., 1901, 6410; 1911, 7403.

WARSAW, war'sa (Pol. *Warszava,* vàr-shä'vä). A government of Poland (Map: Russia, B 4). Area, 5625 square miles. It is mainly low and flat, but somewhat hilly along the lower course of the Vistula. This river forms the north boundary of the government and is of great importance as a waterway. Warsaw has a poor soil, but agriculture is highly developed owing to the prevalence of large holdings There is also considerable manufacturing, of which cotton and woolen goods, products of iron and steel, various articles of apparel (especially footwear), and sugar (for the production of which beets are extensively grown) form the bulk. Pop., 1912, 2,639,400, of whom the Roman Catholics formed 80 per cent and the Jews about 12 per cent.

WARSAW. Formerly the capital of the Kingdom of Poland, now the capital of the Government of Warsaw, in Poland (Map: Russia, B 4). It is beautifully situated on a gently undulating, fertile plain, for the most part on the left bank of the navigable Vistula, on a cliffy terrace 100 feet high. It is 404 miles east of Berlin. The suburb of Praga is on the right bank, and is flanked by a modern suburb—New Praga. Although it has lost in political status, it has been increasing its prestige in all other directions. Warsaw is the intellectual centre of Poland, whose literary and artistic activity it inspires

The main city lies close to the river in a compact form and is well built. The streets are regularly laid out except in the old city, where the ancient houses are quaint and the

thoroughfares crooked and narrow. There are 11 gates, beyond which lie the suburbs. Two bridges cross the Vistula—a railway bridge and the Alexander Bridge, the latter dating from 1865. The former is guarded by a strong fort on each side of the river, the Alexander Citadel being on the left bank. The centre of life in Warsaw is the Palace Square, near the river, and the terminal of the Alexander Bridge. The Theatre Square lies a short distance southwest and is flanked by the town hall, and by the fine Grand Theatre, where plays and operas are given. Two fine boulevards, in imitation of the Champs-Elysées district of Paris, are found in the southern part of the city—Ujazdowska and Jerusalem streets. Southwest of the Palace Square is the small but attractive Saxon Garden laid out by Augustus II. There are also the Krasinski gardens. Along the river in Praga stretches the Alexander Park.

There are seven Russian and more than 30 Roman Catholic churches. The Roman Catholic Cathedral of St. John is north of the Palace Square, and is connected by corridors with the royal palace, which lies on the right and between the square and the river. The church was founded in 1360. Near the Saxon Garden is the cathedral of St. Alexander Nevsky, built in the Byzantine style in 1894–1912. The church of the Holy Cross lies southwest and dates from 1695. The numerous palaces of the nobility have generally been put to municipal uses by the Russians. The ancient royal palace and the Saxon Palace, in the Saxon Garden, formerly the residence of the Saxon-Polish kings, is used by the public administration. In the Casimir Palace is the university. In the southern end of the city, near the river, is the Belvedere summer palace, with beautiful gardens embellished with ponds, etc. Adjacent is the Lazienki Palace, built by Poniatowski. There is an elaborate memorial, with eight reposing lions, to the Polish generals who fell in 1830 while remaining loyal to the Russians.

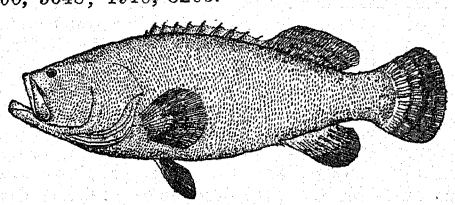
Warsaw is the great industrial and commercial centre of Poland. Machinery, carriages, food products, animal products, and woven goods are leading items among the many varied productions. There are more than 50 book-printing establishments. Boot and shoes, millinery, plated ware, etc., are manufactured. In 1912 there were in this city 11,277 industrial establishments, employing 576,233 workmen and turning out goods valued at over $500,000,000. Leather, coal, and corn are leading commodities of trade. Warsaw is the seat of the government and of the high dignitaries of both the leading religious faiths.

Pop., 1901, 756,426; 1913, 872,500, including 15,000 Protestants and 300,000 Jews. Germans form a considerable part of the population. At the head of the educational system stands the university. (See WARSAW, UNIVERSITY OF.) The medical school of Warsaw is famous, as is also the school of art, with a fine museum. The other educational institutions include a conservatory of music, an institute of agriculture, and a technical college. In nearly every educational institution in the city the instruction is given in Russian.

History. Warsaw was the residence of the mediæval dukes of Masovia. In 1526 Warsaw and all Masovia became part of Poland. In 1550 King Sigismund II established his residence here and Sigismund III made it the capital, although the kings continued to be crowned at Cracow. The city was taken by Charles X Gustavus of Sweden in 1655. Here, on July 28–30, 1656, was fought a great battle in which the Poles were defeated by the armies of Sweden and Brandenburg. In 1702 Charles XII of Sweden entered Warsaw. In 1794, after the second partition of Poland, the city rose against the Russians. In the summer of that year it successfully withstood the forces of Frederick William II of Prussia. In the fall a Russian army under Suvarov advanced against it. Praga was stormed on November 4, the Russians perpetrating a fearful massacre, and on the 8th Warsaw surrendered. In the third partition of Poland Warsaw fell to Russia. In 1807 it became the capital of the newly erected Duchy of Warsaw. (See POLAND.) In 1813 it passed to the Russians. The Polish uprising of 1830 began here on November 29, the Grand Duke Constantine being forced to retire. It was also the centre of the uprising of 1863. Occupying as it did a position far to the front, Warsaw was peculiarly exposed in the War of 1914. Its exposure was further accentuated by the fact that from the Russian point of view it was situated on the wrong, i.e., the left, bank of the Vistula. It was strongly protected to the northeast by the line of the Narev with its fortresses, and to the northwest by Novo-Georgievsk on the Vistula, facing, as it were, Thorn. On the south it was not so well off, the nearest position of strength being Ivangorod, a considerable distance up the river. In the campaign of 1915 the fall of Ivangorod brought on the evacuation of Warsaw. But before this it had successfully resisted all German attempts made to capture it. See WAR IN EUROPE.

WARSAW. A city and the county seat of Kosciusko Co., Ind., 122 miles north by east of Indianapolis, on the Pennsylvania and the Cleveland, Cincinnati, Chicago, and St. Louis railroads (Map: Indiana, F 2). It is in a picturesque lake region and has considerable reputation as a summer resort. The noteworthy features include Winona Park, the Winona Agricultural and Technical Institute, the public library, and the county courthouse. Warsaw manufactures overalls, cut glass, splints, vacuum cleaners, flour, machinery, etc. Pop., 1900, 3987; 1910, 4430.

WARSAW. A village and the county seat of Wyoming Co., N. Y., 44 miles southwest of Rochester; on the Erie and the Buffalo, Rochester, and Pittsburgh railroads (Map: New York, B 5). It has a Carnegie library and a municipally owned opera house. There are salt works and manufactories of knit goods, brooms, carriages, elevators, ivory buttons, lanterns, paper boxes, steel bridges, flour, and pipe organs. Pop., 1900, 3048; 1910, 3206.



THE WARSAW.

WARSAW (corruption of *guasa*). A large fish (*Promicrops guttatus*), common in the Gulf of Mexico and southward. See JEWFISH.

WARSAW, PRINCE OF. See PASKEVICH, I. F

WARSAW, UNIVERSITY OF. A university founded in 1816 and opened in 1818. After the Polish Revolution of 1830 the university was suppressed and its library transferred to St. Petersburg. In 1857 a medical school was opened at Warsaw, and in 1861 a higher institution of learning was established, which was organized into a university in 1869. The statutes of 1884 which took away all academic freedom from Russian universities are also in force at the University of Warsaw. Before the great war it consisted of the following faculties (1) History-philology, (2) physics-mathematics, (3) law; (4) medicine. It had an attendance of 2415 in 1913. The library is particularly rich in Polish literature and history. It contains now over 570,000 volumes and nearly 1400 manuscripts. The ethnographical museum also contains valuable manuscripts. In 1820 the astronomical observatory was erected. During the German occupation the university was reconstituted with a Polish faculty.

WARSHIP. A vessel armed and equipped for purposes of war. All fully efficient fighting ships are designed and built as such, the characteristics of a warship and merchant vessel being so different that it is impossible to transform the latter into an efficient fighting craft. Warships are divided into battleships, battle cruisers, coast-defense ships, light cruisers, gunboats, destroyers, torpedo boats, and submarines. Merchant vessels, when armed for scouting, commerce destroying, or other service, are called auxiliary cruisers. Fleet auxiliaries, such as supply ships, repair ships, hospital ships, etc., are not regarded as warships; if they carry an armament it is only a light one. Battleships are those which are best armed and protected. All of recent design in 1916 were of the "dreadnought" type, i.e., the main battery consisted of a number of heavy guns which are all of one calibre. Smaller pieces were carried, but for defense against torpedo and air craft only. Battle cruisers carry guns of the same calibre as those on contemporary battleships, from which they differ in being very much faster. This excess of speed is obtained by reducing the weight of armor protection and increasing the displacement. The so-called "armored cruisers" are no longer built. They were usually smaller than contemporary battleships, faster, carried lighter guns, and were protected by thinner armor. Protected cruisers were given the name because they were fitted with curved "protective" decks of armor just below the water line. All cruisers have such decks, and nearly all late types below the battle-cruiser class have thin armor belts along the water line as well; the speed is high, reaching 30 knots; but the battery is necessarily light and nearly all such vessels are called "light cruisers." Coast-defense ships are usually armored, and most of them are old vessels no longer fit for fleet uses; but a few small coast-defense battleships have been built for the weaker navies and during the great war Great Britain constructed some monitors of special type for inshore work. Gunboats are of many kinds, the sea-going type being merely small cruisers of 1500 tons or less. Destroyers, torpedo boats, and submarines are very completely described under the head of TORPEDO BOAT. See CRUISER; FRIGATE; MONITOR; NAVAL OPERATIONS; NAVIES; RAM, MARINE; SHIP AND SHIPPING; SHIP, ARMORED; WAR IN EUROPE; also *Navy*, under the head of UNITED STATES, FRANCE, GERMANY, ETC.

WARS OF THE ROSES. See ROSES, WARS OF THE

WART (AS. *wearte*, OHG. *warza*, Ger. *Warze*, wart; perhaps connected with AS. *wearre*, Lat. *verruca*, wart, or with Goth. *waúrts*, Ger *Wurz*, AS. *wyrt*, Eng. *wort*, weed, and ultimately with Eng *root*). An excrescence of the skin due to hypertrophy of the papillæ, varying in shape, size, and position. Warts are generally round or oval, with roughened summits, frequently on the hands, rarely on the face. They appear especially upon children. There are several varieties of wart or verruca. The ordinary form, verruca vulgaris, appears upon children between the ages of 2 and 14, remains a few years, and then disappears; or they may last through life. When a wart has been cut or burned, frequently small warts, called "seed warts," appear near by. Verruca senilis is a wart probably caused by the senile degeneration of the tissues of the skin, favored by irritation and want of cleanliness. These are generally upon the back, arms, face, neck, or trunk. They are rounded and irregular, dark in color, and of a greasy feel. Frequently they are the seat of troublesome itching. Venereal warts, or condylomata, occur as a result of the discharge of gonorrhœa (q.v.) or as an evidence of syphilis (q.v.); they are found upon the genitals or the mouth, between the toes, or beneath the breasts. Warts which are threadlike, usually appearing on the face or neck, are called verrucæ filiformes. Other varieties are of little importance. Treatment of warts consists of cauterization with nitric acid, acetic acid, silver nitrate, or the acid nitrate of mercury. Salicylic acid removes some, as also a strong alkali, frequently applied. Some may be snipped off with scissors close to their bases; but they frequently return. The electrocautery and electrolysis have been used with success.

WARTABIED. See ARMENIAN CHURCH

WARTBURG, värt'burg. A castle near Eisenach in Saxe-Weimar, Germany, situated on a hill 565 feet above the town. (See EISENACH.) It was begun about 1070 and till the year 1247 it was the residence of the Landgraves of Thuringia, attaining its greatest splendor under Hermann I (1190–1217), who was a noted patron of the arts. The castle is the occasional residence of the Grand-Duke of Saxe-Weimar. The restoration of the castle was begun in 1847 after designs by Ritzen, who reproduced with great faithfulness the original plan of the structure.

The Sängersaal in the Hofburg is noted as the scene of the legendary Wartburg Krieg or Sängerkrieg of 1207, in which the most celebrated of German minstrels competed for supremacy. Walther von der Vogelweide, Wolfram von Eschenbach, and Heinrich von Ofterdingen participated in the musical tourney, and to the first of these fell the prize. This legend, dating from the early part of the thirteenth century, was blended in time with a West German tradition regarding the contest between the pious Wolfram and the magician Klingsor aided by the devil. The story in its modified form became the subject of an early poem which attained wide currency before the end of the thirteenth century. From this source Wagner, among others, drew part of his material for the libretto of *Tannhäuser*. On Oct. 18, 1817, about 500 students

of the various German universities assembled at the Wartburg, at the instance of the Jena Burschenschaft (q.v.) to celebrate the third centennial of the beginning of the beginning of the Reformation and the anniversary of the battle of Leipzig (1813). In reality the meeting was a protest on the part of the German youth against the policy of reaction which, after the Congress of Vienna, Metternich forced upon Germany. See GERMANY.

WARTEGG, ERNST VON HESSE-. See HESSE-WARTEGG, ERNST VON.

WARTENBURG, HANS YORCK VON. See YORCK VON WARTENBURG.

WARTHE, vär'te (Pol. *Warta*) A river of Germany and Russian Poland, the largest tributary of the Oder It rises in southwest Russian Poland and flows in a general northwesterly direction, entering Prussia at its junction with the Prosna (Map. Germany, G 2). It traverses the Prussian Province of Posen through the Warthe swamps, of which 140 square miles are protected by dikes, and joins the Oder at Kustrin Of its total length of over 540 miles, 265 miles are navigable. As the principal river of Posen the Warthe has a considerable traffic and is connected by canal with the Vistula.

WART HOG. A large bush-ranging wild pig of Africa, of which there are two species, *Phacochœrus africanus*, of Eastern Africa, called "halluf" in Abyssinia, and *Phacochœrus æthiopicus* of South Africa. Both have very long and broad heads with enormous tusks, and the face made ugly by pairs of great wartlike protuberances on each side of the nose, and one pair just below the eyes.

WARTON, wär'ton, JOSEPH (1722–1800). An English literary critic, born at Dunsfold, Surrey. He was educated at Oriel College, Oxford, took orders in 1744, and was curate at Basingstoke (1744–45), and subsequently at Chelsea In 1744 he published a book of verse with the title *Ode on Reading West's Pindar*, and in 1746 a collection of *Odes on Various Subjects*, in which he declared against the didactic school of poetry represented by Pope. In 1753 he published a four-volume edition of Vergil in Latin and English, himself contributing translations of the *Eclogues and Georgics*, critical essays, annotations, and a *Life* of the poet. He failed of any important preferment in the Church, and in 1755 became second master of Winchester School. From 1766 to 1793 he was headmaster. While at Winchester he published the two volumes (1757–82) of his *Essay on the Genius and Writings of Pope*, his most important work. His edition of Pope's works (1797) remained the best until the appearance of that by Elwin and Courthope. Warton became prebendary of London in 1782, and of Winchester in 1788.

WARTON, THOMAS (1728–90). An English poet and critic, born at Basingstoke. He was the younger brother of Joseph Warton (q.v.). From Trinity College, Oxford, he graduated B.A. in 1747, and M.A. in 1750. He remained at the university all his life, being professor of poetry there in 1757–67. In 1767 he took the degree of B.D. To him fell two Church livings—Kiddington in Oxfordshire (1771) and Hill Farrance in Somersetshire (1782). In 1785 he was appointed Camden professor of history at Oxford, and poet laureate in succession to William Whitehead. Warton began writing verse in boyhood. His poems (sonnets, odes, and lyrics), collected in 1777, reached a fourth edition in 1789. Written in imitation of Spenser and Milton, they are interesting as links between the older English poetry and the remarkable poetic outburst beginning with Wordsworth and Coleridge. Warton gained his reputation as a critic with *Observations on the Faerie Queene* (1754, enlarged to 2 vols., 1762), a pioneer work in the revival of enthusiasm for magic and mystery. In 1774 appeared the first volume of his *History of English Poetry*. Two more were added in 1778 and 1781, bringing the work through the age of Elizabeth. A fourth volume, intended to carry the subject onward to Pope, was never written. In spite of errors in fact and of generalizations proved incorrect by later investigations, the *History of English Poetry* still possesses very great value Judged historically, it marks an epoch in English literary history. Warton's last important undertaking was an edition of *Poems upon Several Occasions by John Milton* (1785), which in the judgment of David Masson is the best critical edition of Milton's early poems ever published. Warton's *History of English Poetry* was reëdited with suppressions and additions by W. C. Hazlitt (London, 1874). The standard memoir is prefixed to the *Poems*, ed. by R. Mant (2 vols., Oxford, 1802). Consult also W. P Kerr, *Thomas Warton* (Oxford, 1911), and C. Rinaker, *Thomas Warton: A Biographical and Critical Study* (Urbana, Ill., 1916).

WARWICK, wŏr'ĭk. The county town of Warwickshire, England, on the Avon, 21 miles southeast of Birmingham (Map: England, E 4). The most notable edifice is Warwick Castle, the principal residence of the earls of Warwick, beautifully situated on a rocky elevation 40 feet high, on the banks of the Avon. Of this edifice, Guy's Tower, 128 feet high, was built in 1394; and Cæsar's Tower, 147 feet high, is still more ancient. Warwick Castle possesses a valuable collection of paintings, armor, and other relics The Leicester Hospital and the Beauchamp Chapel in the parish church are fine examples of mediæval architecture. There are ironworks and manufactures of gelatin. Originally a British settlement, Warwick was occupied by the Romans. It was destroyed by the Danes. William the Conqueror's presence is recorded in Warwick, where he erected strong fortifications, and the earls of Warwick are famous in British history. Pop., 1901, 11,889; 1911, 11,858. Consult Cooke, *Historical Guide to Warwick Castle* (Warwick, 1859).

WARWICK, wär'wĭck. A town including several villages, in Kent Co., R. I., 5 miles south of Providence, on Narragansett and Cowesett bays, the Pawtuxet and Providence rivers, and on the New York, New Haven, and Hartford Railroad (Map: Rhode Island, C 3). In 1912 the town was divided, about 8 square miles being set apart and called West Warwick, leaving the original town with about 36 square miles. While Warwick has foundries and machine shops, a thread mill and a bleachery, it is essentially residential, the industrial quarter now being included almost wholly in West Warwick, where there are extensive manufactories of cotton goods. Pop., 1900, 21,316; 1910, 26,629; 1915, Warwick, 13,302; 1920, 13,481; West Warwick, 1915, 15,782; 1920, 15,461.

Warwick, founded in 1642 by a small company headed by Samuel Gorton (q.v.), was called Shawomet until 1648, when its present name

was adopted in honor of the Earl of Warwick. Massachusetts at first claimed jurisdiction, and in 1643 almost completely destroyed the settlement. In 1676 Warwick suffered severely from an Indian attack. It was the birthplace and early home of Gen. Nathanael Greene. Consult Fuller, *The History of Warwick* (Providence, 1875).

WARWICK, FRANCES EVELYN (*née* MAYNARD), COUNTESS OF (1861–) A British humanitarian After her marriage to the fifth Earl of Warwick she became a leader of society, but was more generally known for her interest in public movements. She founded a complete organization, both at Warwick Castle and at Easton Lodge, for the welfare of the poor and nursing of the sick; the Lady Warwick College (housed in Studley Castle, Warwickshire) for training young women in horticulture, dairy, bee, and poultry keeping; a science and technical school on her Essex estate; and a home for crippled children at Warwick. Lady Warwick became an active Socialist, and lectured on Socialism in the United States. She published *Warwick Castle and its Earls* (2 vols., 1903), and *William Morris, his Home and Haunts* (1912).

WARWICK, GUY OF. See GUY OF WARWICK.

WARWICK, JOHN DUDLEY, EARL OF. An English statesman. See DUDLEY, JOHN.

WARWICK, RICHARD BEAUCHAMP, EARL OF (1382–1439). An English soldier. He succeeded to the title in 1401, and participated in the war with Owen Glendower and the Percys, and was at the battle of Shrewsbury (1403). In 1408 he set out on a pilgrimage to the Holy Land, and, after traveling widely, returned to England in 1410. In 1413 he went to France as a commissioner to treat for peace, and the next year attended the Council of Constance. In 1414 he was put in command of Calais. After the death of Henry V Warwick was in charge of the education of Henry VI (q.v.). He was employed in many difficult matters, and finally in 1437 he was appointed lieutenant to rule Normandy; this office he held until his death, April 30, 1439. Consult: Sir J. H. Ramsay, *Lancaster and York* (Oxford, 1892); C. L. Kingsford, *The First English Life of King Henry the Fifth, etc.* (ib., 1911); J. H. Wylie, *The Reign of Henry the Fifth*, vol. i (Cambridge, 1914).

WARWICK, RICHARD NEVILLE, EARL OF, popularly named THE KING-MAKER (1428–71). A celebrated English warrior and statesman. He was born on Nov. 22, 1428, the eldest son of Richard, Earl of Salisbury, and Alice, daughter and heiress of Thomas Montacute. He became the most powerful nobleman in the kingdom, by his marriage with Anne, daughter and heiress of Richard Beauchamp, Earl of Warwick, and not only acquired by this alliance the lands of the Warwick family, but was created Earl of Warwick, with succession to the heirs of his wife. He is the most prominent figure in the Wars of the Roses (q.v.). Until 1453 Warwick remained neutral, but after that he was associated with Richard, Duke of York. The first battle, at St. Albans, between Yorkists and Lancastrians in 1455, was won mainly by his impetuous onset. He was rewarded with the governorship of Calais. In 1457 he obtained command of the fleet for three years. In 1458, with five large and seven small vessels, he attacked 28 ships, 16 of which belonged to the King of Castile. After a battle of six hours he withdrew, having captured six vessels A little later, in spite of the truce with Lubeck, he seized a fleet bound thither Upon the renewal of civil strife in 1460 Warwick landed in Kent at the head of his Calais troops, and entered London amid acclamations. He defeated Queen Margaret's army, near Northampton (1460), with great slaughter, and took the King prisoner. The Duke of York now advanced his claim to the throne. Queen Margaret raised an army to rescue the King, and the Duke committed the monarch to the custody of Warwick, while he marched against the Lancastrians. At Wakefield, on Dec. 31, 1460, the Yorkists were overthrown by the army of Queen Margaret. The Duke was taken prisoner and put to death, and Warwick's father, the Earl of Salisbury, with 12 other Yorkist chiefs, was beheaded at Pontefract. The second battle of St. Albans was won by the Lancastrians (1461), but Edward, Earl of March, now Duke of York, accompanied by Warwick, marched boldly upon London, which was thoroughly Yorkist, and Edward was proclaimed King (Edward IV). The Lancastrians suffered defeat at Towton, and Edward, returning to London in triumph, was crowned June 22, 1461. Warwick now had his first misunderstanding with King Edward He had been authorized to negotiate with Louis XI of France for the marriage of his sister-in-law, Princess Bona of Savoy, to King Edward, and was indignant at the King's sudden marriage with Elizabeth Woodville. He was now high in power. To the earldoms of Warwick and Salisbury, with the estates of the Despensers, he added the offices of high admiral and great chamberlain, besides the lord lieutenancy of Ireland and the government of Calais. But he was losing in the King's council and the relatives of the Queen were becoming more prominent. After having been sent into honorable banishment by means of embassies to France, Burgundy, and Brittany, Warwick in 1469 gave his daughter in marriage to George, Duke of Clarence, the King's brother, without asking Edward's permission. He finally broke out into open revolt against Edward, and concluded a treaty with Queen Margaret, by which it was agreed that her son, Prince Edward, should espouse Anne Neville, Warwick's daughter, and that in failure of issue the crown should devolve on Clarence. King Edward escaped to Holland, and Henry VI, who had been confined in the Tower, resumed the sovereignty. Edward, however, raised a body of Flemings and Dutchmen, and, landing near Hull, advanced towards London. He gave battle to King Henry's army, commanded by Warwick, at Barnet, April 14, 1471. Warwick and his brother Montagu, betrayed by Clarence, were left dead on the field, and with them fell the greatness of the house of Neville. Warwick is the hero of Lord Lytton's *The Last of the Barons.* Consult: C. W. C. Oman, *Warwick the Kingmaker* (London, 1891); Sir J. H. Ramsay, *Lancaster and York*, vol. ii (Oxford, 1892); Sir William Stubbs, *Constitutional History of England*, vol. iii (6th ed., ib., 1897).

WARWICK, ROBERT RICH, second EARL OF (1587–1658). An English Puritan nobleman and naval commander. He was the eldest son of Lord Robert Rich, who was created Earl of Warwick in 1618; in the following year the son succeeded to the title. He was educated at Emmanuel College, Cambridge, studied law, and

was admitted to the bar in 1604, and became member of Parliament for Maldon in 1610. He joined the Puritan movement, played an important part in the colonization of Rhode Island and Connecticut; was a councilor of the New England Company, and a friend of Thomas Hooker, the founder of Hartford. In the Civil War he was a supporter of the Parliamentarian cause; in 1642 he served as lieutenant of the fleet under Northumberland, whom he succeeded as admiral in 1643, and during the protectorship of Cromwell was chosen to bear the sword of state in the latter's presence

WARWICKSHIRE, wŏr'ĭk-shēr. A midland county of England (Map England, E 4). Area, 902 square miles. The surface is generally level or gently undulating. The county is traversed by the river Avon; it was formerly covered with forest and there is still much woodland Five-sixths of its area is under cultivation, including pastures; wheat is the chief crop, while dairying receives much attention. The north portion is industrial and its mechanical industries are very important, especially founding and the manufacture of machinery, cycles, automobiles, jewelry, and instruments. Nearly 3,000,000 tons of coal are mined annually, and the production of iron ore is increasing. Pop. (administrative county), 1901, 940,879, 1911, 1,040,409. The county town is Warwick, and the largest cities are Birmingham and Coventry.

WAR ZONE. In warfare, especially in naval warfare, the ever-present problem is to reconcile the military necessity of the belligerents with the personal and commercial rights of neutrals. The belligerent state must be free to put effective pressure upon its antagonist, but the rights of a neutral state, being inherent in sovereignty, may not be abridged by belligerent action. These principles, if rigidly insisted on, would produce inevitable clash; hence experience has suggested compromise, and international law has accorded to the belligerent the right of visit and search with a view to prevent carriage of contraband or unneutral service, as well as the more extreme right of blockade. See BLOCKADE; CONTRABAND OF WAR; INTERNATIONAL LAW; LONDON, DECLARATION OF; NEUTRALITY.

The actual zone of battle, on sea as on land, has always been considered as interdicted to neutrals, and if damage is sustained through necessary acts of war no claims for indemnity arise. But it is unsafe to press the analogy further, for while on land the theatre of operations is always under the jurisdiction either of the local sovereign or the military occupant, naval warfare is conducted in large part upon the high seas which lie outside the jurisdiction of any state and upon which all, neutrals and belligerents alike, have an equal right to be.

The restriction implied in the war zone, however, is primarily a result of new methods of warfare, such as the mine, the submarine, and the use of radiotelegraph. It was employed for the first time in the Russo-Japanese War both by way of the laying of mines on the high seas and the designation of strategical areas through which the passage of all vessels was regulated and in certain cases prohibited. Japan established 12 or more such areas, but in all cases the essential purpose was defense, though "in several areas the boundaries seem to have run outside the 3-mile limit and even 10 miles from land seems to have been included in some instances." The conclusion drawn from a discussion of the subject was that a "belligerent may be obliged to assume in time of war for his own protection a measure of control over the waters which in time of peace would be outside of his jurisdiction" (*International Law Situations*, United States Naval War College, 1912, pp. 114–129)

The policy of the belligerents in the great war went far beyond this limited idea of defense sea areas. Charging each other with violation of international law, they proceeded, on the basis of reprisals, to preempt for hostile uses large areas of the high seas. These areas were mined in many cases and became the scene of an unregulated submarine warfare. Early in October, 1914, the British government advised mariners that it had authorized a mine-laying policy in the southern part of the North Sea, in retaliation for a similar policy pursued by Germany. On November 3 notice was given that the whole of the North Sea was to be considered a military area, and all vessels were warned against entering it except under Admiralty directions. This step was taken, it was stated, because of indiscriminate German mine-laying on the high seas on the trade route between Liverpool and America, the Admiralty feeling it necessary "to adopt exceptional measures appropriate to the novel conditions under which the war is being waged." On Feb. 4, 1915, the German government announced a further extension of this policy by proclaiming as a war zone the waters surrounding Great Britain and Ireland, the English Channel included. "On and after Feb. 18, 1915," according to this proclamation, "every enemy merchant ship found in the said war zone will be destroyed without its being always possible to avert the danger threatening the crews and passengers on that account Even neutral ships are exposed to danger in the war zone, as in view of the misuse of neutral flags ordered on January 31 by the British government and of the accidents of naval war, it cannot always be avoided to strike even neutral ships in attacks that are directed at enemy ships."

The United States was prompt to protest against the proposed policy in so far as it might affect American life and property. Such a course of action, it pointed out, could not be viewed "in any other light than as an indefensible violation of neutral rights," and all steps would be taken to secure to American citizens the full enjoyment of their acknowledged rights on the high seas.

This policy of the war zone, rigorously pursued, led to a prolonged diplomatic controversy. Meanwhile a principle just beginning to get a locus standi in international law was extended, through reprisals, far beyond its original purpose, in defiance alike of the recognized laws of warfare and the long-established rights of neutrals.

Bibliography. United States Naval War College, *International Law Situations* (1912); World Peace Foundation, *War Zones* (Pamphlet Series, Boston, 1915), being the official documents as published by the United States government.

WASATCH (wą'săch *or* wą'săch') **MOUNTAINS.** A mountain range belonging to the Rocky Mountain system (Map: Utah, C 3). It begins in southeast Idaho, and runs southward, east of the Great Salt Lake and through

the centre of Utah, gradually turning to the southwest, and ending at the southwest corner of the State. It forms the eastern boundary of the Great Basin, from which it rises abruptly in great and very conspicuous rugged masses broken by deep cañons, and bearing large pine forests on its middle slopes Its average height is about 10,000 feet, and several of its peaks are over 12,000 feet high. The range is a recent uplift, and of a composition similar to that of the minor Basin Ranges. It consists in the north of a ridge of Carboniferous rocks flanked by Tertiary and Cretaceous strata, and in the south of great masses of igneous rocks. Coal, iron, and silver constitute its chief mineral wealth

WAS'CO (Tenino, grass people). The easternmost tribe of Chinookan stock (q.v.) formerly claiming the country on the south side of the Columbia River, about the Dalles, Oregon, and now gathered with other tribes upon the Warmspring Reservation in the same vicinity. They were essentially a fishing people. They number 242.

WASE'CA. A city and the county seat of Waseca Co., Minn., 76 miles south of St Paul; on the Chicago and Northwestern and the Minneapolis and St. Louis railroads (Map: Minnesota, D 6). It has several grain elevators, and manufactories of flour, cereals, foundry and machine-shop products, etc. Notable buildings are the county courthouse, the First National Bank, and the People's State Bank. Adjoining the city on the east is Clear Lake. Pop., 1900, 2774; 1910, 3054.

WASH. See LOTION.

WASH, THE. A drowned plain on the east coast of England, between the counties of Lincoln and Norfolk (Map: England, G 4). It is about 22 miles in length, 15 miles in average breadth, and receives the rivers Witham, Welland, Ouse, and Nen. The shores are low and marshy, and the Wash is occupied by sandbanks, dry at low water. Two wide spaces or pools of water, called Lynn and Boston Deeps, afford anchorage for vessels.

WASHASHE, or WASASH. See OSAGE.

WASH'BURN. A city and the county seat of Bayfield Co., Wis., 60 miles east by south of Duluth, Minn.; on Chaquamegon Bay, an arm of Lake Superior, and on the Chicago and Northwestern and the Northern Pacific railroads (Map: Wisconsin, B 2). It has a handsome high school, courthouse, and city hall, and a public library. The harbor is well adapted to shipping, and considerable trade is carried on in the products of the vicinity—principally grain, lumber, and brownstone. There are saw and lumber mills, a creamery, and a large crate factory. There is a large dynamite plant four miles from the town. The Jesuits founded a mission near here in 1665. Pop., 1900, 6814; 1910, 3830

WASHBURN, CADWALLADER COLDEN (1818–82). An American soldier, political leader, and capitalist, born at Livermore, Me. In 1839 he removed to Iowa and later to Illinois, where he studied law. In 1842 he began practice at Mineral Point, Wis. He entered into partnership with Cyrus Woodman in 1844, the firm devoting much of its attention to real estate and banking. Woodman retired in 1855 and subsequently Washburn made fortunate investments in timber lands and became one of the pioneers in the flour-milling industry. In 1854 he was elected to Congress by the Antislavery element, and was twice reelected, serving until 1861 There he joined his brothers, Israel Washburn and Elihu B. Washburne (q.v.). Soon after the outbreak of the Civil War he raised the Second Regiment of Wisconsin Cavalry and was mustered into the Federal service in February, 1862 He served under General Curtis in Arkansas from March to July of that year and was then promoted to be brigadier general of volunteers. In November, 1862, he was promoted to be major general and was given a division in the Army of the Tennessee In 1864 he was given command of the District of West Tennessee, which, with the exception of some months when he commanded the District of Vicksburg, he continued to administer until he resigned from the service on May 25, 1865. He was again a member of Congress from 1867 to 1871, and in 1872–74 was Governor of Wisconsin. He gave largely to education, built an observatory at the University of Wisconsin, and founded an orphan asylum at Minneapolis

WASHBURN, EMORY (1800–77). An American jurist. He was born in Leicester, Mass.; studied at Dartmouth, but finished his education at Williams in 1817; was admitted to the bar (1821); practiced at Leicester until 1828, then at Worcester for 30 years. He served in both branches of the State Legislature, was a justice of the Common Pleas Court (1844–47), and Governor of Massachusetts (1854–55). In 1856 he was appointed Bussey professor of law in the Harvard Law School and served until 1876. He died in 1877. He published a number of pamphlets and lectures and the following legal treatises: *American Law of Real Property* (Boston, 1860); *American Law of Easements and Servitudes* (Boston, 1863).

WASHBURN, GEORGE (1833–1915). An American Congregational missionary and educator, born at Middleboro, Mass., and educated at Amherst College (A.B., 1855), and at Andover Theological Seminary. In 1858, as a missionary of the American Board (Congregational), he went to Turkey, where he labored until 1868. After seven years as professor of philosophy in and acting president of Robert College, Constantinople, he served as its president from 1877 to 1903, succeeding his father-in-law, Cyrus Hamlin (q.v.). In this office he accomplished an important work in piloting the institution successfully through a critical period. Because of his deep interest in Bulgarian independence he received the Order of St. Alexander from the Prince of Bulgaria. In 1908 he returned to the United States. He published *Fifty Years in Constantinople and Recollections of Robert College* (1909; 2d ed., 1911). Consult also W. S. Monroe, *Bulgaria and her People* (Boston, 1914).

WASHBURN, MARGARET FLOY (1871–). An American psychologist. She was born in New York City, and was educated at Vassar (A.B., 1891), and at Cornell (Ph.D., 1894). Miss Washburn served as professor of psychology and ethics at Wells College from 1894 to 1900, at Cornell was warden of Sage College and lecturer in psychology in 1900–02, and at the University of Cincinnati was assistant professor of psychology in 1902–03. Afterward she was associate professor, and from 1908 professor, at Vassar. Her contributions to periodicals deal largely with problems of sensation

and perception She translated *Principles of Morality* (1901), which is vol. iii of Wundt's *Ethics*, and wrote *Animal Mind: Textbook of Comparative Psychology* (1908).

WASHBURN COLLEGE. An institution for higher education, founded at Topeka, Kans., in 1865 by the General Association of Congregational Ministers and Churches of Kansas. The campus contains 160 acres on which are 13 buildings. The college gives instruction through the College of Liberal Arts, the course in Engineering, Law School, School of Fine Arts, and an Academy. The value of the college buildings in 1915 was $274,708, the endowment amounted to about $260,000, and the total annual income was about $60,000 In 1916 a campaign was carried on to raise $400,000, to which the General Education Board offered to add $100,000. The total enrollment in the college in 1915–16 was 831, of whom 479 were in the College of Liberal Arts. The faculty numbered about 80. The president was Parley P. Womer, D.D

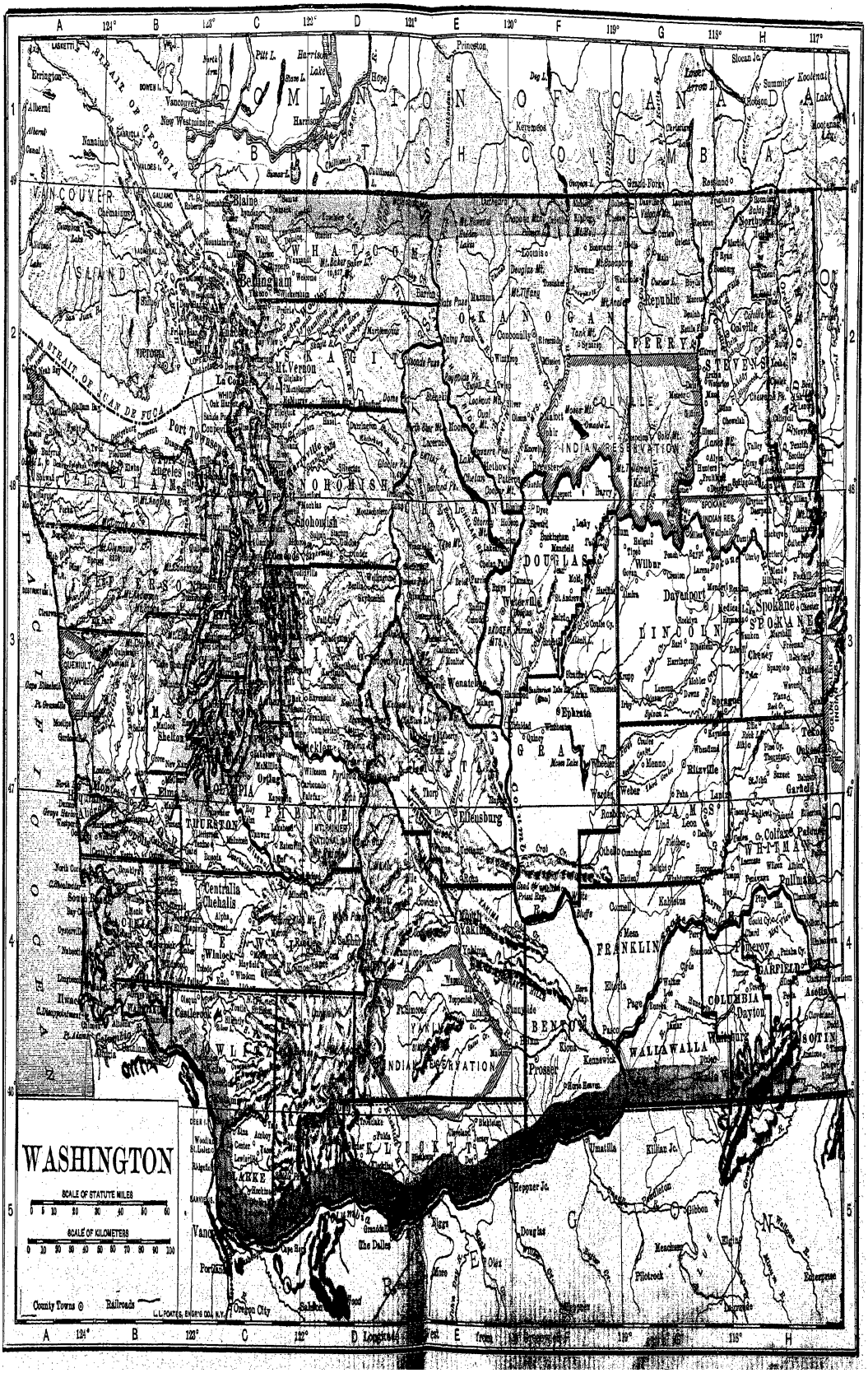
WASH'BURNE, ELIHU BENJAMIN (1816–87). An American political leader and diplomat, born at Livermore, Me He studied law in the Harvard Law School and was admitted to practice in 1840. He was a delegate to the Whig National Convention of 1844, and from 1853 until 1869 was a member of Congress. From 1855 until 1865 he was chairman of the Committee on Commerce, and he was also a member of the Joint Committee on Reconstruction. By his insistence on economy in the national service he gained the name of the "Watch Dog of the Treasury." Among the many bills he introduced was one for the establishment of national cemeteries. When Grant became President, he made Washburne his Secretary of State, but Washburne soon resigned to become Minister to France. During the Franco-Prussian War he represented the German interests, and during the bloody days of the Commune was the only foreign representative who remained at his post. In 1877 he returned to the United States and settled at Chicago. He published *Recollections of a Minister to France, 1869-77* (2 vols., 1887), and edited *History of the English Settlement in Edwards County, Illinois* (1882), and *The Edwards Papers* (1884).

WASH HOUSES, PUBLIC. In Great Britain and on the Continent, where public bath houses, owned and operated by the municipality, have long been in existence, it is quite common to operate public laundries in connection with the bath houses. (See BATH HOUSES, MUNICIPAL.) Within recent years, however, there has been a tendency to separate these institutions and locate them in different buildings. The first public wash house in England was built in 1842 at Liverpool, in connection with a public bath house. The first public wash house erected in Germany, having a public laundry, was built at Hamburg in 1855. Unlike the British wash houses, it is said that most of the German wash houses have proved self-supporting and sometimes yield a profit. In America there are no municipally owned public laundries. In a few of the public bath houses the bathers are supplied with conveniences for the cleansing of their wearing apparel. In Philadelphia the Public Baths Association operates a public wash house in connection with the bath house. The laundry, which at first was reserved for men on certain days, was subsequently open to women only.

WASHING MACHINES. See LAUNDRY MACHINERY.

WASHINGTON. A western State of the United States, popularly called the Evergreen State It occupies the northwestern corner of the United States proper, lies between lat. 45° 32′ and 49° N, long. 116° 57′ and 124° 48′ W. In the northwest a deep inlet formed by the straits of Juan de Fuca, Haro, and Georgia separates the State from Vancouver Island The greater part of the southern boundary is formed by the Columbia River The State is roughly of rectangular shape, with an extreme length from east to west of 360 miles and an extreme breadth of 240 miles. The area is 69,127 square miles, including 2291 square miles of water. Washington ranks nineteenth in size among the States.

Topography. Washington closely resembles Oregon in its main topographical features, and, as in Oregon, the Cascade Mountains divide the State into a smaller western and a larger eastern section, which are strongly contrasting in their climatic and other characteristics The Cascade Mountains (q.v.) vary in width from 50 miles at the southern margin of the State to over 100 miles at the international boundary. The main crest has an average altitude of about 5000 feet, but above this rise a large number of individual peaks and ridges The highest mountains are five snow peaks of volcanic origin, as follows: Adams (12,307), St. Helens (10,000), and Rainier or Tacoma (14,408) in the southern part of the range, and Glacier Peak (10,436) and Baker (10,837) in the northern Cascades. From the eastern base of the Cascades and south of the Great Bend of the Columbia stretches the vast basaltic plateau, an undulating treeless plain lying between 500 and 2000 feet above the sea. Almost the only irregularities in its surface are the deep valleys of the Columbia and its branches, the coulees, which are more or less dry cañons, and the rolling hills of æolian origin which comprise the chief wheat lands of the State. West of the Columbia, however, the lava field has been upturned in a series of anticlinal and monoclinal ridges running east and west as spurs of the Cascades. South of the Snake River, in the southeastern corner of the State, there is another uplift, known as the Blue Mountains, exceeding 5000 feet in altitude. The northeastern quarter of the State, north of the Great Bend and the Spokane River, is rugged and mountainous, forming a connecting link between the Rocky Mountain system and the Cascades and rising in some of its peaks to an altitude of over 6000 feet. The central feature of western Washington is the Puget Sound basin, a longitudinal depression between the Cascade and Coast ranges corresponding to the Willamette valley of Oregon. Its highest parts are scarcely over 500 feet above the sea, and it is penetrated through more than half its length by the numerous branching arms of Puget Sound, forming one of the most magnificent systems of harbors in the world. The Coast Range is not very pronounced in the south, consisting of broad irregular masses having a maximum elevation of 3000 feet. In the north, however, it rises into a well-defined group called the Olympic Mountains, whose highest point is Mount Olympus, with a height of 8150 feet. The Pacific coast itself south of the Straits is but little


WASHINGTON
SCALE OF STATUTE MILES
0 5 10 20 30 40 50 60
SCALE OF KILOMETERS
0 10 20 30 40 50 60 70 80 90 100
County Towns
Railroads
STRAIT OF GEORGIA
STRAIT OF JUAN DE FUCA
VANCOUVER ISLAND
WHATCOM
SKAGIT
SNOHOMISH
OKANOGAN
FERRY
STEVENS
PEND OREILLE
LINCOLN
SPOKANE
DOUGLAS
GRANT
ADAMS
WHITMAN
KING
KITTITAS
YAKIMA
BENTON
FRANKLIN
WALLA WALLA
COLUMBIA
GARFIELD
ASOTIN
CLALLAM
JEFFERSON
MASON
PIERCE
THURSTON
LEWIS
CLARK
SKAMANIA
KLICKITAT
COLUMBIA R.
Bellingham
Mt. Vernon
Port Angeles
Olympia
Centralia
Chehalis
Aberdeen
Hoquiam
Raymond
Shelton
Ellensburg
Yakima
Prosser
Kennewick
Pasco
Dayton
Pullman
Colfax
Palouse
Ritzville
Davenport
Chewelah
Republic
Colville
Omak
Okanogan
Wenatchee
Ephrata
Moses Lake
Othello
Connell
Odessa
Lind
Wilbur
Reardan
Cheney
Medical Lake
Deer Park
Newport
Metaline Falls
Sequim
Port Townsend
Port Orchard
Bremerton
Kelso
Longview
Vancouver
Goldendale
Stevenson
Bingen
White Salmon
Dallesport
The Dalles
Oregon City
Portland
Hood River
Pendleton
Umatilla
Hermiston
Boardman
Heppner Jc.
Arlington
Kilian Jc.
Gibson
Meacham
Pilot Rock
Elgin
Enterprise
Joseph
Wallowa
Grande Ronde
Imnaha
Snake R.
Columbia R.
Yakima R.
Okanogan R.
Methow R.
Chelan L.
Lake Chelan
Lake Roosevelt
Franklin D. Roosevelt L.
Rufus Woods L.
Banks Lake
Moses Coulee
Grand Coulee
Dry Falls
Coulee City
Soap Lake
Quincy
Columbia Basin Project
Priest Rapids Project
Rock Island Dam
Wanapum Dam
Grand Coulee Dam
Chief Joseph Dam
Wells Dam
Rocky Reach Dam
Wenatchee Heights
Entiat
Waterville
Douglas
Mansfield
Coulee Dam
Nespelem
Inchelium
Kettle Falls
Northport
Orient
Laurier
Metaline
Ione
Newport
Usk
Cusick
Tacoma
Seattle
Everett
Bellevue
Renton
Auburn
Kent
Puyallup
Sumner
Enumclaw
Issaquah
Snoqualmie
Monroe
Sultan
Darrington
Granite Falls
Arlington
Stanwood
Oak Harbor
Coupeville
Friday Harbor
Lopez
Orcas
Shaw
Blaine
Lynden
Ferndale
Sumas
Nooksack
Deming
Glacier
Maple Falls
Mount Baker
Mount Rainier
Mount Adams
Mount St. Helens
Mount Olympus
Olympic Mts.
Cascade Mts.
Selkirk Mts.
Kettle River Range
Huckleberry Mts.
Chiwaukum Mts.
Wenatchee Mts.
Saddle Mts.
Horse Heaven Hills
Rattlesnake Hills
Yakima Indian Reservation
Colville Indian Reservation
Spokane Indian Reservation
Kalispel Indian Reservation
Quinault Indian Reservation
Quileute Indian Reservation
Makah Indian Reservation
Lake Washington
Lake Sammamish
Lake Union
Puget Sound
Hood Canal
Grays Harbor
Willapa Bay
Columbia River
Pacific Ocean
Strait of Georgia
Strait of Juan de Fuca
Rand McNally & Co. N.Y.

indented, practically the sole reentrant being Gray's and Willapa harbors

Hydrography. The only large independent river in Washington is the Columbia (q.v.), which drains the entire eastern section of the State. Its principal tributaries within the limits of Washington are the Pend Oreille and the Spokane rivers in the northeast and the Snake River in the southeast. Its chief affluent from the east slope of the Cascades is the Yakima. Western Washington is drained by a large number of comparatively small streams flowing into Puget Sound and the ocean The largest of those entering the sound are the Skagit in the north and the Nisqually in the south. Of the streams rising on the western slope of the Cascades only one, the Chehalis, breaks through the Coast Range and enters the ocean directly. There are a number of lakes in eastern Washington, but most of them are either expanded rivers, such as the long and narrow Lake Chelan, the largest in the State, or remnants of old river courses. There are glaciers on several of the highest mountains.

Climate. There is a great contrast between the climates of western and eastern Washington, owing to the fact that the Cascade Range condenses the greater part of the moisture in the west winds and shuts out the tempering influence of the sea. In western Washington the climate is equable, with a mean temperature for January of 39° and for July of 62°, while the minimum is generally between 10° and 20° and the maximum about 95°. In eastern Washington the mean for January is 30° and for July 74°, while the extremes range between 112° and 30° below zero. Western Washington has a humid atmosphere, with an annual rainfall ranging from less than 25 inches at Port Townsend to 132 inches at Clearwater, on the Pacific coast. About 70 per cent of the rain falls at night. The heaviest belts of rainfall are on the western slopes of the Olympics and towards the western summit line of the Cascades. The average normal rainfall for the whole of eastern Washington is 16 inches, and except on the higher slopes in the northeast and southeast it is insufficient to support agriculture without irrigation. In the south-central part the average is less than 10 inches. Throughout the State by far the greater amount of precipitation occurs during the winter months; thus at Clearwater the normal precipitation for January is 20 inches, while in July it is only one inch. The snowfall is heavy on the western mountains, but in eastern Washington it is light, and the warm chinooks often evaporate it completely without wetting the ground. The higher peaks are capped with perpetual snow. Blizzards and tornadoes are unknown. Thunderstorms occur quite frequently in eastern Washington during the late spring and early summer months.

Soil and Vegetation. The soils are fertile in most parts of the State. The Puget Sound basin is covered with a rich alluvium over the bottom lands and a deep mantle of glacial drift over the uplands. Over the great plains of eastern Washington the soil is composed mainly of decayed volcanic material, which possesses the elements of fertility in the highest degree, and, where it has accumulated to a sufficient depth, can be rendered highly productive by irrigation. Where not irrigated, however, the eastern lava plains are treeless and consist mainly of sagebrush desert. The higher slopes of the north and east are covered with rich grasses, and on the eastern spurs and slopes of the Cascades there are open, park-like forests of pine. Western Washington, on the other hand, is covered with some of the most magnificent forests in the world. They consist mainly of gigantic coniferous trees, such as the Douglas fir, spruce, giant cedar, and Western hemlock The forests are rendered almost impenetrable by a profusion of undergrowth thriving in the rankest luxuriance in the moist atmosphere.

Geology. In Washington the igneous and metamorphic rocks predominate, the sedimentary formations underlying only a minor portion of the State The northern Cascades are composed mainly of metamorphic rocks with igneous intrusions; the southern Cascades have a smaller proportion of metamorphic rocks and a larger amount of igneous rocks, both in the form of dikes and lava flows. East of the Cascades and south of the Great Bend of the Columbia and the Spokane River the bed rock is almost wholly basalt. The basalt is of Middle Tertiary age and occurs as a great series of horizontal sheets or layers representing flows or outpourings of molten lava that came up from beneath through longitudinal fissures and which flowed far over the plains before cooling. The individual layers or strata of basalt vary in thickness from a few feet to several hundred, and they are well exposed for observation or study along the cañons of the Snake and the Columbia. North of the lava plains the formations are mainly metamorphic rocks, such as gneiss, schist, slate, quartzite, and marble, in age varying from Paleozoic to Tertiary. There are numerous areas of igneous rocks, represented mainly by granites, diorites, rhyolites, and basalts. The centre of the Olympics is composed of folded strata of quartzites and slates of pre-Tertiary age, surrounded on nearly all sides by conglomerates, sandstones, and shales, with some intrusive rocks, practically all of Tertiary age. About the Puget Sound basin and throughout southwestern Washington the bed rock is of Tertiary age and is made up of alternating layers of shale, sandstone, and conglomerate, with frequent outcrops of basalt. The northern part of the State and all of the higher Cascades were covered by the Pleistocene ice sheet, which made at least two well-defined advances.

Mineral Products. Washington ranked twenty-ninth among the States in the total value of minerals produced. It is the only State on the Pacific coast in which coal mining is of any importance. Coal represents over half the total value of the mineral products of the State. The product in 1914 amounted to 3,064,820 short tons, valued at $6,751,511. The principal producing area is the Rosslyn field in Kittitas County and in the counties close to Puget Sound. Cement ranks second in importance among the mineral products, and in 1914 there were produced 2,045,465 barrels, valued at $2,303,433. The principal products of the clay-working industry are vitrified brick, common brick, sewer pipes, etc. The value of the products in 1914 was $1,809,491. Basalt and sandstone are the principal quarry products. In 1914 the total value of stone produced was $1,600,615. The gold produced in the year amounted to 26,953 fine ounces, valued at $557,173. Other minerals produced are copper, lead, and silver. The total value of the mineral produced in 1914 was $13,830.739.

Agriculture. Of the total land area of approximately 42,775,040 acres, 11,712,235 were included in farms, 54 4 per cent of which was improved land. There were in that year 56,192 farms, the average number of acres per farm being 208.4 There are in the eastern section of the State large tracts of semiarid land used as ranches. The total value of all farm property including land, buildings, implements and machinery, domestic animals, poultry, and bees was $637,543,411. The average value of farm land per acre was $44.18. Of the total number of farms, 48,466 were operated by owners and managers, and 7726 by tenants. There were in that year 37,770 native white farmers, 17,297 foreign-born white farmers, and 1125 negro and other nonwhite farmers. Of the foreign-born farmers most came from Germany, Sweden, Canada, Norway, and England in order named Of the 1125 nonwhite farmers 673 were Indians, 316 Japanese, 77 negroes, and 59 Chinese The total acreage of all crops for which acreage was reported in 1909 was 3,431,273, and combined value of all crops $78,927,053

The following table shows the acreage, production, and value of the principal crops as estimated for 1915 by the United States Department of Agriculture.

CROPS	Acreage	Prod in bu.	Value
Corn..	39,000	1,053,000	$811,000
Wheat .	2,000,000	50,394,000	41,324,000
Oats	275,000	13,750,000	5,088,000
Rye	3,000	146,000	110,000
Potatoes ..	61,000	8,235,000	4,365,000
Hay	812,000	*1,868,000	20,174,000
Barley .	175,000	7,263,000	4,067,000

* Tons.

The leading crops in order of importance in 1909 were wheat, hay and forage, oats, barley, and potatoes. The thirteenth census shows that there was in wheat an acreage of 2,118,015, a production of 40,920,390 bushels, valued at $35,-102,370; in hay and forage an acreage of 742,137, a yield of 1,391,664 tons, valued at $17,147,648; in oats an acreage of 269,742, a production of 13,228,003 bushels, valued at $5,870,857; in barley an acreage of 171,888, a yield of 5,834,615 bushels, valued at $3,331,930. There was devoted in the same year to potatoes 57,897 acres, from which 7,667,171 bushels were harvested, the value of the crop being $2,993,737. The acreage devoted to vegetables (other than potatoes) was 24,410 and their value $2,989,000. Orchard fruits to the value of $4,274,124 were grown in the same year. Most important among such products was the apple, followed by plums and prunes. By far the most important of the small fruits is the strawberry, the total quantity raised that year being 7,683,774 quarts and their value $529,535. The total production of small fruits produced in that year was 13,-480,930 quarts, valued at $941,415. The grape production in that year was 1,704,005 pounds, valued at $51,412. There were devoted to the growth of flowers and plants and nursery products 1682 acres, the output being valued at $1,044,907. There were also raised 13,794 tons of sugar beets, valued at $85,954.

Live Stock and Dairy Products.—The value of live stock on farms in 1909 was $47,370,775. According to the estimates of the United States Department of Agriculture there were on the farms of the State on Jan. 1, 1916, 308,000 horses, valued at $28,952,000, 15,000 mules, valued at $1,590,000, 263,000 milch cows, valued at $15,912,000; 221,000 cattle other than milch cows, valued at $6,696,000; 568,000 sheep, valued at $3,010,000; 314,000 swine, valued at $2,669,-000. The total value of milk, cream, and butter fat sold, and butter and cheese made in 1909 was $8,746,041 There were sold 25,524,209 gallons of milk, valued at $3,889,006, and 6,751,575 pounds of butter were made, which had a value of $1,992,249. The total number of fowls of all kinds on the farms in that year was 2,272,775, valued at $1,367,440

Irrigation—Irrigation is carried on to a greater or less extent throughout the State. West of the Cascades the rainfall as a rule is ample for the cultivation of all crops, while the region east of the mountains is arid or semiarid. It is here that irrigation is more generally practiced, and in Yakima County from 75 to 90 per cent of the farms are so treated. The number of farms on which irrigation was carried on in 1910 was 7664, the acreage so treated being 334,-378. There were in that year 1934 independent enterprises capable of irrigating 470,514 acres. The total length of ditches was 3892 miles, of which 1600 were main, while 1180 were laterals.

Forest Products. Washington held first place among the States in 1909 in the production of rough lumber, the output being 3,862,916 M feet B. M. valued at $51,083,399. Nearly 80 per cent of this was Douglas fir. The State also produced nearly three-fifths of all of the shingles manufactured in the United States and stood second in the production of laths, the output being 8,879,467 thousand and 451,384 thousand respectively. The chief species cut were Douglas fir, yellow pine, cedar, spruce, hemlock, larch, and white pine. The production of Douglas fir amounted to 3,060,983 M feet B. M., and the output of cedar was 183,952 M feet B M. The State held second place in the production of western yellow pine with a cut of 266,357 M feet B. M., and third place in the production of larch with output of 39,795 M feet B M. In addition to figures given above there were produced on the farms forest products valued at $3,754,293.

Fisheries. In point of value of fish products Washington ranked fourth in 1908. More than three-fourths of the value of these products was contributed by salmon and halibut. The catch of the former was valued at $1,571,000, while the output of the latter was put at $1,236,000. The oysters taken were valued at $352,500. The fishing industry gave employment to 4954 persons, and its equipment and other capital were valued at $3,441,000. The value of the apparatus employed in boat and shore fisheries greatly exceeded that reported for vessel fisheries, while the value of catch of the two classes of fisheries was about equal. The total value of the fishery products in 1908 was $3,513,000.

Manufactures. Washington ranked twenty-first among the States in total value of manufactured products, the per capita value of such products being $193. The manufacturing industry has depended very largely for its crude materials upon the natural resources of the State. The principal figures for 1909 and 1904 regarding the manufactures of the State and five leading industries are shown in the following table.

SUMMARY OF MANUFACTURES FOR 1909 AND 1904

THE STATE — FIVE LEADING INDUSTRIES

INDUSTRY	Census	Number of establishments	PERSONS ENGAGED IN INDUSTRY: Total	PERSONS ENGAGED IN INDUSTRY: Wage earners (average number)	Capital	Wages	Value of products	Value added by manufacture
					Expressed in thousands			
All industries	1909	3,674	80,118	69,120	$222,261	$49,766	$220,746	$102,858
	1904	2,751	51,459	45,199	96,953	30,087	128,822	62,656
Lumber and timber products	1909	1,263	47,447	43,749	97,224	31,327	89,155	52,276
	1904	1,099	32,579	30,137	44,799	19,820	54,999	35,581
Flour-mill and gristmill products	1909	96	973	644	11,077	464	17,853	2,379
	1904	76	840	613	6,490	410	14,664	1,894
Slaughtering and meat packing	1909	14	971	828	5,103	575	15,654	1,894
	1904	13	402	335	2,284	287	6,252	829
Canning and preserving	1909	80	2,284	2,029	7,355	1,272	9,585	4,549
	1904	61	834	689	2,261	380	3,617	1,266
Printing and publishing	1909	506	4,583	2,624	5,867	2,140	9,286	7,062
	1904	383	2,834	1,797	2,850	1,354	4,765	3,709

In point of total rough lumber sawed Washington ranked first in 1909. (See *Forest Products.*) By far the most important product of flour and grist mills was white flour, the production of which in 1909 was valued at $12,287,736. The most important of the slaughtering and meat-packing products is fresh beef, which in 1909 was valued at $6,035,883. The canning industry is largely confined to canning and curing of fish and the canning of oysters and clams.

The average number of wage earners was 69,120, of whom but 266 were under 16 years of age. The female wage earners numbered 2859. For a majority of the wage earners the prevailing hours of labor were 60 per week.

The 10 cities which in 1909 had a population of 10,000 or more gave employment to 39.8 per cent of the average number of wage earners and turned out 50.7 per cent of the total value of products. Seattle, the largest of the group, gave employment in 1909 to 11,331 wage earners and put out products to the value of $50,569,198. Tacoma gave employment to 5765 wage earners and manufactured products valued at $22,449,979. Spokane, with 3989 wage earners, had an output valued at $18,879,591. Everett, Bellingham, Aberdeen, Walla Walla, and North Yakima rank after these in the order named. See articles on these cities.

Transportation. Washington's water communications comprise an extensive system of waterways, consisting of the Columbia (q.v.) and Snake rivers and their branches and Puget Sound with its numerous bays and inlets, which afford excellent shipping facilities on some of the best harbors on the Pacific coast. The railroads are quite adequate and are fairly distributed over the State, and in 1914 the total mileage was 8833. The most important roads and their mileage in that year were the Northern Pacific, 2788; the Oregon and Washington, 2557; the Great Northern, 1414; the Chicago, Milwaukee, and St. Paul, 926; and the Spokane, Portland, and Seattle, 548.

Banks. As Washington was admitted to statehood long after the national banking system was introduced, the national banks are the older and the stronger institutions. The banks are sound and there were no failures even during the panic of 1893.

The following table shows the condition of the various banks in 1915:

	National banks	State banks
Number	78	244
Capital	$11,435,000	$7,882,700
Surplus	4,464,000	2,063,659
Cash	7,165,000	3,828,911
Deposits	84,876,000	56,278,759
Loans	65,316,000	44,121,441

Government. The present constitution of the State was adopted in 1889, but has since been amended in important details. Amendments may be proposed in either branch of the Legislature, but in order to become a part of the constitution must be favored by a two-thirds majority of each House and approved by the voters at large.

Legislative.—The legislative authority is vested in the Legislature, consisting of Senate and House of Representatives, both of which meet biennially. The initiative and referendum have been adopted and are in full force. The House of Representatives consists of not less than 63 nor more than 99 members. The Senators must number not more than one-half or less than one-third of the number of members of the House of Representatives. Members of the Legislature are elected biennially.

Executive.—The executive department consists of a Governor, Lieutenant Governor, Secretary of State, Treasurer, Auditor, Attorney-General, Superintendent of Public Instruction, and Commissioner of Public Lands. They are chosen at the same time and place of voting as members of the Legislature. The Governor holds office for four years, as do the other executive officers. The State Treasurer is not eligible for immediate reëlection.

Judiciary.—The judicial power is vested in a supreme court, superior court, justices of the peace, and such inferior courts as may be established by the Legislature. The supreme court consists of nine judges, the majority of whom form a quorum and may pronounce a decision. Judges of the supreme court are elected for a term of six years. In each of the organized counties is a superior court, for which at least

one judge is chosen at the general State election, to serve a term of four years.

Suffrage and Elections.—All persons, male or female, of the age of 21 years or over, who are citizens of the United States and have lived in the State one year, in the county 90 days, and in the city, ward, town, or precinct 30 days, and who are able to read and speak the English language, are allowed to vote. Indians not taxed are not allowed to vote. Elections for State officers are held on the Tuesday following the first Monday in November, every four years, in even years. All nominations to office are by primary elections. By a constitutional amendment adopted in 1914 all elected public officers, except judges of courts of record, are subject to recall.

Local and Municipal Government—The county is the unit of local government County officers are elected for a term of two years and may not hold office more than two terms in succession. Any city containing a population of 20,000 inhabitants or more may frame a charter for its own government.

Miscellaneous Constitutional and Statutory Provisions—There are laws forbidding the employment of children under 14 years; providing system for the registration of births and deaths; prevention of race-track gambling; establishing pensions for mothers and a juvenile court law. State-wide prohibition went into effect on Jan. 1, 1916

Finances. At the time of its admission to statehood Washington assumed the Territorial debt, consisting of $153,669, which existed in the form of unpaid and interest-bearing warrants. This debt was bonded in 1900 The constitution prohibits the creation of a funded debt over $400,000, but the insufficiency of taxable property made payments of money expenses impossible, and both the bonded and floating debt gradually grew In 1900 the bonded debt amounted to $820,000, and there were outstanding debts to the amount of $721,000. Since then most of the latter has been converted into bonds. In 1914 the bonded indebtedness was $331,024. The total receipts for the fiscal year ending Dec. 30, 1915, amounted to $11,927,794, the disbursements to $10,945,613, leaving a balance in the treasury of $4,842,465.

Militia. The males of militia age in 1910 numbered 340,872. The organized militia on Jan. 1, 1915, was composed of 1244 enlisted men and 82 officers. It included a regiment of infantry, a troop of cavalry, a company of signal-corps troops, four companies of coast artillery, and three detachments of sanitary troops.

Population. The population of the State at each Federal census since its designation as a Territory was· 1860, 11,594; 1870, 23,955; 1880, 75,116; 1890, 357,232; 1900, 518,103; 1910, 1,141,-990, 1915, 1,471,043; 1920, 1,356,621. The density per square mile in 1910 was 17 1. The urban population, i e, in places of 2500 or more, was 605,530 in 1910. The native whites of native parentage numbered 585,386, the native whites of foreign or mixed parentage 282,528, and the foreign-born whites 241,197. Japanese and Chinese constitute 1.3 per cent of the population, the Indians 1 per cent, and negroes 0.5 per cent. Of those born in foreign countries 16.2 per cent came from Canada, 13 3 from Germany, and 11 8 from Norway. Of the native-born population only 29.7 per cent was born in the State. Those from other States come largely from the northern half of the United States, Minnesota, Illinois, Iowa, and Wisconsin contributing the largest shares By sex the population was divided into 658,663 males and 483.327 females In 1910 there were 10 cities with a population of 8000 or over. These, with their population for 1910 and 1915 (est), follow. Seattle, 237,194 and 330,834; Spokane, 104,402 and 142,990, Tacoma, 83,743 and 108,094; Everett, 24,814 and 33,767; Bellingham, 24,298 and 31,609, Walla Walla, 19,364 and 24,205; North Yakima, 14,082 and 19,844, Aberdeen, 13,660 and 19,277; Vancouver, 9300 and 13,555; Hoquiam, 8171 and 11,103.

Education. Washington has been one of the foremost States in the development of its educational system. The percentage of illiteracy (among those of 10 years of age and over) in 1910 was 2. In the native white population the percentage was 0.3 and in the foreign-born white population 4 8. The school population (ages 6–20 years) according to the thirteenth census was 293,478, of whom 195,259 attended school. According to the report of the State Superintendent of Education the total number of children of school age in the State on May 1, 1915, was 303,614 The average daily attendance was 190,129, out of a total enrollment of 240,521. The total number of teachers was 9068, of whom 7276 were women and 1792 were men. The average salary paid men teachers per month was $113 09 and women $85.04. There were 153 high schools fully accredited and 358 not fully credited.

Washington was one of the first States in which women were placed in charge of educational affairs Special effort has been made to create a more general interest in practical agricultural and industrial study among the boys and girls. To further this there has been organized the Washington Boys' and Girls' Agricultural and Industrial Contest Association, which carries on a series of community, county, and State contests, in which farmers, bankers, and business men and women coöperate with school superintendents and teachers. High schools are inspected by a regular high-school inspector. The growth of high schools in numbers and efficiency in recent years has been remarkable. In 1914 there were 484 schools, in which were enrolled 31,321 students. The Legislature of 1915 passed several measures relating to education. Among these was an act establishing and providing for the maintenance of night schools. Another important measure provided for the consolidation of two or more adjoining districts in the same county, in case the majority of the electors of each district vote for such consolidation. The current school fund in 1915 amounted to $3,036,140. The total disbursement for educational purposes for the year ending June 30, 1914, was $10,850,603.

There are State normal schools at Bellingham, Cheney, and Ellensburg The University of Washington at Seattle and the State Agricultural College at Pullman are part of the educational system of the State. Other institutions of collegiate rank are Spokane College at Spokane, the College of Puget Sound at Tacoma, Whitworth College at Tacoma, and Whitman College at Walla Walla. These are all coeducational. Gonzaga College at Spokane is a Roman Catholic institution for men only.

Charities and Corrections. The charitable and correctional institutions are under the super-

vision of a State Board of Control. These institutions include Western Hospital for the Insane at Fort Steilacoom, Eastern Hospital for the Insane at Medical Lake, Northern State Hospital for the Insane at Sedro Woolley, State Institution for the Feeble-Minded at Medical Lake, State Soldiers' Home at Orting, Washington Veterinary Home at Port Orchard, State School for the Deaf and State School for the Blind at Vancouver, State Penitentiary at Walla Walla, State Training School of Chehalis, and State reformatories at Seattle, Tacoma, Olympia, Everett, and Monroe

Religion. The Roman Catholics constitute over one-third the reported number of communicants The Methodists, about one-third of the Catholics, rank next, followed by the Presbyterians, Lutherans, Baptists, Disciples, and Congregationalists.

History. The Territory of Washington was set off from Oregon, March 2, 1853 The southern boundary was the Columbia River to the forty-sixth parallel near Walla Walla, and thence east to the Rocky Mountains, thus including Idaho and a part of Montana. (For early history, see OREGON.) At its organization the population was only 3965, of whom 1682 were voters. With the discovery of gold in eastern Washington a great influx of population followed and the alarmed Indians determined to exterminate the whites This led to the Washington-Oregon Indian War of 1855–56. Again, in 1857, there were serious Indian troubles concurrent with the rush of population to the gold fields of British Columbia, but the greatest rush was after the discovery of gold at Salmon River in 1860. At the time of the boundary treaty between Great Britain and the United States in 1846 (see OREGON), the forty-ninth degree was accepted as the boundary to the channel between Vancouver Island and the mainland, thence down that channel to the sea In 1859 a dispute arose as to which channel was meant, as on this hinged the possession of the Haro Archipelago, of which San Juan is the largest island. A collision between British and American soldiers was narrowly averted. (See PICKETT, GEORGE E.) The question was finally settled in favor of the United States by the decision of the German Emperor, Oct. 21, 1872 In 1885–86 a violent agitation arose against the Chinese. Mobs burned their houses, forced them to leave towns, and in some cases resorted to murder. Martial law was declared in Seattle in 1886, and the Governor called for the aid of Federal troops. An attempt was made to secure statehood in 1876, and in 1878 a constitution was adopted, but to no purpose. In 1881–83 another bill was introduced into Congress, but again failed. In 1889 (February 22) the Omnibus Statehood Bill, admitting the two Dakotas, Montana, and Washington, was signed by the President. A constitutional convention met July 4, the constitution formed was ratified October 1, and State officers were elected at the same time. The State was admitted November 11, and its progress since has been exceedingly rapid. The Federal government has spent large sums for a navy yard and other governmental works at Bremerton, on Puget Sound. In national politics the State voted for Republican electors in 1892 and for a fusion ticket of Democrats and Populists in 1896, but returned to the Republican column in 1900 and 1904. In the presidential election held in 1908 Taft received 106,062 votes, and Bryan 58,691. Samuel C Cosgrove, Republican, was elected Governor, but died on March 28, 1909 He was succeeded by Lieutenant Governor M. E. Hay. In the election of Nov. 8, 1910, a constitutional amendment giving suffrage to women was adopted by a large majority In 1911 the cities of Seattle and Tacoma recalled their mayors from office In the presidential election of 1912 Roosevelt received 111,179 votes, Wilson 87,674, and Taft 71,252 The Democrats elected their candidate for Governor, Ernest Lister. A measure providing for State-wide prohibition to go into effect on Jan. 1, 1916, was carried at this election

GOVERNORS OF WASHINGTON

TERRITORIAL

Isaac I Stevens		1853–57
C. H Mason	Acting	1857
Fayette McMullen		1857–58
C H. Mason	Acting	1858–59
Richard D Gholson		1859–60
Henry M McGill	Acting	1860–61
William H. Wallace		1861
L J S Turner	Acting	1861–62
William Pickering		1862–66
George E Cole		1866–67
E L Smith	Acting	1867
Marshall F Moore		1867–69
Alvin Flanders		1869–70
Edward S Salomon		1870–72
Elisha P Ferry		1872–80
William A Newell		1880–84
Watson C. Squire		1884–87
Eugene Semple		1887–89
Miles C Moore		1889

STATE

Elisha P Ferry	Republican	1889–93
John H McGraw	"	1893–97
J. R Rogers	Democrat-Populist	1897–1901
Henry G. McBride	Acting	1901–05
Albert E. Mead	Republican	1905–09
Samuel C Cosgrove	"	1909
M. E Hay	"	1909–13
Ernest Lister	Democrat	1913–19
Louis F Hart (acting),	Republican	1919–21
Louis F. Hart	"	1921–

Bibliography. Bancroft, *History of Washington, Idaho, and Montana* (San Francisco, 1890); Evans, *History of the Pacific Northwest* (Portland, 1889); Hawthorne, *History of Washington* (New York, 1893); *Illustrated History of Klickitat, Yakima and Kittitas Counties; with Early History of the State* (Spokane, 1905); Bagley, *In the Beginning: Sketch of Early Events of Washington* (Seattle, 1906).

WASHINGTON. The capital city of the United States, conterminous with the District of Columbia (q.v.), a territory of 69¼ square miles (excluding 9¼ square miles of water), under the exclusive jurisdiction of Congress. It is situated on the Potomac River, about 100 miles from its mouth, and 40 miles by rail southwest of Baltimore, 228 miles from New York, 3118 from San Francisco, and 1110 from New Orleans; lat. (Capitol) 38° 53′ N., long. 77° W.

Description. The situation of the city is one of picturesque beauty. The Potomac stretches out nearly a mile in width along its border, the city touching tidewater and the head of navigation. Rock Creek and the Anacostia or Eastern Branch here enter the river, which is spanned by three bridges Along the Potomac the land is low, but it gradually rises, reaching an elevation of 100 feet, and much more in the suburban portion of the city. A circle of hills forms the edge of a plateau which has in some parts an elevation of 300 to 420 feet. Formerly the section of the District bounded approxi-

mately by Rock Creek, the Potomac River, the Eastern Branch, and Florida Avenue was the city of Washington, but now there are no civil distinctions throughout the entire District. Georgetown, built partly on the heights of the Potomac River, west of Rock Creek, was a municipality before the site of the Federal city was selected. Anacostia, Brightwood, and other names given to the settlements in the District away from the main centre of population are still in use, but have no civil significance. The steam railroads enter the city from three different points and centre in the beautiful Union Station.

The plan of the city, which was made in 1791 by Pierre Charles L'Enfant, a French engineer who served in the Revolutionary War, under the direction and executing the general idea of General Washington, is generally conceded to be the most complete as well as the most artistic city system ever carried out So far as the topography of the country outside of the former urban limits made it possible, this plan has been applied to the entire District. Out of the celebration, Dec. 12, 1900, of the Centenary of the National Capital came as its permanent memorial the plan (1902) of the Senate Park Commission (D. H. Burnham, Frederick Law Olmsted, Augustus Saint-Gaudens, C. F McKim), extending, in principle, the plan of the park system of the city of Washington to the entire District and also suggesting sites for future public buildings and monuments Never adopted by either House of Congress it is nevertheless being followed generally because of the authority of its reasoning. Within the old city limits the alphabetical streets run east and west and the numbered streets north and south, the whole being intersected by twenty-one avenues named from different States in the Union. The avenues converge at centres such as the Capitol and the President's house, so that these broad thoroughfares aid materially in giving that variety which is the unique feature of the city's plan, and in providing direct communication between the different centres.

The streets on the whole are among the widest in the country, ranging, as they do, from 80 to 160 feet. They are paved with asphalt very generally and the sidewalks are commonly of cement. More than 100,000 trees line the streets. Massachusetts Avenue is adorned with a quadruple row its entire length of four miles and a half The broad diagonal avenues form at the intersections with the rectangular streets 302 squares and circles and reservations. The most important of these streets are K Street Northwest, Sixteenth Street Northwest (Avenue of the Presidents), Massachusetts Avenue, and Connecticut Avenue The tendency in the growth of the city is towards the northwest.

Buildings. The architectural character of the city is dominated by the neoclassic spirit of the principal government buildings At the founding of the city the Roman revival was beginning to modify the simpler Colonial taste; later the Greek revival brought in a further modifying influence. All the earlier and some of the later official buildings have been erected in one or the other of these styles or in a blending of the two. These give to the whole city an air of dignified splendor which the carrying out of the "Commission" improvements will greatly enhance. The earliest building to be completed was the "White House" (q.v.) or Executive Mansion, designed by Thomas Hoban from Ireland, in 1795, burned in 1814, and rebuilt subsequently. But the most conspicuous monument is the Capitol, at the other (east) end of Pennsylvania Avenue; whose white dome, 288 feet high, dominates the view in every direction. Begun in 1793 on plans by Wm Thornton (q v) and continued under Latrobe and Bulfinch (q v), it was built of sandstone and substantially completed in 1811. It was burned in 1814 by the British and rebuilt by Bulfinch (1815–27). It then comprised only the central part of the present edifice The House and Senate wings of marble and the iron dome were added by T. U. Walter (q v) between 1851 and 1863 The completed edifice measures 751 by 350 feet, and is decorated with pilasters and columns of the Corinthian order. The central rotunda, 97 feet in diameter and 180 feet high, has many historical paintings chiefly by John Trumbull Statuary Hall was formerly the Hall of Representatives, and the original Senate Chamber is now occupied by the Supreme Court The Capitol as a whole, despite faults of detail, is probably the most stately of all legislative palaces, and worthy of the dignity of the United States government. Nearly opposite it, to the east, is the Library of Congress, a fine building completed in 1897 at a cost of over $6,000,000. It is in Renaissance style, and is remarkable for the elaborate richness of its interior decorations by noted American artists. (See LIBRARY OF CONGRESS, with Plate.) The administrative offices of the Senate and House occupy two buildings of marble adjoining the Capitol grounds, with imposing Corinthian colonnades. They are respectively by Carrère and Hastings and McKim, Mead, and White

The view from the Capitol down the broad expanse of Pennsylvania Avenue to the White House is interrupted by the unfortunate location of the great Treasury Building This is a magnificent structure of granite, designed by Robert Mills (1845); it is of the Greek Ionic order and measures 450 by 250 feet. Near by is the huge building of the War, State, and Navy departments, by Mullet, in an uninspired and mechanical version of the French Renaissance style, picturesque in mass, but defective in detail. The Patent Office at F Street, by Mills (extended by Walter), is a massive and dignified Greek Doric building. It is the official home of the Department of the Interior, which also occupies a building across the street, formerly the Post Office Department building, with its Indian and Land offices The old City Hall, now occupied as a courthouse, northwest of the Capitol, is an interesting building of the early nineteenth century. In quite different style from all the foregoing buildings are those devoted to the Pension Bureau and the Government Printing Office, both on G Street and built of brick. The first named is noted for its great glass-roofed court, and its exterior frieze in terra cotta depicting scenes from the Civil War. West of the Capitol, in the Mall, stand two important institutions: the Smithsonian, with its group of picturesque "Norman" buildings; and the new National Museum, a noble structure of white marble, recently completed at a cost of $4,000,000, in a dignified neoclassic style, harmonizing with the Capitol and other public buildings. In a somewhat freer Renaissance style are the charming Carnegie Library on Mt. Vernon Square, by A R. Ross; the Corcoran

Art Gallery on New York Avenue, adjoining the White House grounds, by Ernest Flagg, the Continental Hall of the D. A R., by E. P Casey, and the Pan-American building of the Bureau of American Republics, by Cret and Seeler These last two are comparatively recent buildings, as are also the magnificent Union Station by D. H. Burnham, completed in 1911 at a cost of several million dollars, and the new Post Office Department near by, by Burnham and Graham, completed in 1916, a white marble structure of the Corinthian order The Municipal Building of the District of Columbia on the south side of Pennsylvania Avenue was completed in 1908 from plans of Cope and Stewardson It is a handsome building in Renaissance style Near by is the Post Office, a lofty building with a tower, in the Romanesque style (1895). The Carnegie Institution on Sixteenth Street, by Carrère and Hastings, and the magnificent new Temple of the Scottish Rite on Fifteenth Street, by J. R. Pope, are among the conspicuous buildings of the northwest section.

Important new buildings for the government are about to be along the Mall: they are those for the Agricultural Department, the Department of Justice, the Supreme Court, and the Records Office. They are all in Renaissance or neoclassic style, and will add materially to the architectural dignity of the capital. Deserving of mention apart from any architectural merit or demerit are the ordnance buildings in the old Navy Yard, where gun forgings are finished, the Bureau of Engraving and Printing in the southwest section; the National Observatory beyond Rock Creek; and the Army Medical Museum and the Fish Commission buildings in the Mall.

Owing to the District regulations limiting the height of buildings in proportion to the width of the streets, there are no "sky-scrapers" in Washington. The nearest approach to the type is seen in the Post Office, the *Star* newspaper office, the government Printing Office, the new Ebbitt Hotel, and a few hotels and apartment houses on the wider avenues. Nevertheless, the tallest masonry building in the world is in Washington—the Washington Monument (q.v) in Monument Park, a mile and a half west of the Capitol. It is of obelisk form, 555 feet high. It closes the vista through the Mall from the Capitol South of this is the Lincoln Monument, now in process of erection from plans by Henry Bacon—a noble Greek Doric hall, with reliefs and a colossal statue of the martyred President.

The ecclesiastical architecture of Washington calls for no special mention, but the city abounds in handsome residences, some of them of remarkable beauty.

Parks. With the exception of the Mall, the plan of the city made no provision for extensive park space. There are, however, many open places scattered throughout the city, some of which are of sufficient size to warrant their being placed in the category of small parks. Their combined area is 617 acres. While this system of little parks is to remain a feature of the urban plan as applied to the territory beyond the original city limits, yet large areas have been and are to be reserved The latest addition is Potomac Park, a domain of 739 acres, which has been reclaimed from the Potomac River. It is practically a continuation of the Mall and will afford water drives and other attractive features The water attractions are increased by a large tidal reservoir basin connected with the main channel of the Potomac. Another fine public reservation is the stretch of territory comprising the Zoölogical and Rock Creek parks and containing 1775 acres. The land lies on either side of Rock Creek ravine from Connecticut Avenue north to the District bounds and is broken and picturesque. A monumental bridge of concrete crosses Rock Creek at Connecticut Avenue; another at Q Street. When the reclamation of the Anacostia flats is completed, another large addition will be made to the park area.

The statues throughout the city are numerous and, on the whole, meritorious. Many are effigies in bronze of distinguished soldiers and sailors. Among them is the statue of Rochambeau in Lafayette Park, which flanks the one erected on the east side of the same park in memory of Lafayette and his compatriots in the Revolutionary War. Another is that of Frederick the Great, near the War College Abraham Lincoln is commemorated by a bronze group erected in Lincoln Park by the colored people and elsewhere by other statues There are also memorials to those who have won distinction along paths other than military; as, e g , Joseph Henry, Daniel Webster, Benjamin Franklin, Samuel D. Gross, Martin Luther, Samuel Hahnemann, John Marshall, John Witherspoon, Henry W. Longfellow, and James A. Garfield.

Educational Institutions. The public-school system has the patronage of all classes of the community, and a smaller percentage of children attend private institutions than in the average city. The system includes all the approved modern features, from the technical high school to kindergarten, night school, and vacation schools. In 1915 there were 57,533 pupils enrolled and the number of teachers was 1766. There were 153 permanent school buildings. The higher educational institutions are the George Washington University (q.v.), the Catholic University of America (q.v.), Georgetown University (q v.), Howard University (q.v.), the Carnegie Institution (q.v.), and the Columbian Institution for the Deaf and Dumb. Law, medical, and dental schools are maintained in connection with the George Washington, Georgetown, and Howard universities. There are also a law school under the auspices of the Catholic University, and the Washington College of Law, primarily for women. In addition to the National College of Pharmacy there is a pharmaceutical school in George Washington University and also one in connection with Howard University. There is in George Washington University a college of veterinary surgery. The American University, established by the Methodists, has extensive grounds near the city, and two buildings have been erected, but the university has not yet been opened. Near the Catholic University are several affiliated colleges established by various orders for the education of their members. These include St. Thomas College (Congregation of St. Paul), the Marist College, Holy Cross College, College of the Holy Land (Franciscans), St. Austin's College (Society of St. Sulpice), Trinity College for girls, and colleges conducted by the Dominicans and the Paulists. Housed in a splendid building on Seventeenth Street are the treasures of the Corcoran Art Gallery. An art school carried on in connection with the gallery has large classes.

Libraries. Washington contains a greater number of collections of books than any other city of its size in the world There are no less than 34 libraries owned by the government, besides the Public Library and those in educational institutions and in private hands The aggregate number of books and pamphlets in these libraries is estimated to be more than 2,000,000. The Library of Congress, with 1,500,000 books and pamphlets, is one of the great general collections of the world The various scientific bureaus of the government have valuable special collections. Among these may be mentioned the great medical library of the Surgeon-General's Office, and the collections belonging to the Geological Survey, the Patent Office, the Smithsonian Institution, the Agricultural Department, the Bureau of Labor, the Weather Bureau, the Bureau of Education, the Naval Observatory, and the War, State, and Navy departments. The Public Library is a free circulating library. It occupies a spacious marble structure on Mt. Vernon Square, given by Andrew Carnegie. The library is controlled by a board of trustees, appointed by the District Commissioners The Bar Association has a valuable library in the Court House, and there are also collections of books in the various educational institutions.

Charitable Institutions. The city is well supplied with hospitals, some of the leading ones being Garfield, Providence, Freedmen's, Homœopathic, Emergency, Columbia Hospital for Women, Government Hospital for the Insane, District of Columbia Tuberculosis and Municipal Children's Hospital, Georgetown University Hospital, and George Washington University Hospital. There are many dispensaries, asylums, homes, reformation and relief societies. Social-settlement methods are not lacking. Organized charitable work on an extensive scale is carried on by the Associated Charities, which is supplied in large part with funds raised by the Citizens' Relief Committee. An incorporated company has erected sanitary homes for the poor

Theatres, Clubs, and Hotels. Some of the leading theatres are the Columbia, the National, and the Belasco. The principal clubs are the Metropolitan, Cosmos, University, Chevy Chase, and Army and Navy, which are all in commodious homes. There is perhaps no city in the world where the flood of visitors is so continuous as at the national capital. It is probably true that more conventions and annual gatherings are held in Washington than in any other place. The facilities for the comfort and care of the stranger are extensive and thoroughly modern. Among the prominent hotels are the New Willard, Shoreham, Raleigh, Ebbitt, Gordon, Cochran, Hamilton, and Grafton.

Communications. Railroads entering the city are the Baltimore and Ohio, the Chesapeake and Ohio, the Pennsylvania, the Southern, and the Washington South at the Union Station, and the Washington and Old Dominion, the Washington Baltimore and Annapolis Electric, and the Washington and Virginia Electric at various points through the city. The city is well equipped with electric lines, underground trolleys being used exclusively within the boundaries, while the overhead are outside the city limits. Many of these lines afford cheap transportation to the outlying territory, some of them extending as far as 20 miles out into the country.

Manufactures. Washington is not a manufacturing city, but still a large sum of money is invested in manufacturing enterprises, and the value of the yearly output is considerable. The product is made up principally of articles for home consumption According to the census reports in 1914 the District had 513 private manufacturing establishments, with a total capital of $40,799,000 They employed 8884 hands and paid in wages $6,076,000. The materials used were valued at $12,074,000. The product was valued at $28,904,000. Besides, the government employed in its manufactures 11,639 employees, receiving $16,820,000 in annual wages.

Government. Since 1874 the government has been under the control of three Commissioners, appointed by the President and approved by the Senate The citizens have no direct voice in the appointments to office within the District, having no vote in District or national affairs

Estimates of the money needed for municipal purposes are sent to Congress by the District Commissioners, and an appropriation bill is framed, based on these estimates. In the year 1915 the total District expenditures were $14,845,469.45, of which $1,376,359.46 was from water taxes and other trust and special funds. The principal items were as follows education, $3,164,308.17, interest on debt and sinking fund provision, $975,408, improvements and repairs of streets, $1,671,897 19, health, including sewerage system, $1,174,622 79, protection, including police and fire departments, $1,920,589 07 Half of the amount appropriated is paid by the United States, and the other half is raised by taxation from the citizens of the District. This division of the municipal burden is based partly upon the large ownership by the United States of property in the District, which of course is untaxed and which is estimated to be one-half of the entire area of the old city and over one-third of the entire District, and also on the exclusive control of the government and its policy to keep it simply a national capital The expenditures of money made under the direction of the Commissioners must pass the scrutiny of the auditing officers of the Treasury Department, just as in the case of all Federal expenditures. With these safeguards about municipal disbursements and the practical elimination of local politics, the affairs of the District are managed with a degree of economy and efficiency that is believed to be without a parallel in the history of municipal government. The tax rate on both real and personal property is $1.50 per hundred. In the case of real estate it is upon the assessed valuation, which is not less than two-thirds the actual value. The total debt of the District on June 30, 1915, was $6,223,000. The assessed value of real estate in 1915 was $390,098,849 and of personal property $51,341,826.

The water supply is brought from the Great Falls of the Potomac by means of an aqueduct 12 miles long. The water works are owned by the government. The fund from the water tax is kept separate from the general fund and used for the water system. A sand-filtration plant is part of the system.

Population. In 1915 the population of the District was 357,749; 1920, 437,571, of whom 258,940 were white and 98,809 were colored.

History. For a number of years after the Revolutionary War the country had no permanent capital, and there was great rivalry among the principal cities to secure the seat of govern-



WASHINGTON
THE CAPITOL

ment. At last, in 1790, partly as the result of a compromise and partly in deference to Washington's judgment, the Potomac country was chosen and Virginia and Maryland each offered to cede a tract to the general government. By Act of March 30, 1791, Washington, who desired a great national capital, was authorized to select the site and mark the boundaries, and this he did early in the year, the corner stone of the Federal territory being laid on April 15. On the spot chosen an Englishman named Francis Pope had settled in 1663 and had called his place Rome. Major Pierre Charles L'Enfant, a French engineer who had served in the Continental army, was chosen to lay out the town, and, though dismissed in March, 1792, he drew up a plan which was adopted by the commissioners in charge and in general accordance with which Andrew Ellicott laid out the city. In September, 1791, the name Columbia was adopted for the District and the name Washington for the city. The District was originally 10 miles square, but in 1846 the Virginia portion was retroceded, leaving a total area of 70 square miles. The land within the area of Washington laid out in lots was divided by agreement equally between the United States and the proprietors, and certain other portions were purchased by the government at a nominal price. The land for streets and avenues was given to the United States by the proprietors; it constituted 54 per cent of the area By the sale of the lots thus obtained a part of the money used in the erection of the public buildings was secured. In order to facilitate this division the land owners deeded their entire holdings to the government, receiving from the latter title deeds. For this reason the land records within the original urban limits start from the government's title to the whole acquired in 1791. During the first few years the large scale on which the plans were drawn was in such striking contrast to the actual size of the place that by travelers and others Washington was derisively called the City of Magnificent Distances, the City of Streets without Houses, the Wilderness City, and the Capital of Miserable Huts. In 1800 the north section of the Capitol, the corner stone of which had been laid in 1793, was finished, and Congress held its first session there in November, the archives having been transferred from Philadelphia somewhat earlier. A letter writer in this year said: "The Capitol is on an eminence near the centre of the immense country called here the city. There is one good tavern and several other houses are finished or being built." The city is now regarded as coextensive with the District, though there are some differences in taxation between the urban and the rural parts.

On Aug. 24, 1814, an English force of about 5000 men under General Ross and Admiral Cockburn defeated an American militia force of about 7000 at Bladensburg (q.v.), and, advancing to Washington, set fire to the Capitol, the President's house, and other public buildings, all of which, however, were replaced within the next few years.

During the Civil War Washington was repeatedly threatened by Confederate armies, notably in July, 1864, when General Early, after defeating Gen. Lew Wallace at Monocacy, only 30 miles away, advanced to within a few miles of the city. Early in 1861 work was begun on a system of fortifications which when finished consisted of "68 inclosed forts and batteries, having an aggregate perimeter of about 14 miles and emplacements of about 1120 guns; of 93 unarmed batteries, having 401 emplacements; and of 20 miles of infantry trenches" These works have been since unoccupied with the exception of Fort Myer (q.v.) on Arlington Heights. Throughout the war Washington was a vast depot of military supplies; long trains of army wagons were almost constantly passing through its streets; immense hospitals for the sick and wounded were erected, and many churches, public institutions, and the Capitol itself were at times given up to this service. On May 23 and 24, 1865, Washington was the scene of the greatest military display ever witnessed in America, when the Federal veterans of the war were reviewed by President Andrew Johnson

With the year 1871 began what has been called the Renaissance of Washington. Under the lead of Alexander R. Shepherd, Governor of the District, vast improvements were effected throughout the city; pavements were constructed, a sewage system devised, shade trees set out, grades equalized, parks beautified, and a new system of water supply provided In consequence of the expense entailed by this reconstruction of the city, which was carried on with great waste, arising in a great measure from extravagance, the Territorial debt increased from $5,000,000 in 1871 to $22,000,000 in 1875, and largely on this account Congress (1874) changed the government. Georgetown, which had been settled as early as 1695, had been laid out as a town in 1751 and had been incorporated in 1789, was annexed to Washington in 1878, its charter having been withdrawn in 1871.

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WASHINGTON. A city and the county seat of Wilkes Co., Ga., 75 miles by rail northwest

of Augusta, on the Georgia Railroad (Map: Georgia, D 2) It has St Joseph's Academy and the Mary Willis Library. The village has carriage factories, foundries, and machine shops, and manufactories of fertilizers, cottonseed oil, engines, furniture, etc. Pop, 1900, 3300, 1910, 3065.

WASHINGTON. A city and the county seat of Daviess Co, Ind, 111 miles southwest of Indianapolis, on the Evansville and Indianapolis and the Baltimore and Ohio Southwestern railroads (Map Indiana, C 7) It manufactures lumber, flour, tiling, clothes hangers, plows, and veneering. The Baltimore and Ohio Southwestern Railroad maintains repair and construction shops here There is a public library. Pop., 1900, 8551: 1910, 7854

WASHINGTON. A town and the county seat of Washington Co., Iowa, 66 miles southwest of Davenport, on the Chicago, Rock Island, and Pacific, the Chicago, Burlington, and Quincy, and the Chicago, Milwaukee, and St Paul railroads (Map: Iowa, F 3) It has important horse-breeding and stock-raising interests and manufactures flour, buttons, and hog-oilers. There is a public library. Pop., 1900, 4255; 1910, 4380; 1915 (State census), 4685.

WASHINGTON. A city in Franklin Co., Mo., 54 miles west of St. Louis, on the Missouri River, and on the Missouri Pacific Railroad (Map: Missouri, E 3). There are manufactories of pipes, boxes, shoes, zithers, etc. Pop., 1900, 3015: 1910, 3670.

WASHINGTON. A borough in Warren Co., N. J., 65 miles west of Jersey City, on the Morris Canal, and on the Delaware, Lackawanna, and Western Railroad (Map: New Jersey, B 2). Washington is important industrially, having, among its manufactories, sanitary-supply works, woodworking establishments, piano and organ factories, silk mills, brass foundries, etc Pop, 1900, 3580; 1910, 3567.

WASHINGTON. A city and the county seat of Beaufort Co., N. C., 127 miles by rail east by south of Raleigh, on the Pamlico River, and on the Atlantic Coast Line, the Washington and Vandemere, and the Norfolk and Southern railroads (Map: North Carolina, E 2). It carries on a considerable trade in cotton, corn, rice, farm produce, lumber, and naval stores. Oyster fishing and shipbuilding are important industries, and there are also steam gins, lumber and planing mills, cooperages, and manufactories of fertilizers, buggies, shirts, etc. The city contains two hospitals and the Washington Collegiate Institute. Pop., 1900, 4842; 1910, 6211.

WASHINGTON. A borough and the county seat of Washington Co, Pa., 32 miles by rail southwest of Pittsburgh, on the Pittsburgh, Cincinnati, Chicago, and St. Louis, the Baltimore and Ohio, and the Waynesburg and Washington railroads (Map: Pennsylvania, A 7). It is the seat of Washington and Jefferson College (q.v.), and of Washington Female Seminary. There are also the Citizens' and the Washington County Law libraries, and that of the Young Men's Christian Association. The leading manufactures are glass, flour, paint, carriages, tin, steel, foundry and machine shop products, baby carriages, automobile tires, electric furnaces, pottery, and brick. Originally called Bassettown, Washington received its present name in 1784. It was incorporated as a township in 1810, and was chartered as a borough in 1852. Pop., 1900, 7670; 1910, 18,778; 1915 (U. S. est.), 21,160; 1920, 21,480.

WASHINGTON, FORT. See FORT WASHINGTON

WASHINGTON, MOUNT The highest peak of the White Mountains in New Hampshire, and, with the exception of a number of peaks in North Carolina and Tennessee, the highest point in the United States east of the Rocky Mountains (Map. New Hampshire, G 4). It rises from the Presidential Range near the centre of the White Mountain group, east of the Crawford Notch, and has an altitude of 6290 feet It is composed chiefly of granite, its west slope is steep, and on the north and east it is broken by deep gorges. The lower slopes are covered with forest, but the summit is bare and rocky

WASHINGTON, STATE COLLEGE OF. A coeducational State institution founded at Pullman, Washington, in 1890 under the National Land Grant Act. It offers partially elective courses in the departments of mathematics and civil engineering, chemistry, botany and zoology, agriculture, horticulture, forestry, English, economic science and history, mechanical engineering, modern languages, mining engineering, and military science and tactics with supplementary courses in physics, geology and mineralogy, Latin, and education. Special instruction is provided in the schools of agriculture, dairying, pharmacy, veterinary science, and business, the school of artisans, and the preparatory school. Provision is also made for graduate instruction. The endowment includes 190,000 acres of land, the larger part of which has not yet been converted into funds, $50,000 annually from the Morrill Fund, $15,000 from the Hatch Fund, $15,000 from the Adams Fund, $10,000 from the Smith-Lever Fund, and State appropriations amounting to about $800,000 biennially. The total attendance in 1915 was 1647, and the faculty numbered 150 The building and grounds are valued at about $1,315,000, and the college property at $293,000 The gross income amounts to about $570,000 annually The library contains about 20,000 books and 8000 documents. The institution was formerly known as Washington Agricultural College and School of Science. The president in 1916 was Enoch A. Bryan, LL.D.

WASHINGTON, TREATY OF A treaty concluded in 1871 between the United States and Great Britain for settling various differences between the two governments, but chiefly those with regard to the Alabama claims (q.v.). In the beginning of 1871 the British government sent Sir John Rose to the United States to ascertain whether negotiations looking towards the settlement of the question in dispute would be acceptable to the President The United States government received his advances with cordiality and on the 26th of January Sir Edward Thornton, the British Minister at Washington, formally proposed the appointment of a joint high commission to meet at Washington for the purpose of devising means for settling the matters at issue. The United States readily consented to the proposal, provided the differences growing out of the Civil War should be included among the subjects to be considered. The British government promptly accepted the American proviso and the President appointed as Commissioners Hamilton Fish, E. R. Hoar, Justice Samuel Nelson, Robert C. Schenck, and George H. Williams. The British government

selected as its Commissioners Earl de Grey (Marquis of Ripon), Sir John Macdonald, Sir Stafford Northcote, Sir Edward Thornton, and Montague Bernard. The joint commission entered at once upon its task and on the 8th of May concluded a treaty which received the prompt approval of the two governments, and which is known as the Treaty of Washington. Aside from the settlement of the dispute growing out of the so-called *Alabama* claims (q.v.), provision was made for the adjustment of the differences with regard to the Northeastern fisheries by the appointment of a mixed commission to meet at Halifax and pass upon the relative value of certain reciprocal privileges granted each of the contracting parties. Finally provision was made for submitting to the arbitration of the Emperor of Germany the dispute concerning the Northwest boundary. See SAN JUAN BOUNDARY DISPUTE.

The so-called rules of Washington agreed upon by the contracting parties for the guidance of the tribunal in the interpretation of certain terms used in the treaty, and of certain principles of international law governing the obligations of neutrals, are: (1) That due diligence "ought to be exercised by neutral governments in exact proportion to the risks to which either of the belligerents may be exposed, from a failure to fulfill the obligations of neutrality on their part." (2) "The effects of a violation of neutrality committed by means of the construction, equipment, and armament of a vessel are not done away with by any commission which the government of the belligerent power benefited by the violation of neutrality may afterward have granted to that vessel; and the ultimate step by which the offense is completed cannot be admissible as a ground for the absolution of the offender, nor can the consummation of his fraud become the means of establishing his innocence." (3) "The principle of exterritoriality has been admitted into the laws of nations, not as an absolute right, but solely as a proceeding founded on the principle of courtesy and mutual deference between different nations, and therefore can never be appealed to for the protection of acts done in violation of neutrality." The agreement on the part of Great Britain to these rules was qualified by the declaration that "her Majesty's government cannot assent to the foregoing rules as a statement of principles of international law which were in force at the time when the claims mentioned arose, but, in order to evince its desire of strengthening the friendly relations between the two countries and of making satisfactory provision for the future, agrees that the arbitrators should assume that the British government had undertaken to act on the principles set forth in the rules."

Consult: Caleb Cushing, *Treaty of Washington: Its Negotiation, Execution, and the Discussions Relating Thereto* (New York, 1873); C. F. Adams, *Before and After the Treaty of Washington* (ib., 1902); J. F. Rhodes, *History of the United States*, vol. vi (ib., 1906); Fish, *American Diplomacy*, (ib., 1915). See ALABAMA CLAIMS.

WASHINGTON, BOOKER TALIAFERRO (c.1858–1915). An American educator of the negro, born near Hale's Ford, Franklin Co., Va. He was a plantation slave, the son of a mulatto slave and of a white man. After the Civil War he removed to Malden, W. Va., where he was employed in a salt furnace and later in a coal mine and where he obtained his first instruction in a night school After much difficulty and hardship he made his way to the Hampton (Va.) Normal and Agricultural Institute, where he defrayed the cost of his board by acting as janitor, and studied for three years (1872–75). He then taught school for two years at Malden, studied further for eight months (1878–79) in the Wayland Seminary of Washington, D. C., and in 1879 was appointed an instructor at Hampton Institute. There he was successful in directing the work of about 75 Indians of whose education General Armstrong was then making trial, and introduced and took charge of the night school, which soon became an important feature In 1881 he was appointed to establish a colored normal school at Tuskegee, Ala., the State Legislature having granted an annual appropriation of $2000 to be used for the salaries of instructors. He opened the school in a dilapidated shanty and a church, with 30 scholars, and himself as the only teacher, but he left it with many buildings, hundreds of acres of land, 1500 students and 185 teachers, and a remarkable spirit of devotion and aspiration. His efforts to better the condition of this institution led to his appearance at many important public assemblages, religious and secular, both North and South, and his addresses on these occasions soon made him known as a remarkably fluent and effective speaker. He became known, moreover, not only as a man who was tremendously in earnest, but as a far-sighted and practical reformer. His most notable address was that given at the opening of the Atlanta (Ga) Cotton States and International Exposition in 1895, on the subject "The New Negro." In 1900 he organized the National Negro Business League at Boston, Mass. He received an honorary M. A. from Harvard in 1896 and an LL.D. from Dartmouth in 1901 When abroad he was received by the King of Denmark and addressed the National Liberal Club of London. He died at Tuskegee, Nov. 14, 1915. His publications include: *The Future of the American Negro* (1899), *Sowing and Reaping* (1900); *The Story of My Life and Work* (1900; new ed, 1915); a remarkable autobiography, *Up from Slavery* (1901); *Character-Building* (1902); *Working with the Hands* (1904), a sequel to *Up from Slavery; Tuskegee and Its People* (1905); *Putting the Most Into Life* (1906); *Frederick Douglass* (1907); *The Negro in Business* (1907); *The Story of the Negro* (1909); *My Larger Education* (1911); *The Man Farthest Down* (1912). Consult also: Thrasher, *Tuskegee; Its Story and Its Work* (Boston, 1900); W. H Holtzclaw, *The Black Man's Burden* (New York, 1915); Stowe and Scott, *Booker T. Washington: Builder of a Civilization* (Garden City, N. Y., 1916), with introduction by Washington. See TUSKEGEE NORMAL AND INDUSTRIAL INSTITUTE.

WASHINGTON, BUSHROD (1762–1829). An American jurist, born in Westmoreland Co., Va. He was the son of John Augustine Washington, younger brother of General Washington. He graduated at William and Mary College in 1778; studied law in Philadelphia; practiced for a time in his native county; and from 1780 until the surrender of Cornwallis at Yorktown served as a volunteer in Col. J. F. Mercer's troop of horse. In 1787 he became a member of the Virginia House of Delegates, and in the fol-

lowing year was a member of the Virginia convention that ratified the Federal constitution. In 1798 he became an associate justice of the United States Supreme Court Four years later, upon the death of Martha Washington, he inherited the mansion of Mount Vernon and part of the estate Among his published works are *Reports of Cases Argued and Determined in the Court of Appeals of Virginia* (1798–99); and *Reports of Cases Determined in the Circuit Court of the United States, for the Third Circuit, from 1803 till 1827*, edited by Richard Peters (1826–29). His *Life* was written by Horace Binney (privately printed, Philadelphia, 1858).

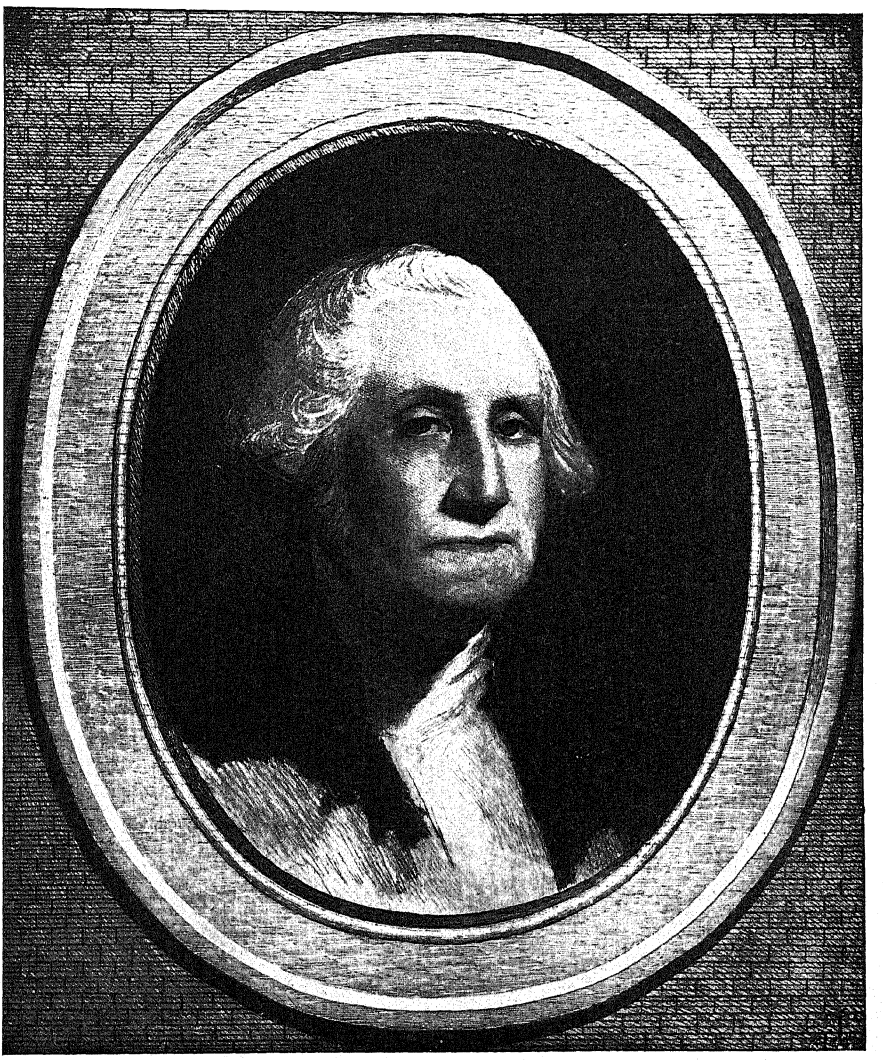
WASHINGTON, GEORGE (1732–99). Commander in chief of the Continental forces in the War of the American Revolution, and first President of the United States. He was born at Bridges Creek, Westmoreland Co., Va., Feb 22, 1732, and was the oldest son of Augustine Washington by his second wife, Mary Ball. His great grandfather was John Washington, who emigrated from England about 1657 with his brother Lawrence. John became a landed proprietor and planter in Virginia, in the Northern Neck, a district between the Potomac and the Rappahannock rivers, and left two sons, Lawrence and John, the former being the father of Augustine. The little recorded concerning Augustine Washington represents him as a man of high character. By his first wife he had three sons and a daughter, by Mary Ball, who was endowed with great intelligence and beauty, four sons and two daughters. Soon after George's birth his father removed to a farm on the Rappahannock River, opposite Fredericksburg, where he died in 1743. His estate was bequeathed to George; the other children were handsomely provided for, Lawrence receiving the estate afterward called Mount Vernon But while the family had a competency and were large landed proprietors, the facilities for education in the Colonies—particularly in the South—were at this time so meagre that the younger children were forced to depend on the poor common schools of the neighborhood, where they acquired only the rudimentary branches. Yet, though naturally diffident, George saw something of planter society, and at the age of 13 he wrote out for his own use 110 maxims of civility and good behavior.

He was athletic in form, much given to exercising, a graceful and expert rider, and fond of the wild life of the woods and encampments. He had the customary boyish proclivity towards imitation of military service, possibly in a marked degree, and appears to have been generally chosen as a leader by the companions of his youth, and to have been deferred to by them in the settlement of disputes which arose. As a growing lad, he was not remarkable as a scholar; was rather reserved and sedate in his demeanor; and was of a more serious turn of mind than is usual among boys. Such education as he received was completed by the time he was 16 years of age, his last two years of schooling having been devoted mainly to the study of engineering, geometry, trigonometry, and surveying, probably from his having a mathematical turn of mind, and also because the profession promised advantages, in view of the wild state of the country and the increasing demand for accurate surveys.

In 1748 Washington received a commission as public surveyor, and the summer months of the next three years were occupied by him in the duties of his profession, more particularly in the region of the Alleghanies, and especially on the immense tracts of land owned by Thomas, Lord Fairfax, the first surveys of which he made in March and April, 1748. Surveyors were scarce, and the remuneration was ample, and as the young Virginian was economical, he saved money, and acquired property by purchase long before he reached his majority. This fact and the qualities of character which he displayed gained him a solid reputation; and he was thus early regarded with esteem and confidence by the leading men in the Colony.

The year 1751 found the frontiers of Virginia threatened by the French and Indians, and frequent attacks and depredations occurred, necessitating some provision for the public safety. The Colony was accordingly divided into military districts, to each of which an adjutant general was appointed, with the rank of major, and a salary of £150 per annum George Washington received one of these appointments, and entered with zeal on the study of military tactics and strategy, chiefly under Adjutant Muse, a Virginian, and Jacob Van Braem, a Dutch soldier of fortune. These studies were interrupted in 1751–52 by an excursion to Barbados with Lawrence, who was sent thither by his physicians. On his death, in July, 1752, Lawrence bequeathed to George the estate of Mount Vernon, which had been left to him by his father. The care of this property and his military duties occupied George until 1753, when he was sent as a commissioner by Governor Dinwiddie to gain information concerning the intentions of the French, who had sent an expedition to the headwaters of the Ohio, and to warn them against trespassing upon territory claimed by Virginia. Washington acquitted himself of this mission very creditably, displaying great judgment, coolness, and address He set out from Williamsburg in October, 1753, with no escort, and performed his journey through nearly 600 miles of wilderness in a most intrepid manner in spite of treachery and accidents. In the spring of 1754 he was made second in command of the regiment which formed the military establishment of the Colony, and, with half the regiment, was sent forward to occupy the outposts on the Ohio. His superior officer, Col. Joshua Fry, suddenly died, and he was soon left in sole command. This was his first campaign, and he at once distinguished himself by defeating a detachment of the French under Jumonville. The skirmish of Great Meadows (July 3, 1754), which followed, resulted in the capitulation of the provincial forces on terms honorable to Washington. On a reorganization of the Virginia troops, which meant an inferior military grade for him, he resigned his commission and retired to Mount Vernon, refusing in a dignified way offers from Governor Sharpe of Maryland of a renewal of his commission under conditions he deemed incompatible with self-respect.

In 1755, however, he accepted a position as aide on General Braddock's staff and passed through the ill-fated campaign of that year. His personal bravery under fire was conspicuously shown in the disastrous battle of the Monongahela, July 9, in which he displayed the greatest gallantry, and it was recognized that Braddock's defeat was largely due to neglect of



GEORGE WASHINGTON
FROM AN ETCHING BY T. JOHNSON

Washington's wise counsel. The duty now fell to Washington of reorganizing the provincial troops, and he retained the command of them until the close of the campaign of 1758, when he resigned his commission and retired to private life.

On Jan. 6, 1759, Washington married Mrs Martha Custis, a young widow with two children, John and Martha Parke Custis, and wealthy in her own right The management of her large estate, combined with that of his own, now occupied most of his time, at least until about 1763. Having been elected to the House of Burgesses of Virginia shortly before his marriage, he now began to appear prominently in public affairs, attending regularly every meeting of the Assembly, and, though seldom speaking, taking care to be thoroughly informed upon every prominent public question. He moved much in society; was also an enthusiastic hunter, practiced a generous hospitality at Mount Vernon; associated constantly with the leading men of the Colony; and soon, and imperceptibly, gained a recognized position as a man of great ability and marked personal influence. At this time he was frequently made the depositary of important trusts, and was very often chosen to act as arbitrator in disputes arising among the colonists. His devotion to business and affairs was untiring, his industry extraordinary. He personally took charge of all his numerous accounts and business records, conducted his large and increasing correspondence, and drafted all his own contracts and deeds. At the outbreak of the Revolution he was recognized as the leading man in the Colony of Virginia, and was certainly one of the wealthiest in the Colonies.

When the disputes between the Colonies and England began, Washington held that arms should be the last resort. His respect for lawful authority made him dread any rupture; nevertheless, he drew up in 1769 a nonimportation agreement, which was signed by the House of Burgesses, and at the provincial convention at Williamsburg, Aug. 1, 1774, he was among the foremost in asserting the right of the Colonies to self-government. It was at this time that he made one of the few impulsive speeches recorded of him. Touched by the sufferings of Boston, resulting from the enforcement of the Boston Port Bill (q.v), he exclaimed: "I will raise 1000 men, subsist them at my own expense, and march with them, at their head, for the relief of Boston." He was one of the six Virginia delegates appointed to the first Continental Congress, which met in September, 1774; and on June 15, 1775, was chosen by the second Continental Congress commander in chief of the Continental army, his nomination having been formally made by Thomas Johnson of Maryland. He accepted with great modesty, refused any pay for his services, and asked only that his expenses be refunded to him after the war. For this important position his previous education had singularly adapted him. Not only was he competent in military affairs and skilled by precept and experience in the art of war, but his extensive knowledge of the geographical character of the country, and his familiarity with the characteristics and qualifications of the royal army, made him certainly the most dangerous antagonist, as a commanding officer, with whom that army could have to cope in the Colonies.

Washington left Philadelphia on June 21, joined the army at Cambridge, and assumed command on July 3, 1775 This army numbered about 16,000 men, all told It was in want of everything that could make it an effective fighting force—arms, ammunition, accoutrements, and, worse than all, esprit de corps. He proceeded at once to complete an effective organization of his army, by forming it into six brigades of six regiments each, keeping together the troops from each Colony, as far as practicable, and placing them under a commander from their Colony. He maintained a constant correspondence with Congress, pressing his views earnestly upon that body, and, though slowly, with marked success. All the officers were commissioned anew by Congress, and gradually a Continental army was formed. Washington corresponded with the heads of the different Colonial governments, and afterward with the Governors of the several States, and succeeded at length, not only in creating the American army, but in becoming the sole channel of communication between it and the numerous and complicated depositories of authority in the United States. But all this was accomplished amid embarrassments innumerable The army itself became diminished by the expiration of terms of enlistment; there were cabals among the officers, and disagreements with the civil authorities. For the events of the Revolutionary War, see UNITED STATES, *History*. After the war Washington exerted himself in endeavoring to obtain from Congress a settlement of the claims of his officers. It is probable that, had Washington so desired, he could at this time have founded a monarchy, sustained by his army. He took the course, on the contrary, of quelling this disposition on the part of his soldiers whenever it showed itself. On June 8, 1783, he issued his splendid letter to the Governors of the States with regard to the necessity of establishing a firm and dignified Federal government. On Nov. 25, 1783, the British evacuated New York; on December 4 Washington delivered his farewell address to the army; and on December 23, at Annapolis, he resigned his commission to Congress and retired to private life.

During the five years following the close of Washington's military career, he found sufficient occupation in attending to the affairs of his homestead and property, and in fostering the progress of his native State. Mount Vernon was now constantly the scene of a profuse hospitality over which Washington presided with the courtly dignity natural to him. He maintained his keen interest in public affairs, greatly regretting the general chaos and such disgraceful outbreaks as Shays's Rebellion, and helped by his correspondence to bring the leading men of the country to a determination to form a more perfect Union. He was president of the Philadelphia convention of 1787, which framed the Constitution of the United States. Washington was unanimously chosen the first President of the United States, and on April 30, 1789, took the oath of office in New York, where Congress was then sitting.

Washington's administration of the civil government was marked by the methodical precision which had characterized his conduct through life. His conscientious habit of undertaking no duty until he comprehended its entire scope and bearing was also especially apparent in his new position. He thoroughly informed himself

concerning all affairs of state, and every political act of importance which had been performed by the government and its agents since his retirement. He personally directed the organization of the different departments of the government under the new system, and in accordance with the Constitution, and no act of his was more significant than his appointment as heads of departments of such distinguished and able men as Jefferson, Hamilton, Knox, and Edmund Randolph. Meanwhile, before the work of Congress began, Washington found time to make a tour through the Eastern States, better to acquaint himself with the views of the men who were presently to lay the foundations of the commercial and industrial greatness of the United States. Before Congress, in his first message, he laid an eminently judicious series of suggestions of laws and provisions, which were at once made the basis of legislation. He refrained sedulously from allying himself with either of the two parties, Federalist and Democratic Republican, forming under Hamilton and Jefferson; and, on the contrary, strove to reconcile the differences between the leaders which he foresaw must inevitably in the future bring about wider differences among the people. The success of his first administration, and the universal sense of a security under his leadership, produced a general anxiety, as his term of office drew to a close, that Washington should accept the presidency for a second term. Jefferson and Hamilton—wide apart as the poles in their political opinions, and personally at enmity with each other—agreed in this; and each wrote a letter to Washington urging his compliance with what was now a great popular demand To their solicitation and that of others he acceded; he was reëlected unanimously, and on March 4, 1793, took the oath of office for the second time as President of the United States.

The very beginning of Washington's second administration saw the United States drawn into the vortex of European politics. The French Revolution was culminating in a Reign of Terror. Great Britain and France were at war, and gratitude seemed to demand that the western Republic should sustain her sister state and former ally in the existing struggle. But Washington was especially opposed to foreign complications, and while he recognized the French Republic, and received its representative, he steadfastly adhered to his resolution to avoid interference in European turmoils, and issued a proclamation of neutrality on April 22, 1793. Factions now arose in the United States, the one side seeking to enforce practical adherence to the cause of France and the other sustaining Washington in the face of bitter accusations of bias in favor of the recent enemy of America, Great Britain. Between Republicans and Federalists the line was now drawn strictly on this basis. Dissensions and resignations occurred in the cabinet. Among the people Jacobin clubs were formed, which were as virulent in the expression of their animosities as were their prototypes in France In the midst of all the excitement consequent upon such a state of affairs, which was greatly increased by the injudicious, not to say insulting, defiance of the proclamation of neutrality by Genet, the French representative to the United States, Washington sent John Jay as envoy extraordinary to England. Jay negotiated a commercial treaty which, though by no means satisfactory, was better than nothing, and this was signed by Washington on Aug. 18, 1795. (See JAY TREATY.) Thus, by his wisdom and determination, did Washington prevent his country—just emerging from the trials and vicissitudes of the War of Independence—from engaging in entangling alliances which would certainly have precipitated renewed warfare and perhaps have rendered impossible the growth of the Republic

Among the important events of Washington's administration were the admission of Vermont, Kentucky, and Tennessee into the Union, the assumption of the war debts of the States by the Federal government, the chartering of the Bank of the United States, the establishment of the national mint, the Whisky Insurrection (q.v.) of 1794 in western Pennsylvania, the unsuccessful expedition of General Harmar against the northwestern Indians in 1790, the disastrous defeat of General St Clair by them in 1791, and the victory gained by General Wayne over them at Fallen Timbers, Aug. 20, 1794. The retirement of Jefferson from the cabinet, and the more decided ascendency of Hamilton in the councils of the Administration, also should be mentioned, as well as the scurrilous attacks upon Washington by the radical adherents of the former While Washington leaned to the Federalist side, he was far from being the mere instrument of the brilliant Hamilton.

On Sept. 19, 1796, Washington, declining to serve again, issued his Farewell Address to the country he had been so largely instrumental in forming almost out of chaos. He delivered his last presidential message, turned over his office to his successor, John Adams, and retired to his home at Mount Vernon, followed by the love and veneration of his people. For further details concerning his two administrations as President, see the article UNITED STATES

At Mount Vernon he devoted himself to agriculture. In 1798 the prospect of a war with France led to his appointment as commander in chief of the National army. On Dec 12, 1799, he was exposed in the saddle, for several hours, to cold and snow, and attacked with acute largyngitis, for which he was repeatedly and largely bled. He sank rapidly, and died on December 14. His last words were characteristic. He said: "I die hard; but I am not afraid to go. I believed from my first attack that I should not survive it. My breath cannot last long." A little later he said: "I feel myself going. I thank you for your attentions; but I pray you to take no more trouble about me Let me go off quietly. I cannot last long" After some instructions to his secretary about his burial he became easier, felt his own pulse, and died without a struggle.

When news of his death reached Europe, the mourning became almost as widespread as it had been in America. The armies of Bonaparte and the Channel fleet of Great Britain did homage to his memory. It was admitted on all hands that a cosmopolitan statesman of the highest rank, and a noble friend of mankind, was lost to the world. The eulogy of "Light-Horse Harry" Lee that he was "First in war, first in peace, and first in the hearts of his countrymen," thus had a wider meaning than its author intended perhaps to give it—a meaning which the lapse of years has extended rather than diminished.

Washington was 6 feet 2 inches in height, with brown hair, blue eyes, large head and

hands, and strong arms. The portraits painted in his early life are perhaps the most truthful, as the artificial teeth worn in his later years altered decidedly the expression of his face. The statue by Houdon, at Richmond, has been accepted as the typical likeness, but the forehead is probably too retreating. The earliest known portrait, by Charles Wilson Peale, was painted in 1772. That by Joseph Wright, painted in 1782, was highly approved by Washington himself. Those by Trumbull and Sharpless are considered faithful in most respects. Those by Stuart are somewhat idealized. No one picture can be accepted as entirely satisfactory. Washington was a forcible, but not a fluent, speaker. He was attentive to his personal appearance and somewhat fond of display. To a natural diffidence was doubtless due the cold and reserved manner that distinguished him when in public life. Towards young people, and especially towards his nieces and nephews—his adopted children, for he had none of his own—he was gracious and gentle. He was fond of fox hunting, visited the theatre occasionally, and was a moderate wine drinker, but was opposed to the use of tobacco, although he raised it on his plantations. He was, like nearly all Americans of property at that period, a slaveholder, but he was a considerate master. He possessed at his death 124 slaves, whom he directed, in his will, to be emancipated at the death of his wife, so that the negroes of the two estates who had intermarried might not be separated. As early as 1786 he expressed himself in favor of abolition by legislative authority. He was not a scholar, and the 1200 or more volumes that composed his library were chiefly on agricultural and military topics. He was a member of the Protestant Episcopal church, but the exact nature of his religious opinions is a subject of controversy.

The early biographers of Washington erred in representing him as an ideal being of almost superhuman excellence. The criticism of later times deems it but honest to portray the man as he was. There are writers who, forgetting that balance of genius is rarer and more commendable often than brilliance, are inclined to rate him below Hamilton or Jefferson in political wisdom; but even these echo the tributes paid by the world to his unselfish devotion to duty, especially to the cause of independence, to his courage, his sublime hopefulness under defeat, his strong will, his marvelous insight into character, his abiding faith in God, and his absolute integrity and purity of motives. When these virtues are considered, few, if any, heroes of history can be placed beside him. The site for a fitting memorial to Washington was appropriated by Congress and plans were accepted for its construction in 1915. They called for a fine Colonial building to be used as a headquarters for patriotic, educational, literary, scientific, medical, and similar organizations in the United States.

Washington's wife, who was of nearly the same age with him, is described as having been amiable in character and lovely in person. She was the daughter of Col. John Dandridge, of New Kent County, and was born in May, 1732. Her first husband, to whom she was married in June, 1749, was Daniel Parke Custis, a wealthy planter. By the courtesy of the period she was called Lady Washington, and whether in her own home or at the "Federal court," she presided with dignity and grace. She died at Mount Vernon, May 22, 1802.

Bibliography. *The Life and Writings of George Washington* by Jared Sparks (12 vols, Boston, 1834–37) has been for the most part superseded by *The Writings of George Washington* edited by W C. Ford (14 vols, New York, 1889–93); *Letters to Washington*, edited by S M. Hamilton (5 vols, Boston, 1898–1902) are of interest Consult also *The Diary of George Washington, from 1789 to 1791*, edited by B. J Lossing (New York, 1860), *Washington and the West. Diary of September, 1784* (1905); Chief Justice Marshall, *The Life of George Washington* (5 vols., Philadelphia, 1804), Washington Irving, *Life of George Washington* (5 vols., New York, 1855–59); Richard Rush, *Washington in Domestic Life* (Philadelphia, 1857); H. C. Lodge, *George Washington*, in the "American Statesmen" series, (2 vols, Boston, 1898); H. B. Carrington, *Washington the Soldier* (Boston, 1898); R. H Schauffler, *Washington's Birthday* (New York, 1910); G. O. Trevelyan, *The American Revolution* (4 vols., ib, 1905–12); P. L. Haworth, *George Washington: Farmer* (Indianapolis, 1915). For the history of Washington's administrations, see Schouler's and McMaster's histories of the United States

WASHINGTON, Henry Stephens (1867–). An American mining geologist, born at Newark, N. J. He was educated at Yale (A.B., 1886), where he was an assistant in physics (1886–88) and in mineralogy (1895–96), at Leipzig (Ph.D., 1893), and at the American School for Classical Studies, Athens, Greece. After 1892 he engaged in geological investigations (mainly in the branch of petrology), visiting, in pursuit of his studies, Greece, Asia Minor, Italy, Spain, Brazil, and various parts of the United States. After 1906 he was also a consulting mining geologist. His publications include: *Chemical Analyses of Igneous Rocks* (1903); *Manual of the Chemical Analysis of Rocks* (1904; 2d ed, 1910); *The Roman Comagmatic Region* (1907).

WASHINGTON, University of. A coeducational and State institution for higher education founded at Seattle, Wash., in 1861. For several years the work of the University did not rank greatly above that of an academy, but in recent years it has assumed a high place among American State universities. The first class was graduated in 1876. The university includes 10 schools and colleges, the graduate school, college of liberal arts, college of science, college of education, college of engineering, college of fine arts, college of forestry, school of law, college of mines, and college of pharmacy. The total registration in all departments in 1915–16 was 3225. There is held annually a summer session in which over 1000 students are in attendence. An extension division gives instruction through extension classes by correspondence to 1000 additional students. The faculty in 1915–16 numbered 219. The university was a pioneer in giving instruction in journalism, such a course being established as early as 1868. The property of the university is valued at about $5,000,000, the grounds, buildings, and equipment at $2,536,662, and the annual income to about $555,000. The grounds cover 355 acres, within the limits of the city of Seattle. The president in 1916 was Henry Suzzallo, Ph. D.

WASHINGTON, WILLIAM (1752–1810). An American soldier, a kinsman of George Washington, born in Stafford Co, Va. He was educated for the ministry, but on the outbreak of the Revolutionary War entered the patriot army as a captain under Col. Hugh Mercer. He was wounded in the battles of Long Island and Trenton, fought at Princeton, and later became a major in Colonel Baylor's corps of cavalry In 1779 he joined General Lincoln's army in the South and became a lieutenant colonel in March, 1780. At the battle of Cowpens he made a charge upon Tarleton's troops that decided the day, and in the pursuit he had a personal encounter with the British leader. He assisted in covering the rear of Greene's army in the famous retreat before Cornwallis, and fought with great distinction at Guilford Court House and Hobkirk's Hill At Eutaw Springs he was taken prisoner, and was not released until the close of the war. He later settled in Charleston, and became a member of the South Carolina Legislature. When war with France became imminent in 1798, he was, upon the recommendation of General Washington, made a brigadier general.

WASHINGTON AND JEFFERSON COLLEGE. An institution for higher education founded at Washington, Pennsylvania, in 1802 The students in 1915–16 numbered 326, and the instructors 21. The productive funds of the college amount to about $900,000, and the annual income to about $70,000. The library contains about 26,500 volumes The president in 1916 was Frederick W. Hinitt, Ph D, D.D.

WASHINGTON AND LEE UNIVERSITY. An undenominational institution of learning at Lexington, Va, established as the Augusta Academy in 1749 and chartered in 1782. The first considerable amount of money received by the school was that given by George Washington, which still yields an annual income of $3000 to the university. The name was in consequence changed in 1798 to Washington Academy. In 1802 the Cincinnati Society, on dissolving the organization, appropriated the residue of their funds to the institution. In 1813 its name was changed to Washington College. Gen Robert E. Lee was made president of the college in 1865, and during an administration of five years wielded great power for good with the students. After his death the corporate name of the institution was changed in 1871 to its present title, and in the same year Gen G. W. Custis Lee succeeded his father as president, resigning in 1897. His successor was William Lyne Wilson, former Postmaster-General of the United States, who died in 1900 The following year George Hutcheson Denny, LL.D., was elected to the vacant position. He was succeeded in 1912 by Henry Louis Smith, Ph.D., LL.D. The university is divided into four schools, the college, the school of commerce, the school of applied science, and the school of law, with courses leading to the degrees of B.A., B S., and LL.B. It accepts the certificates of accredited schools in lieu of the entrance examination and offers a number of free scholarships and a university fellowship. In 1916 it had a faculty of 33; 513 students; an endowment of $950,000, with an income of $100,000, and property valued at $660,000, including buildings and grounds worth $450,000. The library numbered 50,000 volumes.

WASHINGTON BARRACKS. A United States Military Post, established in 1797 as Washington Arsenal. The reservation, which includes 69 acres, is situated on Greenleaf's Point in the city of Washington, D C, which is the post office and telegraph station. It was changed from an arsenal to an artillery post in 1881, and quarters for 25 officers and 400 men and stables for 150 horses were provided. It is the headquarters of the War College, and of the Engineer School Washington Barracks has been occupied by engineering troops since 1901 and is the repository for part of the military bridge equipage of the United States army, as well as for miscellaneous engineering tools and scientific instruments The garrison, under normal conditions, is a battalion of engineers.

WASHINGTON COURT HOUSE. A city and the county seat of Fayette Co., Ohio, 40 miles southwest of Columbus, on the Cincinnati, Hamilton, and Dayton, the Baltimore and Ohio Southwestern, the Detroit, Toledo, and Ironton, and the Pennsylvania railroads (Map Ohio, C 6). It is one of the largest live-stock markets of the country, has two canning plants, and manufactures boots and shoes, flour, furniture, stoves, lumber, etc Poultry packing is also an important industry. Pop., 1900, 5751; 1910, 7277.

WASHINGTON ELM. A venerable elm northwest of the common in Cambridge, Mass., under which Washington is said to have assumed command of the American army on July 3, 1775. The tree, though carefully protected, is decaying and only about one half remains.

WASHINGTON MONUMENT. A huge shaft in the form of an obelisk, erected in Washington, D C., to the memory of the first President of the United States. It is the highest masonry structure in the world, having an altitude of over 555 feet, and was designed by Robert Mills (q.v.). The corner stone was laid in 1848 and work on the monument continued slowly until 1877, when it ceased, but was resumed in 1878, and finished in 1884 The Washington National Monument Society originated the plan and controlled the work of construction until 1877, when its property was conveyed to the United States. Maryland marble is the material out of which the monument was constructed. The foundation covers an area of 16,000 feet, and weighs 36,912 gross tons The shaft is 55 feet 1.5 inches square at the bottom, 34 feet 5.5 inches square at the top, weighs 43,633 gross tons, and is 500 feet 5⅛ inches high; the apex, weighing 300 tons, is 55 feet high, its summit being nearly 600 feet above the tide water of the Potomac. The apex is capped by an aluminium point. Towards the cost of erection the Monument Society had expended $300,000; the total cost has been $1,187,710 31. Lieutenant Colonel T. L. Casey, of the United States Engineers, had charge of the work of construction after it passed under the control of the United States. An elevator and an iron stairway of 900 steps within the monument afford access to the base of the apex. The interior of the shaft contains 179 memorial stones donated by various countries, states, and societies.

WASHINGTON UNIVERSITY. A nonsectarian institution, chartered at St. Louis, in 1853, as Eliot Seminary, in honor of Rev. William G. Eliot. In deference to his wishes the name was changed to Washington Institute. Its first educational work under the charter was

the opening of an evening school for boys, the O'Fallon Polytechnic Institute In 1857 the institution assumed the title of Washington University The first college degrees were granted in 1862 A law school was organized in 1867, the Polytechnic School now known as the schools of Engineering and Architecture in 1870, the School of Fine Arts in 1879, and the School of Botany in 1885. The St Louis Medical College founded in 1842, became a department of the university in 1891, the Missouri Dental College in 1892, and the Missouri Medical College in 1899. Students are admitted to the undergraduate department on examination, or by certificate from an accredited school The college confers the degree of Bachelor of Arts, and the schools of Engineering and Architecture that of Bachelor of Science. The professional degrees of mechanical, chemical, civil, and electrical engineering are given only after three years or more of successful practice. The master's degree in art and science and the degree of Ph.D. are also conferred. In 1894 a tract of land of which the university now owns about 155 acres just outside the city limits northwest of Forest Park was purchased as a new site for the university, and gifts made by citizens of St. Louis made it possible to begin building at once The 10 new buildings and new grounds were occupied by the Louisiana Purchase Exposition Company, until January, 1905, at which time the university took possession of the new site and buildings now numbering 13. The Barnes Hospital and the St. Louis Children's Hospital have entered into an affiliation with the Medical School, the school constituting the medical staff and opening their laboratories to the hospitals, the hospital permitting the medical school to use their wards for teaching and investigation. In 1915–16 the faculty numbered 220, and the students enrolled were 1871, without duplicates. Of the students, 1362 were in arts and science, including 627 enrolled in Saturday and evening courses, 379 in the professional schools, and 188 in the art schools. The value of the grounds and buildings in 1915 was estimated at $3,990,000, the equipment at $1,060,000, the total value of the university property at $14,173,000, the endowment $7,065,000, other invested funds about $2,000,000. The library contains about 155,000 volumes and about 60,000 pamphlets. In 1916 the chancellor was David F. Houston.

WASHITA (wŏsh'ĭ-tà) **RIVER.** See OUACHITA.

WASH'O. A small tribe constituting a distinct linguistic stock, occupying the eastern slopes and valleys of the Sierra Nevada, west of Reno and Carson City, Nev. They appear to be entirely distinct from any other tribe, and are probably the remnant of a more numerous people destroyed by disease or exterminating wars. Nothing is known of their tribal traditions or customs beyond the fact that their women are noted for their beautiful basketry. They get their subsistence from seeds, piñons, small game, and by labor for the whites. They numbered 819 in 1910. Consult A. L. Kroeber, "Washo Language of East Central California and Nevada," in *University of California Publications in American Archæology and Ethnology*, vol. iv (Berkeley, 1907).

WASH SALES. See STOCK EXCHANGE, *Stock Exchange Terms.*

WASIELEWSKI, vä'syĕ-lĕf'skē, JOSEPH WILHELM VON (1822–96). A German violinist and writer on music, born at Gross-Leesen, near Danzig. He studied at Leipzig under David, Hauptmann, and Mendelssohn, became a member of the Gewandhaus Orchestra, and was concertmeister at Dusseldorf under Schumann from 1850 to 1852. Later he conducted the new Choral Society at Bonn. In 1855 he settled at Dresden and devoted himself to literary work. From 1869 to 1884 he was city music director at Bonn, and in 1884 he retired to Sondershausen. Among his works are: *Robert Schumann. Eine Biographie* (1858; 4th ed., 1906); with important supplementary matter in *Schumanniana* (1884); *Die Violine und ihre Meister* (1869; 5th ed, 1911); *Geschichte der Instrumentalmusik im 16 Jahrhundert* (1878); *Beethoven* (1888), *Das Violoncell und seine Geschichte* (1889; 2d ed, 1911); *Carl Reinecke, sein Leben, Wirken und Schaffen* (1892).

WASMES, vam. The capital of an arrondissement in the Province of Hainault, Belgium, 6 miles southwest of Mons (Map: Belgium, B 4). It is in the Borinage, a region noted for its extensive coal-mining interests., Pop., 1900, 14,660; 1910, 16,743.

WASP (AS. *wæsp, wefse, wespe,* Ger. *Wespe,* wasp, connected with Lat *vespa,* wasp, Lith. *vapsà,* gadfly). Any insect of the hymenopterous superfamilies Vespoidea and Sphecoidea, most of the former being known as social wasps, and of the latter as solitary wasps. All of the social wasps belong to the Vespoidea, and according to present classification there have been added to the group, from structural peculiarities, the wasps of the families Pompilidæ, Eumenidæ, Sapygidæ, Scoliidæ, Myzinidæ, Tiphiidæ, and Thynnidæ, all of which lead solitary lives. The superfamilies also contain the so-called solitary velvet ants (q.v.) and the cuckoo flies, gold wasps (family Chrysididæ), as well as two families of parasitic wasps, the Bethylidæ, formerly placed in the Proctotrypoidea, and the Trigonalidæ, formerly placed with the ichneumon flies. All wasps belong to the old group Aculeata, which includes the so-called stinging Hymenoptera. The social wasps have the sting always issuing from the tip of the abdomen, the pronotum not extending back to the tegulæ, the tarsi slender and not dilated or thickened as with the bees. The solitary wasps (superfamily Sphecoidea) are separated from the social wasps by the pronotum, which extends back to the tegulæ when these are present; the trochanters are one-jointed. These wasps are distinguished from the ants by the fact that the first segment of the abdomen is simple and does not contain swellings.

With the exception of the mainly tropical honey wasps (genus *Nectarina*), all the young wasps are usually fed upon other insects or insect remains. The true social wasps of the United States (see INSECT, *Social Insects*) belong to the genera *Vespa* and *Polistes,* the former including the species which make the paper nests with an outer covering, and usually composed of several layers of combs; the latter containing the common, long-bodied black wasps with folded wings which build nests of a single comb without any papery envelope. (See Figure 5, Colored Plate of INSECTS.) These wasps often build nests in barns, etc., but sometimes also in bushes or upon lower surfaces of stones slightly raised from the ground. The cells of one of these wasps' nests are hexagonal, in a

single layer instead of two, as with the higher bees, and usually vertical instead of horizontal. With some species the nest consists of but a single comb, as with *Polistes*, and with others of a series of combs in tiers, the whole inclosed in a spherical case made of many thicknesses of paper, as with many of the Vespas. The nests are enlarged by adding cells to the edges of the comb, space being gained by removing the inner layers of the envelope These removed portions are masticated and added to the outside. An egg is laid in each cell, and the young larva when hatching hangs with its head downward, suspended by a gummy excretion from the anus. They are constantly fed by the workers and females with the juices of fruits, flowers, and the masticated remains of insects. When full grown they spin silken cocoons, the lower end of which serves as a cap to the cell After the adult wasp has emerged the cell is cleaned out and a new egg laid in it. With the larger nest builders, a month or less elapses from the laying of the egg to the emergence of the adult Several generations may be reared in the same cell.

The largest of the American social wasps is the so-called white-faced hornet (*Vespa maculata*). The European hornet (*Vespa crabro*) has been accidentally introduced in the United States and has established itself near New York City. (See HORNET.) The smaller species of *Vespa*, which are generally marked with yellow and are often known as yellowjackets, frequently nest beneath stumps or stones, although nests are often found hanging from rafters and the branches of trees. The nests of *Vespa germanica*, a small yellowjacket, are commonly near the ground, and often exceed a foot in diameter. Access to the nest is gained by one or two circular or oval openings about three-quarters of an inch in diameter, which lead to the centre of the nest. The loose outer papery covering is by no means as tough and firm as with hornets. The combs are built in eight or more horizontal layers attached to each other by strong supports. As a rule the males and queens of true social wasps are not developed until towards autumn, at which time larger cells, always to be found in the lower combs of a nest, are made for their reception.

The tropical social wasps of the genus *Polybia* and its allies build enormous nests A species which occurs in Ceylon has nests which frequently reach a length of 6 feet. The nest of the Brazilian *Polybia scutellaris* is a solid closed structure covered externally with rough knobs or angular projects. The nests of another South American species are so regularly shaped and so compact and solid as to look like a stone. *Vespa orientalis* mixes a considerable quantity of earth with the paper used in its nest, and there is a nest in the British museum from Bahia supposed to be that of a social wasp, the outer wall of which is apparently formed entirely of earth and is one-quarter or one-half of an inch thick. The comb inside appears also to be formed of clay.

The sting of most of the social wasps is severe, but the wasps themselves are not dangerous except when disturbed. When they are flying about they are harmless unless irritated. A person may stand close to a wasp nest without risk if he stands motionless. In fact, a wasp may settle upon a person with no danger of stinging unless some movement is made.

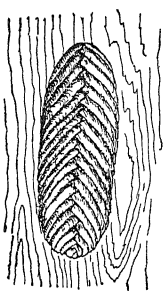
The solitary wasps belonging to the Vespoidea resemble greatly in habits the solitary wasps of the superfamily Sphecoidea, although they differ in important structural characters. The family Pompilidæ is an extensive one, more than 100 species being found in the United States. They may well be known as the spider wasps, since all, so far as known, store spiders in their burrows As a rule they dig burrows in the ground or utilize excavations of other insects. The tarantula killer (q.v.) of the southern United States is a member of this family. The so-called potter wasps of the family Eumenidæ belong to this group, and construct globular cells of clay or sand attached to a twig by a narrow petiole. These little wasps store up caterpillars, sawfly larvæ, and beetle grubs for their young. Each cell is completely filled and contains a single egg of the wasp The wasps of the parasitic families Sapygidæ, Scoliidæ, Myzinidæ, and Tiphiidæ, as a rule, lay their eggs upon the bodies of the larvæ of other insects, especially beetle larvæ.

The true solitary wasps of the superfamily Sphecoidea have been divided into 12 families, and comprise many of the most interesting of insects. They usually construct cells in subterranean burrows, each cell provided with paralyzed insects for their larvæ In their habits the sand wasps or digger wasps are rather typical of the group, eg, the great digger wasp *Sphecius speciosus* stores the large cicadas or harvest flies in deep burrows usually in clay soils. A burrow consisting of a sloping entrance 6 inches long, turning at right angles and extending several inches farther and ending in a globular cell an inch and a half in diameter, is previously prepared by the mother wasp Sometimes the main burrow has several branches, each terminating a similar cell. After a burrow is prepared, a cicada is captured and paralyzed by its captor's sting. The cicada is then carried with great difficulty up a trunk of the tree for some distance in order that the wasp may fly obliquely downward to her nest, the weight of the cicada being so great that she cannot fly with it horizontally or upward. The terminal cell being reached, an egg is laid under the middle of the victim's body, upon which the footless larva of the wasp begins to feed as soon as hatched. In the course of a week the larva spins a white cocoon mixed with earth, and remains through autumn and winter, transforming to pupa in spring. Shortly afterward the adult gnaws through the cocoon and works its way up to the surface of the ground.

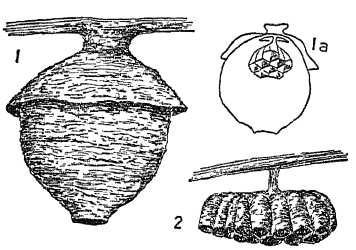
The solitary wasps of the family Crabronidæ are small insects which burrow in soil and sometimes in decaying wood. A great variety of insects is stored in these cells, each species, however, seeming to have a distinct preference. The industry of some of this family is extraordinary. The Peckhams have observed *Crabro stirpicola* working night and day for a period of 42 consecutive hours. The mud daubers, or mud wasps, of the genus *Sceliphron* (formerly *Pelopœus*) build cells of mud, frequently in great numbers, in sheltered places, often entering houses and barns. Spiders are stored in these cells, as a rule, and a single egg is laid upon the last spider which has been pushed in, and the larva works rapidly, as do other wasps' larvæ of this group. The female wasp completes and provisions one cell before beginning another.

The sand wasps of the family Oxybelidæ burrow in the sand and provision their nests with flies.

Important contributions to our knowledge of the psychology of insects have been made from observations upon the solitary wasps. For example, in the genus *Ammophila* the wasps carefully cover their burrows when they are completed and stored, taking the greatest care to conceal the entrance, the mother wasp frequently returning from time to time to see that nothing has been disturbed, and adding sand or other disguising substances to the covering of the burrow. The most interesting feature of the habits of these insects, however, is the undoubted use of a tool by the mother insect. In filling in the mouth of the burrow, Williston has seen the mother wasp take a stone in her jaws and use it as a tamping iron to pack the earth down more tightly. Fabre's extended studies led to the conclusion that these solitary wasps are inspired by automatically perfect instincts which can never have varied to any great extent from the beginning of time. In his opinion deviation from regular rule would mean extinction. G. W. and E. G. Peckham, however, after equally close study, found that variability in the habits of different individuals of the same species exists in every particular—shape of nest, manner of digging it, manner of stinging the prey and of crushing it, manner of carrying the victim, way of closing the nest, and even in either closing the nest or leaving it open. In the Ammophilas it was noticed that there is a distinct personality among the females. One seemed in haste and spent no time on smaller details; another worked with attention to detail, arranging the burrow and surface with scrupulous care, and sweeping away every particle of dust.



CELL OF A MUD WASP.



NESTS OF PAPER-MAKING WASPS.

1 and 2, nest of hornets; 1 a, section showing interior.

Among the English-speaking people of German descent the word "wasp" is frequently used for other groups of hymenopterous insects. Thus an ichneumon fly is called a parasite wasp, and a chalcis fly the same.

Bibliography. Henri de Saussure, *Monographie des guêpes sociales* (Geneva, 1853–58); Sir John Lubbock, *Ants, Bees, and Wasps*, in "International Scientific Series," vol. xlii (New York, 1882); M. W. Morley, *Wasps and their Ways* (ib., 1900), containing a bibliography; David Sharp, "Insects," in *Cambridge Natural History*, vol. vi (ib., 1901); J. H. C. Fabre, *Insect Life* (Eng. trans., London, 1901); G. W. and E. G. Peckham, *Wasps: Social and Solitary* (Boston, 1905); Edward Saunders, *Wild Bees, Ants and Wasps* (New York, 1907); V. L. Kellogg, *American Insects* (2d ed., ib., 1908); F. M. and L. T. Duncan, *Bees, Wasps, and Ants* (Oxford, 1914); L. O. Howard, *Insect Book* (new ed., New York, 1914), J. H. C. Fabre, *Hunting Wasps* (Eng. trans. by Alexander Teixeira de Mattos, ib., 1915). See POTTER WASP; TARANTULA KILLER.

WASPS, THE (Lat. *Vespæ*, Gk. Σφῆκες, *Sphēkes*) A comedy by Aristophanes, produced in 422 B.C at Athens. Its satire is aimed against the proneness of the citizens to go to law.

WASSERMANN, väs'ĕr-män, AUGUST VON (1866–1925). A German therapeutist. Born at Bamberg, he studied medicine in Berlin and Strassburg (M.D., 1889), and became assistant for infectious diseases at the Koch Institute of the Charité in Berlin. In 1913 he added to his duties those of director of the newly founded institute for experimental therapeutics. He became assistant professor of therapeutics at Berlin University in 1902 and professor in 1911. Wassermann became known as one of the most distinguished pupils of Koch and Ehrlich (qq.v.). His greatest discovery, the so-called Wassermann reaction in syphilis (q.v.), was made in 1906. Important also, especially in forensic medicine, is his precipitin reaction which distinguishes the blood of men and animals by differentiating albumin bodies contained therein. His selen-eosin treatment to inhibit cancer in rats and mice (1913) was not successful in man to the date of writing.

WASSERMANN TEST, or REACTION. See SYPHILIS; WASSERMANN, AUGUST VON.

WASTE (OF. *wast, guast*, waste, devastation, from Lat. *vastus*, waste, desolate, vast). In the law of real property, any material injury caused or permitted to be done by a tenant of a particular estate to the property, and lessening the value of the estate of the reversioner or remainder man. It is called voluntary where the damage is the result of some positive and willful act on the part of the tenant, such as plowing up a flower garden or cutting down fruit trees, and permissive where the tenant is unreasonably negligent in omitting to take proper measures to prevent the injury. Even though the tenant holds without impeachment of waste, wanton acts of destruction may be restrained by a court of equity. A tenant may cut such timber as may be reasonably necessary for his own use, or to reclaim land suitable for agricultural purposes, but the destruction of timber to the detriment of the estate is waste. The destruction of ornamental trees will be restrained as waste by a court of equity. The removal of deposits of sand, gravel, clay, etc., and the opening of mines and quarries are waste, unless the premises are let for such purposes. If open mines, quarries, etc., exist on leased premises, it will be presumed that it was intended that the tenant should work them. The remedy for waste is an action at law for damages, or an application to a court of equity for an injunction. Consult the authorities referred to under REAL PROPERTY.

WASTE, DISPOSAL OF. See SEWAGE DISPOSAL.

WASTE, IMPEACHMENT OF. See IMPEACHMENT OF WASTE.

WASTE LANDS. A popular term for uncultivated and unprofitable tracts in populous and cultivated countries. They are very va-

riable in character and include marsh or swamp lands (both fresh and salt), moors, peat bogs, steep and rocky lands, sand, arid lands (see IRRIGATION), alkali soils (q.v.), galled and gullied soils, and chalk downs. Their improvement is largely a question of expense. It is often more profitable to improve lands already cultivated, and to bring them into a higher state of cultivation and productiveness, than to reclaim waste lands. The means of reclamation are also very various and include drainage, manuring, mulching, irrigation on arid soils, growth of sand-binding plants on sandy soils, etc The process of reclamation must as a rule be gradual, especially when the soil is naturally poor, and must include improvement of both the physical and the chemical condition of the soil. The most important waste lands are probably the arid lands reclaimable by irrigation and the marsh, swamp, or peat lands, which need especially drainage, but are usually improved also by liming, manuring, and the application of potash salts and phosphates. Consult A D. Hall, "Reclamation of Waste Lands," in *Popular Science Monthly*, vol. lxxxv, p 377 (1914)

WASTING PALSY. See MUSCLE, DISEASES OF.

WATANNA, wȧ-tȧn'nȧ, ONOTO (1879–). The pen name of an American author, Mrs Winnifred Eaton Babcock. She was born at Nagasaki, Japan, and was educated at Montreal and Toronto, Canada, and at Columbia University. In 1901 she was married to B. W. Babcock. Her writings include: *The Old Jinriksha* (1895); *Miss Numè of Japan* (1899); *A Japanese Nightingale* (1901), dramatized and produced in the United States and England; *The Wooing of Wistaria* (1902); *The Heart of Hyacinth* (1903); *Daughters of Nijo* (1904); *The Love of Azalea* (1904); *A Japanese Blossom* (1906); *The Diary of Delia* (1907); *Tama* (1910); *Honorable Miss Moonlight* (1912).

WATAUGA (wą-tą'gȧ) **ASSOCIATION.** In American history, the name given to the first compact of government west of the Alleghanies, signed by the settlers of what is now East Tennessee in 1772 and 1775. (See TENNESSEE.) Though the articles are lost, the general scheme is known. A legislative council of 13 was chosen by the signers. This council elected five of their number to exercise judicial and executive functions, and the five chose a chairman. A sheriff and an attorney were appointed and courts were held regularly. Jurisdiction was assumed, however, over none but the signers, and in consequence outlaws from Virginia and North Carolina flocked in. In 1775 or 1776 the name Washington District was given to the territory, and in 1776, at their request, their representatives were given seats in the North Carolina Assembly. Consult Ramsey, *Annals of Tennessee* (Charleston, 1853), and Caldwell, *Studies of the Constitutional History of Tennessee* (Cincinnati, 1895).

WATCH (AS. *wæcce*, from *wæccan, wacian, wacan*, to watch, wake). A small, portable machine for measuring time. The parent of the watch, as of the other modern timekeepers, was the ancient tower clock, the earliest example of which, known as De Vick's clock, is described under CLOCK. The invention of the spring to take the place of the weight to drive the wheel train made the construction of a portable timekeeper possible The first watches were made very early in the sixteenth century, Peter Hele, a clock maker of Nuremberg, being usually credited with the invention. At first a straight spring was used, but this was soon replaced by a coiled spring The first balance used in watches, termed a foliot, corresponded in its action to the suspended weights on a horizontal lever of an early clock. It consisted of a metallic rod terminating at each end in a heavy mass, the whole formed out of a single piece of metal. This was afterward replaced by a wheel, in which the weight, accumulated mainly on the rim, took the place of the weights suspended on the ends of a bar The first great improvement made in watch construction was the application of the coiled hair spring to the balance wheel. This invention was probably made by Hooke about 1658.

The earliest watches had little physical resemblance to their modern successors. One of the first was a cylindrical box of metal, chased and gilded, the lid pierced with an opening over each hour mark through which the hand could be seen. Others were made in many grotesque shapes and in all sizes from the diameter of a saucer to that of an ordinary lead pencil. Curious mechanism was as much prized as quaint form in these early timekeepers, and both seem to have been considered of more importance than the accurate measurement of time Alarm watches, and repeaters, or striking watches, were great favorites. The earliest watches usually had but one hand, the minute mechanism and hand being invented in 1687. Enamel dials were first used in 1650. Jewels were first used as pivot bearings for watches about 1700, and about this time keyless watches appeared. In 1749 the compensation balance was invented, the duplex escapement in 1750, the chronometer escapement in 1765. The first very thin watches were made by Lepine in 1776. In 1780 appeared the helical balance spring and the seconds hand.

The fusee, which was invented early in the sixteenth century, continued to be used in English watches until towards the close of the nineteenth century, although it had been discarded in the American machine-made watch many years before. The fusee is a spirally grooved cone, connected with the barrel which contains the main spring by a chain, one end of which is fixed to the broadest part of the cone and the other end to the barrel. From the fusee the motion was communicated to the train, and the theory of its use was that in its unwinding it corrected the variations in the force of the main spring and so equalized the power exerted upon the train. The equalizing effect is due to the fact that, when the spring is all coiled up and its force upon the barrel is greatest, the chain is acting upon the small end of the fusee and its leverage upon the fusee is least; but as the force of the spring diminishes, the chain having reached a broader part of the fusee, the leverage is increased, and the two are so adjusted to each other that the action of the spring modified by the leverage of the chain produces a uniform stress in the fusee. In most modern watches the great wheel forms part of the barrel and the diminishing power of the main spring, as it uncoils, is neutralized by the escapement, with which the balance wheel is connected.

Almost immediately after the invention of the hair spring attempts began to be made to introduce into watches an escapement which would produce greater accuracy than the vertical escapement at first used. The detached lever escapement described farther on is now commonly

used in watches. Early in the history of both clock and watch construction it was noticed that variations in the temperature produced variations in the rate of going, the increase or diminution of the temperature affecting to some extent the moment of inertia of the balance wheel and to a great extent the elastic force of the balance spring. A rise in the temperature makes the balance expand, and therefore augments its moment of inertia; it adds to the length of the spring, and thereby diminishes its elasticity, the elastic force of a spring varying inversely as its length; and the time of vibration of the balance, which depends upon the moment of inertia directly and upon the elastic force of the spring inversely, is increased—i.e., the watch goes more slowly—in consequence both of the increase of inertia and of the diminution of the elastic force of the spring. A fall in temperature is attended by opposite results, the watch going more rapidly. The importance of discovering some means for correcting these temperature variations was most evident in connection with marine chronometers, upon which navigators depend for reckoning their longitude at sea. Early in the eighteenth century John Harrison, who invented the gridiron pendulum for clocks and several other improvements in their mechanism, made the compensating balance, which was soon applied not only to chronometers, but to all high-grade watches. In the compensating balance, the balance wheel is made of two metals—brass and steel—which are affected at unequal rates by temperature. The outer rim is of brass and the inner rim and cross arms of steel, the two metals being firmly united by fusion. To allow for an expansion, the wheel is made in two equal parts, joined by means of a cross arm as shown in Fig. 1. The increased expansive and contractile power of brass over steel is so utilized by proportioning in this combination of the two metals that the changing size of the balance wheel automatically adjusts itself to the varying conditions of the hair spring. It will be noticed (Fig. 1) that the balance wheel

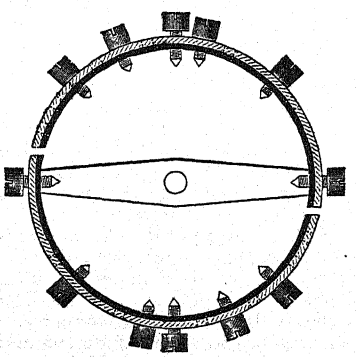


FIG. 1. BALANCE WHEEL.

is ballasted with tiny screws. Their object is twofold, to adjust the balance wheel to the exact weight required to make the desired number of vibrations—18,000 per hour—and, by changing the positions of the screws, to adjust the effective weight of the balance wheel on the diameter to meet changing conditions of temperature. Recent improvements in watch mechanism have resulted in a movement not affected by electrical disturbances. In order to accomplish this, the balance, roller, hair spring, pallet, and fork are made of nonmagnetic materials.

Briefly summarizing the steps by which the mechanism of the modern watch has been developed from De Vick's model, we find: (1) The use of the spring as motive force; (2) substitution of balance wheel, with hair spring, for weights; (3) successive improvements in escapement; (4) introduction of enamel dials; (5) introduction of jewels as pivot bearings; (6) invention of compensating balance; (7) discarding of fusee; (8) introduction of automatic machinery for the construction of the parts.

The mechanism or movement of a modern American watch consists of a series of wheels called the train, the first of which, named the barrel, contains the main spring, in which the power secured when the watch is wound up is stored. The train transmits to the desired points the motion stored up in the spring. At

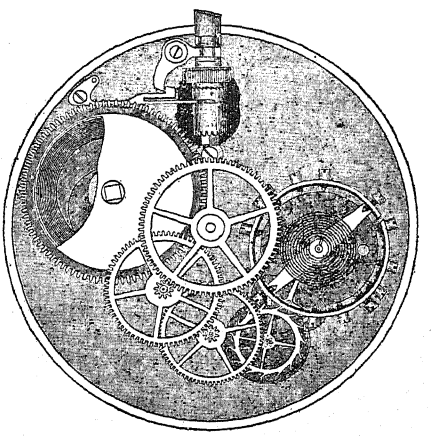


FIG. 2.

the end of the train is the escapement—a delicate and complex mechanism which so regulates the motive force stored up in the main spring that it is expanded with uniformity and at the desired rate. The train of wheels is placed in a circular position as shown in Fig. 2 so as to accommodate the shape of the watch, but the order is best understood by arranging them in a straight line, as in Fig. 3. It has been seen that the first wheel of the train, the barrel, contains the mainspring and is therefore connected with the stem-winding attachment. A little click or pawl, working in the teeth of a ratchet fastened to the mainspring arbor, keeps the lat-

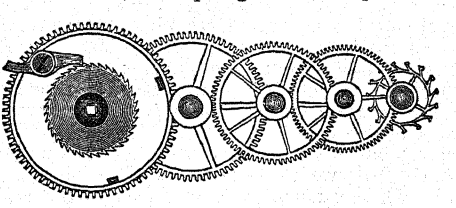


FIG. 3.

ter from running backward. The second wheel of the train, called the centre wheel, is always placed in the centre of the watch, because connected with it on the same staff are the wheels which drive the minute and hour hands. The centre wheel meshes into the third pinion, upon

which the third wheel is firmly fixed. This turns the fourth pinion, which carries a wheel gearing into the escape pinion, upon which the escape wheel is carried. The second or centre pinion is attached to a centre staff, which projects through the main plate of the watch. Upon this projecting portion is mounted another pinion, which from its shape is called the cannon pinion. The minute hand is fitted upon the hub of this pinion and its teeth drive a little wheel which is commonly known as the minute wheel Attached to this wheel is still another pinion geared to drive the hour wheel, which is mounted on the long hub of the cannon pinion Upon the hub of the hour wheel the hour hand is placed. The number of teeth on each of these wheels and pinions (which are generally called the dial wheels) is so arranged that while the cannon pinion, carrying the minute hand, makes a complete revolution in one hour, the hour wheel, carrying the hour hand, revolves once in 12 hours. The stem attachment for setting the watch is connected with one or other of these dial wheels.

Returning now to the wheel train, we find that the fourth pinion has a pivot which projects through the frame plate and upon this pivot the second hand is mounted. Hence it is necessary that the fourth pinion and wheel should make a revolution once a minute, or 60 times as fast as the centre staff. This is accomplished by means of the proportioning of the centre wheel, third pinion and wheel, and fourth pinion to each other. Considering, now, the last wheel of the train and its various attachments, which are grouped together under the general name of escapement, we find that the group consists of seven members: The escape wheel, the pallet, the fork, the roller and roller pin, the balance wheel, and the hairspring. The use of each part is explained farther on. The combined object of the whole group is to stop and then set in motion again, at regular intervals, every wheel in the train—an action which causes the familiar tick of the watch. The teeth of the escape wheel, instead of being cut on the epicycloidal curve like the other teeth of the train, so as to convey motion with as little loss of power as possible, are constructed with an entirely different object and in an entirely different form. They form a series of 15 hooks. An anchor-shaped piece, called the pallet, is so hung that first one and then the other of its horns is locked into the tooth of the escape wheel as it revolves. These locking horns are usually made of some precious stone. The unlocking is accomplished by a lever called the fork, which is attached to the pallet. The action of the fork is controlled by the balance wheel by means of a little disk under the balance wheel called the roller. On the outer edge of this disk is the roller pin, which alternately engages and releases the fork. It has already been shown that the action of the hairspring on the balance makes its vibrations isochronous; by means of the fork disengaging at regular intervals the teeth of the escape wheel from the pallet and so freeing the whole train, this isochronous motion is conveyed to the entire watch train. Fig. 4 of the accompanying cuts shows the action of the fork, roller, roller pin, pallet, and escape wheel, while Fig. 5 shows the hairspring connected with the balance, with the roller and roller pin underneath

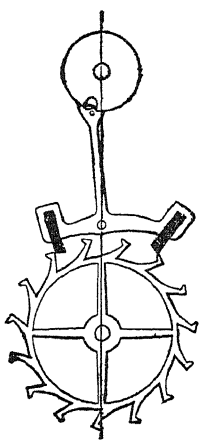


FIG. 4.

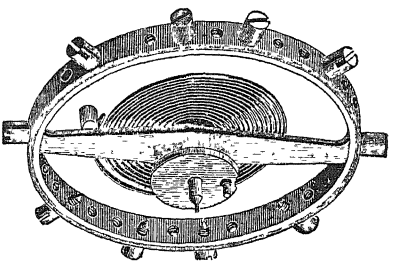


FIG 5

Watch Manufacture. In England and Switzerland watchmaking was early developed as a household industry. Among the Swiss, in particular, it gave employment to thousands, the industry being so far subdivided as to consist of over 100 distinct branches; and the Swiss finally became the watchmakers for the world. As early as 1809, when Luther Goddard, of Shrewsbury, Mass, commenced manufacture on a larger scale than had been attempted previously, various attempts were made in the United States to make watches by hand after the Swiss plan; but the price of labor was too high and the laborers too inexperienced, so that each attempt ended in failure. The idea of manufacturing watches by using machinery to make uniform and practically interchangeable pieces was put into successful practice by Aaron L. Dennison, a Boston watchmaker, in 1849, who was familiar with the methods and machinery employed for the manufacture of army muskets, at the United States Armory at Springfield, Mass. His original plan was to gather under one roof several labor-saving machines already in use in Switzerland for some of their watchmaking processes; to supplement these by new contrivances; and to run them all by one power. He formed a small company, which built its first factory at Roxbury, Mass. But the Swiss authorities passed a law prohibiting the exportation of machines, models, or drawings, so that the pioneer company was obliged to construct its own machines. Its first machine-made watch was turned out in 1853. Subsequently the works were removed to Waltham, Mass., where in 1859 the company was reorganized under the name of the American Watch Company, and is still in existence as the Waltham Watch Company. In 1867 the Elgin watches were put upon the market, the National Watch Company of Elgin being organized in 1864. Other important American watchmaking concerns are: the Hamilton, Pennsylvania; Hampden, Ohio; Howard, New York; N. Y Standard, New Jersey; New England, Connecticut; Rockford and Illinois, Illinois; Seth Thomas, Connecticut; South Bend; Indiana; and Trenton, New Jersey, companies.

It has been claimed for the watchmaking industry that it has caused the invention of a greater number of mechanical appliances than any other, with the possible exception of electricity. Not only ingenuity, but the greatest ac-

curacy and delicacy, is required of the machinery used in watchmaking For instance, the finest screws used in a small-sized watch have a thread of 260 to the inch and weigh $\frac{1}{80,000}$ of a pound. The wire of a hairspring, though a foot long, weighs $\frac{1}{15,000}$ of a pound. The jewel work is extremely minute. A pallet jewel weighs $\frac{1}{180,000}$ of a pound and a roller jewel much less. The advantages of producing all these minute parts by automatic machinery, besides cheapness and rapidity of production, are the greater accuracy of the parts and the possibility of replacing a broken part with an exact duplicate.

The following is an outline of some of the principal processes: The plates which support the mechanism of the watch are turned on lathes and perforated for screws, arbors, and the like, by drills. The arbors, staffs, and pinions on which the wheels and other moving parts work are also turned on lathes. The teeth in the wheels and pinions are formed by cutters or by saws. The screws, big and little, are made by machines which cut the threads and finish the heads both for appearance and accuracy. The metal of the balances has to be compressed with great care to secure uniform density, by means of hammers or rollers. It must then be faced and recessed by lathes, tapped by drills, finished, and glossed. The springs are drawn, flattened, finished, and coiled by special machinery.

Latterly a branch of the watchmaking industry has been developed devoted exclusively to the production of low-priced watches. The pioneer among the low-priced watches was the Waterbury, which was patented by D. A. Bucke in 1878 Its cheap production was largely due to improvements in the old duplex escapement, which made it possible to stamp out its parts with an ordinary die. Within recent years some of the clock companies have begun making low-priced watches as a by-product connected with clock manufacture, while several large companies specialize in low-priced watches exclusively. These cheap watches are made like small spring clocks. The parts are stamped out, no jewels are used, and very little time is devoted to testing and adjustment. For watches of this type, of which the extreme of cheapness is the famous dollar watch, an enormous demand has arisen, both for domestic consumption and export. This has led to improvements in the manufacture of these cheap watches, so that both in appearance, durability, and time-keeping they are quite satisfactory.

The manufacture of watchcases is now conducted by all better-grade manufacturers as a separate industry. The movements are made to standard sizes and qualities and then sold at wholesale to jobbers, and also to watchcase manufacturers. The watchcase industry had a rapid development towards the close of the nineteenth century and is now one of great importance. Most of the work is performed by automatic machinery Gold, silver, nickel, and gun metal are used, besides various alloys known under the trade names of silveroid, nickel silver, etc. The popular gold-filled case was patented in 1859 by James Boss, of Philadelphia Open-face watches have become very popular, thick beveled-edge glass rendering the case as reliable a protection as the extra gold cover of the hunting watch and more nearly dust proof, while watches for the wrist have attained considerable vogue for their convenience both for men and women. Small watches used as pendents are also made for women.

Statistics. The following statistics, of the Thirteenth United States Census, indicate the growth of the industry in the United States This report shows that, in 1909, 13 establishments in the United States were reported to be engaged in the manufacture of watches and 29 in the manufacture of watchcases, the annual product of watches amounting in value to $11,771,055 and of watchcases to $10,514,854. The tendency of industry to concentrate in large establishments is shown in the growth of this industry: in 1869 there were 37 watch-movement factories in the country, or 24 more than in 1909.

Bibliography. Although there are many European books devoted to the history of watches and to foreign practice, very little has been written regarding American history and methods. For the former phase of the subject, consult bibliography under CLOCKS; Manufactures, vol. x, part iv of the Twelfth United States Census, contains valuable historical and statistical matter, while the volumes on manufactures of the Thirteenth United States Census and the Census of Manufactures, 1914, give later statistics. *The Journal of the Franklin Institute* contains a lecture by E. A. Marsh, Dec. 14, 1894, on "The History of Watch Making." He is also the author of *Evolution of Automatic Machinery in America* (Chicago, 1896), and of a chapter on the "American Watch Company," in the *History of Middlesex County, Mass.* (Philadelphia, 1890), and of various valuable publications of the Waltham Watch Company, which should be consulted, as also printed matter of other large watch manufacturers. *Appleton's Journal* for July 2 and 7, 1870, contains an article on "Watchmaking in America," which includes a good account of the early history of timekeepers Consult also papers by H. G. Abbott in *American Jeweler*, "The Watch Factories of America," reprinted, Chicago, 1905; David Glasgow, *Watch and Clock Making* (London, 1893); Claudius Saulnier, *The Watchmakers Hand Book*, translated from the French by Tripplin and Rigg (5th ed., ib., 1912); C. E. Fritts, *The Watch Adjuster's Manual* (4th ed., Philadelphia, 1912).

WATCH (AS. *wæcce*, from *wacian*, *wæccan*, Goth. *wakan*, Ger. *wachen*, to wake, watch). A term used to designate the part of a ship's company that is employed in working her at one time. The deck force is divided into starboard and port watches, and the fire-room and engine-room forces usually into three watches. The starboard and port watches are commonly subdivided into first and second parts called quarter watches, though when only a quarter watch is on deck for duty it constitutes the watch for the time being. In cases of emergency, or when the ship is getting under way, coming to anchor, or performing some other evolution requiring all available men, both watches (all hands) are called. In port, all hands are engaged during working hours, but only an anchor watch (q.v.) is on deck at night except in unusual circumstances In time of war one-half the battery is usually kept manned at night. The term "watch" is also used to designate the period of time during which a watch of men are on deck. This time is two or four hours. The watches are named as follows: midwatch (midnight to 4 A.M.), morning watch (4 to 8 A.M.), forenoon

watch (8 A.M. to noon), afternoon watch (noon to 4 P.M.), first dog watch (4 to 6 P.M.), second dog watch (6 to 8 P.M.), first watch (8 P.M. to midnight) The dog watches are designed to shift the order of the watch so that the same men will not have the same watch every night.

WATCH AND WARD. In the old English law a phrase employed to describe the supervision and care of police officials. Consult Blackstone's *Commentaries*, Book I, p. 356.

WATCHFUL FOX. See KEOKUK.

WATCH HILL. See WESTERLY.

WATCH OFFICER. Officers who have charge of the ship at sea are termed watch officers. The number of such officers depends upon the character of the vessel In many large transatlantic steamers there are usually two officers on watch at a time. In large naval vessels the younger ensigns act as junior officers of the watch under the regular watch officers, who are lieutenants or ensigns of more experience. The watch officer actually on duty is called the officer of the deck or officer of the watch.

WATER, H_2O. A chemical compound of hydrogen and oxygen, formed by the union of two volumes of the former with one of the latter, or, what is the same, containing 11.136 per cent by weight of hydrogen and 88.864 per cent of oxygen. (See CHEMISTRY, especially historical section.) It is formed by the direct explosive union of its elements at a somewhat elevated temperature. This, however, need not be maintained, during the reaction, by the introduction of heat from outside sources; for the heat developed by the reaction itself (67,500 gram calories for every 18 grams of water formed) is not only sufficient to maintain the temperature necessary for combination, but, in the absence of indifferent gases or of an excess of one of the reacting gases, raises the temperature to 2844° C. (5151° F.). At this temperature about one-third of the reacting gases combine (see REACTION, CHEMICAL), the other two-thirds combining gradually during the subsequent cooling. The reaction may be started by platinum sponge or platinum black (forms of finely divided platinum), or other catalytic agents (see CATALYSIS), such as charcoal, pumice stone, porcelain, rock crystal, glass, etc.; with some of these substances, however, it is necessary besides to apply heat, although the initial temperature need not be quite so high as in their absence.

Liquid Water. Water is well known in the three states of aggregation—liquid, solid, and gaseous. Under normal atmospheric pressure, water is liquid between 0° C. (32° F.), its freezing point, and 100° C. (212° F.), its boiling point. Its greatest density is at about 4° C. (39.2° F.), at which temperature one cubic centimeter weighs, in vacuo, one gram. Its specific heat exceeds that of any other substance except hydrogen, the amount of heat required to raise the temperature of one gram from 18° to 19° C. being the most generally adopted unit of heat—the so-called gram calorie. Water is difficultly compressible, 1,000,000 volumes becoming less by only 50 volumes when the atmospheric pressure is doubled. When viewed through layers of considerable height, pure water is seen to possess a bluish tinge. Soft potable waters have a brownish color. Water containing traces of calcium carbonate in suspension appears opaque if viewed through a sufficiently high column; but the opacity is gradually destroyed if carbonic acid gas is passed into the water, the color of the latter meanwhile changing gradually through brown, yellow, and green, to blue. On the strength of this observation, it has been suggested that the colors of natural waters may be due in part to the varying amounts of carbonic acid contained by them, although the nature of the bottom and the color of the sky largely determine the color of waters, beyond doubt. Liquid water is a poor conductor of heat, and when perfectly pure is one of the poorest known conductors of electricity. The purification of water for scientific purposes is best effected by distillation An efficient method consists in dissolving a small amount of potassium permanganate in a quantity of ordinary water, allowing it to stand for a day, then adding a further amount of potassium permanganate and some caustic potash and distilling, preferably in an apparatus provided with a platinum condenser (the metal of the apparatus must be free from lead); the first portions of the distillate should be rejected, and the distillation should be interrupted after about four-fifths has passed over; the intermediate portion may be further purified by dissolving in it a small amount of acid potassium sulphate and redistilling Natural waters may be classified according to their origin. Rain water, which forms by the condensation of the aqueous vapor more or less abundant in the air, is the purest of all natural water, although it takes up foreign substances in its passage from the clouds to the earth, and always contains ammoniacal salts, sodium chloride, and other inorganic salts, as well as traces of organic matter of various kinds. Rain water collected in places where much coal is burned invariably contains traces of sulphuric acid derived from the oxidation of the sulphur from the pyrite present in most coals. Surface water, which includes the water from rivers, is of course less apt to be pure than rain water, its character being determined largely by the nature of the soil over which it passes, and by the vegetation on the surface. The mineral ingredients are usually carbonates, chlorides, and sulphates of the alkalies and alkaline earths, with small quantities of iron and manganese, while the organic matter is of vegetable origin. Well water is that derived from wells or bore holes made in the surface of the earth, and includes the water from shallow wells and that from deep wells. The shallow wells serve chiefly as the source of domestic supply, especially in country districts, and their water is liable to contamination from sewage and other refuse animal matter, owing to the fact that they are invariably sunk in the immediate vicinity of human dwellings It is to such sources that epidemics of typhoid fever and similar diseases are often traced. Nitrates, nitrites, and ammonia are the constituents commonly found in such waters, and their presence indicates contamination of a dangerous character. Wells more than 100 feet in depth, and especially artesian wells, are used as sources of water, chiefly in cities, for manufacturing plants, which contains only mineral ingredients. Mineral waters (q.v.) possess more or less marked medicinal properties, in consequence of the considerable amounts in them of substances capable of exercising various physiological effects. Sea water is the water which forms the ocean, and as it is constantly receiving the waters more or less impure from rivers, and at the same time losing pure water in the form of vapor by means of evaporation, the impurities

remain behind, and have given to this water its well-known saline character. An analysis of sea water shows traces of nearly every known element; its salinity varies in different parts of the world. When it freezes the resulting ice is practically free from salt. Waters are distinguished as hard and soft according as they contain large or small quantities of calcium or magnesium salts in solution, and this fact may be determined by an examination with a soap solution, the addition of which causes the formation of lather when the quantity added is sufficient to have rendered the water soft.

Ice or Solid Water. The passage of water from the liquid to the solid state is accompanied by an expansion equal to about one-eleventh of its volume; hence water freezing in pipes may easily cause them to burst. The normal freezing point of water varies but slightly with the external pressure; considerable pressures, however, cause a marked depression of the freezing point. (See FREEZING POINT; MELTING POINT.) Besides, if carefully kept out of contact with the air, water may be readily undercooled to temperatures far below its freezing point; it is then, however, in an exceedingly unstable state, and mere contact with a sharp-edged body, or especially exposure to the air, causes the entire mass to freeze very rapidly, the temperature simultaneously rising to the normal freezing point. The heat developed during the freezing of one gram of water is 79 06 calories Natural ice is transparent and highly coherent. Ice of similar properties is obtained artificially when the cooling medium employed is only about one degree below the freezing point; the ice formed at lower temperatures occludes minute globules of air, and these render it whitish and more or less opaque. Besides ordinary ice, water forms several other forms of ice, discovered by Tammann and by Bridgman (see ICE). Bridgman's "Ice V," which can exist only under high pressures, can be heated to nearly 80° C. (176° F.) without melting.

Water Vapor, or Gaseous Water. This is a normal constituent of the atmosphere (q.v.). The passage of one gram of liquid water into steam at 100° C. (212° F.) involves the absorption of as much as 536 calories of heat. At every temperature water vapor can only exist below a certain maximum of pressure, viz, the vapor pressure of water at that temperature. Under that pressure the vapor is said to be saturated. Stronger pressure causes liquefaction, unless the temperature is above the critical point, which, according to Battelli, is about 364° C. (about 687.7° F.). (See CRITICAL POINT.) Water vapor is colorless and perfectly transparent, unless it is allowed, in the saturated state, to escape into the cold air, when condensation causes the formation of minute bubbles that produce the characteristic appearance of steam.

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WATER, HOLY See HOLY WATER.

WATER, MINERAL. See MINERAL WATER.

WATER AVENS. See GEUM.

WATER BABIES, THE. A fanciful tale by Charles Kingsley (1863).

WATER BEAR, or BEAR ANIMALCULE. See TARDIGRADA.

WATER BED. A rubber bed-tick, designed to be filled with water and to take the place of an ordinary mattress on a sick bed. Its use decreases the probability of the formation of bed sores (q.v.). Objections to it are its great weight when filled, its liability to become cold, thus chilling the patient, and the difficulty of drawing off the contents and replacing them with warmer water. The air mattress, constructed on the same principle, meets all the requirements and is free from the foregoing objections. It is provided with a valve stem through which it may be inflated with an air pump.

WATER BEECH. See HORNBEAM.

WATER BEETLE. Any beetle which lives in or upon the water; more specifically, one of the true water beetles or water tigers of the family Dytiscidæ. They live in the water both as larvæ and as adults, although they are probably modified terrestrial insects resembling the ground beetles of the family Carabidæ. The pupa is terrestrial. They are elliptical convex insects with the hind legs formed for swimming. The wing cases fit perfectly to the body except at the tip, so as to form an air-tight space above the body proper. This space is the air chamber, and the beetle rises to the surface of the water, exposing the tip of its body and drawing in a supply of air which will last it for some time, when it goes below the surface again. The larvæ of the true water beetles are very rapacious, and suck the juices of small, soft aquatic insects. The mandibles are hollow, with a hole near the tip and another at the base, thus being fitted for suction. The water beetles are more numerous in temperate and boreal than in tropical regions. About 2000 species are known, of which nearly 400 inhabit the United States.

Whirligig beetles of the family Gyrinidæ are small oval forms which swim about on the surface of the water, usually darting in curious curves, from which habit the popular name is derived. They can dive, carrying with them a small supply of air, but their proper life is on the surface. The two hind pairs of legs are so modified as to form paddles. The larvæ are aquatic and are elongate with sharp mandibles. They are carnivorous in the larval stage as well as in the adult. About 350 species are known, of which nearly 40 occur in the United States.

The water beetles of the family Hydrophilidæ are sometimes called water scavenger beetles. The larvæ are predaceous and carnivorous, but

the adult beetles are, as a rule, vegetable feeders, though they will prey upon small aquatic animals. They are usually dark-colored, of elliptical shape, and do not swim as readily as do the other water beetles, nor is the supply of air which may be carried as extensive as with the others. Many species construct egg cocoons, which are sometimes attached to the body of the beetle and sometimes to aquatic plants, and frequently unattached, floating on the surface of the water. From 20 to 100 eggs are laid in each cocoon. About 1200 species are known, and of these 175 are found in the United States and about 90 in England. Other beetles, such as the Amphizoidæ and Pelobiidæ, live in the water in their early stages. The strangely modified parasitic beetle, *Platypsyllus castoris*, found commonly upon the beaver, might also with justice be called a water beetle. Consult L C. Miall, *The Natural History of Aquatic Insects* (London, 1895), and V. L. Kellogg, *American Insects* (2d ed, New York, 1908).

WATER BIRDS. A group of birds alike in their adaptations to an aquatic life. Such are the sea birds, or Steganopodes, as the cormorant; the auk tribe, gull tribe, and other marine groups; and the great tribe of fresh-water aquatic birds represented by the swans, geese, and ducks. Water birds are swimmers and divers, and are more or less completely web-footed, thus being furnished with paddles and with broad supports in walking upon muddy shores. All get their food mainly from the water—fish, amphibians, reptiles, shellfish, and small aquatic animals, or else aquatic vegetation. Their plumage is dense, oily, and, except in the ducks, usually of plain black, white, and brown colors; they nest on the ground, as a rule, laying unspotted eggs, except auks, gulls, etc.; the fresh-water section affords many birds esteemed for food and sport, and several domesticated species of great value. Consult S. F Baird and others, *History of North American Water Birds* (2 vols., Boston, 1884), and H. K. Job, *Among the Water-Fowl* (New York, 1902) See Colored Plate of WATER BIRDS.

WATER BOATMAN. An aquatic bug of the family Corixidæ, in which the head is free, capable of great rotation, and attached to the thorax only by a narrow area. The water boatmen are mottled bugs of oval shape found swimming on the surface of ponds and streams. They are at home beneath the water as well as on the surface, and remain there for a long time, since the fine body hairs retain a film of air. They hibernate in mud at the bottom of ponds or streams. The eggs are laid under water, and are attached to stems of aquatic plants. When their pools dry up they fly to other water, and are sometimes attracted to lights at night. About 40 species occur in the United States, all belonging to the genus Corixa The eggs of *Corixa mercenaria* and *Corixa femorata* are laid in enormous numbers in the lakes near the city of Mexico, and are made into cakes with meal by natives and half-breeds. The adults also are eaten in Mexico and in Egypt.

WATERBRASH. See PYROSIS.

WATER BUCK, or KOB. One of the large marsh-loving African antelopes of the genus *Cobus* or *Kobus*, several species of which go by other names, as singsing (q.v.). The water buck proper (*Cobus ellipsiprymnus*) is more than four feet tall, and remarkable for its long, shaggy, reddish coat. It is numerous all over southern and eastern Africa, roving in small bands about stony hills near the marshy rivers, to which it runs for refuge when alarmed. Its flesh is very poor eating. See Plate of ANTELOPES.

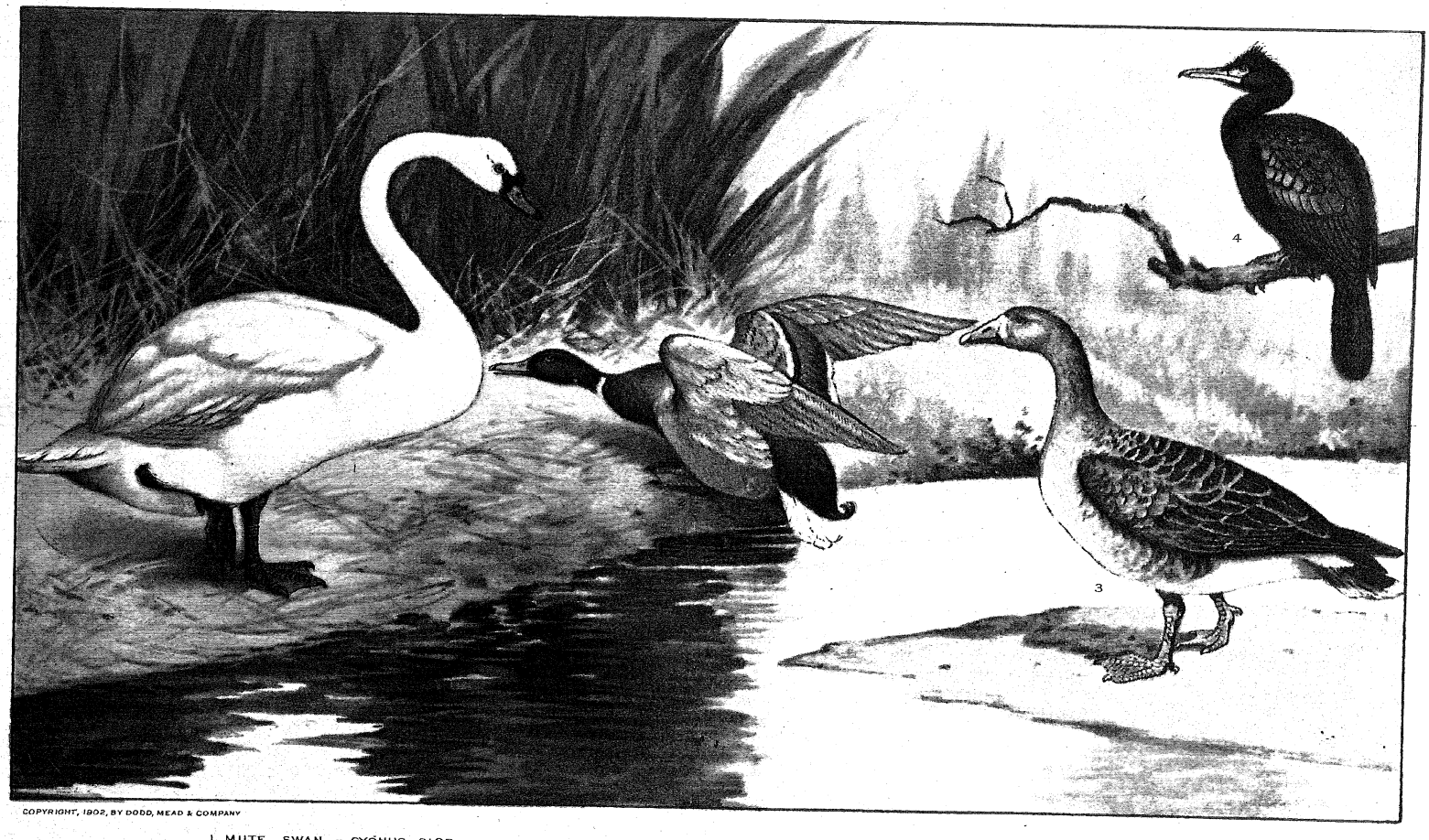
WATER BUFFALO. See BUFFALO.

WATER BUG. In general terms, any aquatic insect of the order Hemiptera, including all of the members of the six families composing the group Cryptocerata or Hydrocorisæ, as well as the Hebridæ and Hydrobatidæ. (See WATER STRIDER.) The families Corixidæ (see WATER BOATMAN), Nepidæ (see WATER SCORPION), Galgulidæ (see TOAD BUG), and Belostomidæ (see FISHKILLER) belong to this group.

The back swimmers of the family Notonectidæ are predaceous water bugs resembling the water boatmen, but the dorsum is very convex and they always swim with the ventral surface upward, a habit which distinguishes them from all other water bugs. The female pierces holes in the stems of water plants for her eggs. The adults hibernate in mud at the bottom of streams and ponds. About a dozen species are known in the United States. These as well as water boatmen are sometimes known as boat flies, as they occasionally leave the water and fly around lights at night. The creeping water bugs of the family Naucoridæ are small, flat-bodied, oval water bugs found in ponds containing plenty of vegetation, on which the creepers crawl or about which they swim, feeding upon land insects which have accidentally fallen into the water. The marsh treaders of the family Hydrometridæ resemble the water striders, but are more slender and delicate. The adults of the commonest species (*Hydrometra lineata*) hibernate under rubbish along the banks of slow streams and ponds, and lay their eggs singly on the stems of aquatic plants. The larvæ fall into the water and remain near the bank, feeding upon the bodies of insects which fall into the stream. The only other true bugs which are in any way aquatic belong to the family Hebridæ, which contains very small species of semiaquatic habits, found in wet moss and littoral vegetation. The common cosmopolitan German cockroach or croton bug (*Ectobia germanica*) is often called water bug in the United States, since it is found near water pipes in houses. See COCKROACH.

WATERBURY, wȧ'tĕr-bĕr-ĭ. A city and one of the county seats of New Haven Co, Conn., 33 miles southwest of Hartford, on the Naugatuck River and on the New York, New Haven, and Hartford Railroad (Map: Connecticut, C 3). It is attractively situated in the heart of the Naugatuck valley. There are four parks—Centre Square, Hamilton, Chase and Union Square, and Riverside Cemetery—of great natural beauty. Among the educational institutions are St. Margaret's Diocesan School for Girls (Episcopal), the Convent of Notre Dame, and the Gerard School. Noteworthy features include: the Silas Bronson Library (97,000 volumes), the Mattatuck Historical Society collection of paintings, historical statuary and medallions, Mulcahy Memorial Hall, the Municipal Building, Union Station, the Federal Building, Elton Hotel, and the county courthouse. The Eagles and Elks orders have homes here. Among the charitable institutions are St Mary's and Waterbury hospitals, Southmayd Home for Old Ladies, and two day nurseries. Waterbury has large industrial interests. It is the leading centre of the United States for the manufacture

WATER BIRDS



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1 MUTE SWAN – CYGNUS OLOR 1/10 NATURAL SIZE
2 MALLARD DUCK – ANAS PLATYRHYNCHOS 1/10 " "
3 GRAYLAG GOOSE – ANSER ANSER 1/10 NATURAL SIZE
4 AFRICAN CORMORANT – PHALACROCORAX AFRICANUS 1/10 " "

of brassware (including castings and finishings), and is noted for the manufacture of watches and clocks There are also copper, oroide, silver, and aluminium works, foundries, and machine shops, woolen mills, and manufactories of presses, stamp and steel dies, machinery of many kinds, pressure gauges, brass and steel oilers, rivets, chains, hardware and nails, boilers, cloth, lamps and reflectors, cutlery, bicycle and automobile trimmings, buckles, cartridges, insulated wire, silk thread, etc. Excellent water power has contributed largely to the city's industrial success. The capital invested in manufacturing enterprises, according to the census of 1914, was $48,921,000, while the total value of the products was $50,659,000. The government is vested in a mayor, chosen biennially, and a unicameral council. The water works are owned and operated by the municipality. Municipal expenditures in 1915 were: education, $585,000; streets and bridges, $284,000; fire, $133,000; police, $107,000; charity, $68,000. Pop., 1900, 45,859; 1910, 73,141; 1915, 87,745; 1920, 91,410.

Settled in 1674, Waterbury was part of Farmington until 1686, when it was incorporated as a town and its present name adopted in place of the old Indian name, Mattatuck. In 1691 it suffered greatly from a flood, and in 1712 an epidemic, called the "Great Sickness," carried away one-tenth of its inhabitants. It was incorporated as a city in 1853. In 1900 the town and city of Waterbury were united into one municipality. Consult Anderson (editor), *The Town and City of Waterbury* (3 vols., New Haven, 1896).

WATERBURY. A town in Washington Co., Vt, 12 miles by rail northwest of Montpelier, the State capital, on the Central Vermont Railroad (Map: Vermont, C 3). It contains the State Hospital for the Insane and the Henry Janes Library. There are extensive granite-quarrying interests and a shoe-last factory Pop., 1900, 2810, 1910, 3273

WATER CALTROPS. Aquatic plants. See TRAPA; WATER CHESTNUT.

WATER CHESTNUT. The edible seeds of the *Trapa natans*, a European and Asiatic species found in a few localities in the United States, called by the French *marron d'eau*. In China the fruit of *Trapa bispinosa*, known as *ling ko*, is common, it having been included among the five food grains of China The seeds do not keep well, and those offered in bazars are often decayed. The fresh nuts resemble chestnuts in taste. The name "water chestnut" is also given to the edible tubers of the *Eleocharis tuberosus*, a plant of the family Cyperaceæ, which is cultivated by the Chinese in tanks very abundantly supplied with manure. It is destitute of leaves, except a slender short sheath or two at the base of each culm. The tubers are produced on stolons. They are esteemed by the Chinese for food.

WATER CHINQUAPIN. See NELUMBO.

WATER CLOCK. See CLEPSYDRA.

WATER-CLOSET. See PLUMBING.

WATER-COLOR PAINTING (AQUARELLE). The process of painting by means of colors mixed with water and some adhesive, as gum or size, instead of oil. The term is now generally used for such painting upon paper which shows through as a ground. It differs from gouache painting, in which the color is applied in successive layers, as in oil. The processes of painting in vogue before the introduction of oil colors were, for the most part, varieties of water color, as, e g, fresco painting (q.v.), in which water colors are applied to the wet line of the plaster, and tempera (q.v.). For the technique of painting among the Egyptians, Greeks, and other ancient peoples, whose works, although they made use of water colors, are not aquarelles in the modern sense, see EGYPTIAN ART; GREEK ART; CHINESE ART; ETC.

In early Christian miniatures and book illustrations water color was the medium usually employed. They were designed with the silver point, drawn with the pen, and then colored with light tints During the Byzantine and Romanesque periods the more elaborate gouache technique was preferred, but the Gothic age saw a revival of the aquarelle From the treatise of Cennini, a disciple of Giotto, we know that these illuminators had greatly advanced upon their predecessors; they had an elementary knowledge of light and shadow and used about the same variety of colors as contemporary panel painters. In the later fifteenth century water colors were extensively used in the coloring of prints from wood engravings, and to some extent of those from line engravings, a practice which lingered until the seventeenth century They were also extensively used during this period in drawings and in colored sketches by many of the principal masters.

Such, indeed, was the origin of modern water color. It was the custom of Dürer and certain of the German, Dutch, and Flemish artists to outline drawings with a reed pen and fill in those outlines with an auxiliary flat wash. Gradually the hard lines were replaced by touches with the brush, and the result was a monochrome in browns, and grays, bistre, or India ink. These again came to be tinted, and so suggested the full use of colors. Rembrandt often drew in brown, and added dashes of strong color; and Rubens produced something very like modern water-color drawings. The modern art became emancipated from the old traditions by "gradual disuse of the old shadow tint, and imitation of the local color, not alone of the objects themselves, but of every modification resulting from light, dark, half tint, or distance, a method which at once led to far greater truth and richness than could ever have been attained by merely passing color over the universal shadow tint." The stained drawing gradually gave way to the more perfect tinted drawing. But the tinted style predominated till 1790; and it may be said that the water colors of the eighteenth century were tinted monochromes. Paul Sandby (1725–1809), often called "the father of water-color art," improved upon the tinted drawings by finally working in body color with considerable skill. Whateley, Westall, and Gilpin used water colors as well as oil. Rowlandson, Cristall, Hills, Wright, Mortimer, Gresse, Hearne, and John Robert Cozens (1752–?1799), developed atmospheric effects in a manner before unknown. Thomas Girtin (1775–1802) attained great richness of tone and breadth; his compositions were grand but simple; he massed light and shade in broad and sometimes abrupt forms. J. M. W. Turner (1775–1851) soon distanced all his predecessors and contemporaries, and in his hands water-color painting became a new art. He wholly abandoned preliminary tinting; minute details are imitated in local color; and his work is marked by breadth, fullness, and warmth, as

well as grace. Other important names are those of Varley, Samuel Prout, who excelled in brilliant effects of light and shade, Peter de Wint, Cotman, David Cox, especially noteworthy in excellent atmospheric effects, Copley Fielding, noted for his truthful rendering of rain storm and marine effects, Cattermole, and Birket Foster, who developed mood painting in water color. Millais, Rossetti, Holman Hunt, Ford Maddox Brown, and other members of the Pre-Raphaelite Brotherhood, achieved success in water color, as did also Sir Hubert Herkomer, Walter Crane, Frederick Taylor, H B. Brabazon, a brilliant colorist, Frederick Walker, and Arthur Melville.

The impetus towards water color in France first came in the early twenties from the Englishman Bonington and from Géricault. It was soon practiced by all important artists, among whom Delacroix, Isabey, and especially Decamps achieved most remarkable results. Among celebrated French aquarellists of a later date were Leloir, Meissonier, Regnault, Detaille, and Vibert, among figure painters; and Jaquemart, scapists. The very popular fan painting upon silk and satin is done with water colors, which have lately been applied, with high success, to paintings upon canvas and other materials as well. In Germany water colors were used by Schwind with great effect in the portrayal of his dreamlike fables, but the first important German aquarellist was Hildebrandt, a pupil of Isabey. Other important representatives are Menzel in Berlin, Karl Werner, and Fielder (Triest). Both in Holland (Israels) and Belgium are flourishing schools, and in Spain and Italy the example of Fortuny gave rise to a particularly brilliant development.

In the exhibitions of water-color paintings yearly held in the United States, particularly in New York and Philadelphia, great variety in technique and subject is seen, but no distinctive American school has as yet been developed. Among the artists prominent in figure painting are Winslow Homer, J S. Sargent, William M. Chase, C. Y. Turner, Robert Blum, Irving R. Wiles, Frank Benson, and Cecilia Beaux; in landscape may be mentioned Alexander Wyant, J. Francis Murphy, Samuel Coleman, R. Swain Gifford, Henry Farrar, Childe Hassam, C. C. Cooper, Gifford Beal; in marine painting, William T. Richards, Charles Woodbury, and Charles A. Platt; in genre, Walter Gay. Among others, belonging to a younger group, are Hilda Belcher, Helen Turner, Harold Camp, C. K Chatterton, H. B. Demuth, Arthur Davies, John Sloan, Samuel Halpert, and John Marin.

At present water-color paintings may be devided into three kinds: (1) those in which the coloring is mainly transparent; (2) where it is usually opaque; (3) where transparent, semi-transparent, and opaque colors are freely used in combination. The quick drying of water-color pigments is favorable to rapid execution, and greater clearness of color is attained than is practicable in oils. They are especially adapted to sketches of all kinds, and the rendering of fugitive impressions, and retain color far better than oil paintings. The progress of the art has been greatly promoted by modern chemical developments in the preparation of the colors—great variety of really permanent colors being now procurable. These are pigments ground with gum or other mucilage, and may be kept in cakes, the usual vehicle for moistening and applying them being gum arabic and water. For artists they are now usually prepared so as to be kept moist in earthenware pans or metallic tubes.

The earliest organized society for the promotion of the art was the British Society of Painters in Water Colors, founded in London in 1804, and known since 1882 as the Royal Society, which has held exhibitions since 1805. Societies exist in other countries where the art is practiced The Société des Aquarellistes Français in Paris was founded in 1879 The American Water-Color Society has held yearly exhibits in New York since 1867, and the New York and Philadelphia Water-Color clubs hold annual exhibitions The South Kensington Museum possesses what is probably the finest collection of water colors in existence.

Bibliography. For the technical side, consult John MacWhirter, *Landscape Painting in Water Color* (London, 1900); A. L. Baldry, *The Practice of Water-Color Painting* (ib., 1911) For the English school, consult Monkhouse, *The Early English Water-Color Painters* (London, 1889); Redgrave, *Water-Color Painting in England* (ib., 1892); A L. Baldry, *Royal Institute of Painters in Water Colors* (New York, 1906); H. M. Cundall, *History of British Water-Colour Painting* (London, 1908).

WATER COLORS. Pigments mixed with water, with the addition of some adhesive material such as gum or size. Those prepared for artists' use are made with great care and are generally formed in dry cakes with gum, or mixed with water and glycerin to a pasty consistency, while those that are used for sign painting or coloring walls are simply mixed up with common glue or size. The latter are sometimes called distemper colors, their application being only of a temporary character. See PAINTS.

WATERCOURSE. In law, a living stream of water usually flowing in a well-defined bed or channel into some other body of water. It does not lose its character as a watercourse if it becomes dry in times of unusual drought, but it must have such a permanent and substantial source of supply as not to depend upon mere surface drainage in case of rain. The source may be living springs or from natural percolation, but must be sufficient to supply water during the greater part of the year. For a discussion of the rights of owners of land along watercourses, see RIPARIAN RIGHTS; WATER RIGHTS. Consult Farnham, *Law of Waters and Water-Rights* (Rochester, 1904).

WATER CRAKE, or WATER-OUZEL. See OUZEL.

WATERCRESS. See CRESS and Plate of SALAD PLANTS.

WATER CURE. See HYDROTHERAPY.

WATER DEER. See CHEVROTAIN.

WATER DOG, or WATER SPANIEL. See SPANIEL.

WATER DOG. See HELLBENDER; MUD PUPPY

WATER DROPWORT (*Œnanthe*). A genus of large perennial plants of the family Umbelliferæ, with compound or decompound disagreeable smelling leaves. The common water dropwort (*Œnanthe crocata*) is common in wet places throughout Europe. The roots of the latter have some resemblance to small parsnips, but are very poisonous. The fine-leaved water dropwort, called water fennel by the Germans

(*Œnanthe phellandrium*), is also common in similar situations in Europe. It is characterized by a jointed rootstalk (rhizome), with tufted whorled rootlets and a strong zigzag stem dilated at the base. Neither of these plants occurs in the United States unless as a rare introduction.

WATEREE (wa'tĕr-ē') **RIVER,** called in its upper course the CATAWBA. A river which rises in the Blue Ridge in North Carolina and flows southeast into South Carolina, where it unites with the Congaree to form the Santee (Map: South Carolina, D 2). Its length is about 300 miles, and it is navigable to the fall line a few miles above Camden, S. C.

WATER ELEVATORS. See PUMPS AND PUMPING MACHINERY.

WATER ENGINE. See HYDRAULIC PRESSURE ENGINE.

WATERFALL. The sudden descent of a stream of water over a declivity. It is the result usually of erosion on rocks of different hardness. A remarkable series of waterfalls exists along the inward edge of the Atlantic coastal plain, in the neighborhood of the cities that lie between Trenton, N J, and Augusta, Ga. Along this line the more resistant rocks of the older strata come to the surface; the weaker rocks lie to the east of this region, which is often called the fall line. On the other hand, in the case of mountain torrents, where the rocks are very hard, the quantity of water small, and the erosive action quite weak, beautiful and artistic waterfalls and cascades are numerous. The highest waterfalls are mountain cataracts; thus the waters of the Yosemite, California, fall 2660 feet in three leaps. The Oroco Falls of Monte Rosa are 2400 feet high; the Grand Falls of Labrador, 2000 feet; the Gavarnie, in the Pyrenees, 1400 feet; and the Staubbach, Switzerland, 1000 feet. The falls that are famous for the immense quantity of water passing over, rather than the extreme height, are the Falls of Niagara, from 150 to 164 feet, those of Iguassu on the Paraná River, 200 feet, and the Victoria Falls of the Zambezi, 400 feet. The Kaieteur Falls in British Guiana rank among the greatest in combined height and flow with a single leap of 741 feet.

WATER FLEA (so called from its skipping like a flea through the water). A phyllopod crustacean, especially of the genus *Daphne*, whose minute species are common in fresh water. See BRANCHIOPODA; COPEPODA; PHYLLOPODA.

WATERFORD, wą'tĕr-fērd. A maritime county of the Province of Munster, Ireland (Map: Ireland, D 7). Area, 717 square miles. The surface is generally mountainous, and there are large marshy districts. About one-half of the area is pasture land, and but a small area is under tillage. Pop., 1901, 87,187; 1911, 83,766. County town, Waterford. Historically Waterford has been one of the chief strongholds of the English in Ireland.

WATERFORD. The capital of Waterford County, Ireland, on the Suir, 12 miles from the sea, and 97 miles south-southwest of Dublin (Map: Ireland, D 7). The city, with the exception of its Ferrybank suburb, with which it is connected by a bridge of 39 arches, 852 feet long, lies on the right bank of the river, along which a handsome and spacious quay extends for nearly a mile, and from which the city ascends gradually in well-built streets. The chief public buildings are the Protestant and Roman Catholic cathedrals, the Protestant Episcopal palace, the Roman Catholic College of St John, and the national school. Ring or Reginald's Tower, an important archæological monument, erected in 1002, was rebuilt in 1819 In addition to the union workhouse, there are an infirmary, a dispensary, a fever hospital, a district lunatic asylum, and a penitentiary. Vessels of 2000 tons are able to discharge their cargoes at the quay, and there is anchorage for larger ships 6 miles lower down the river, at Passage. The chief trade is with England The exports comprise butter, pork, bacon, oats, eggs, and live stock. The imports include maize, wheat, flour, petroleum, sugar, and timber. There is a shipbuilding yard, with patent slip, graving bank, and dock, on the Kilkenny bank of the river, and other industrial establishments include distilleries, breweries, foundries, and flour mills. Originally of Danish foundation, Waterford was taken by Strongbow, by whom it was enlarged. It received a charter from John, which was forfeited under James I, but restored by Charles I in 1626. Pop, 1901, 26,743; 1911, 27,430.

WATERFORD. A town in New London Co., Conn, on the Thames River, 3 miles above New London, and on the New York, New Haven, and Hartford Railroad (Map: Connecticut, G 4). Granite quarrying and cutting and the manufacture of paper are the chief industries. Waterford was part of the city of New London until 1802 when it was incorporated as a separate town. Pop, 1900, 2904; 1910, 3097.

WATERFORD, wą'tĕr-fērd. A village in Saratoga Co, N. Y., on the west bank of the Hudson River, at the junction of the Erie and Champlain divisions of the State Barge Canal, and on the Delaware and Hudson Railroad (Map: New York, G 5). It contains the Breslin Old Ladies' Home and a fine library There are manufactories of knit goods, gloves, fire hydrants, valves, stocks and dies, brush-making machinery, cooperage products, and lathes. Excellent water power is derived from the Mohawk River which here flows into the Hudson. Havre Island, of Revolutionary interest, lies within the town limits, separated from the village by the Mohawk. Pop., 1900, 3146; 1910, 3245.

WATER GAS. See GAS, ILLUMINATING.

WATER GLASS, or SOLUBLE GLASS. A term applied to alkaline silicates containing an excess of alkali and soluble in water. Three varieties of water glass are in use, viz.: 1. Potash water glass, or potassium silicate, prepared by fusing together three parts of silica (sand) and two parts of potassium carbonate, with a small quantity of charcoal, in an ordinary reverberatory furnace, the product being soluble in four or five parts of boiling water. 2. Soda water glass, or sodium silicate, prepared by melting together 15 parts of silica (powdered quartz), 8 parts of sodium carbonate, and 1 part of powdered charcoal, heating for five or six hours, then cooling, powdering, and extracting with five or six times its weight of boiling water. Another process consists in boiling silica in a digester with strong caustic soda under heavy pressure. Thus is obtained the original water glass invented by Fuchs of Munich, who first described it in 1825. 3. The so-called double water glass consists of a mixture of both of the foregoing. It may be made by fusing together 100 parts of silica, 28 parts of potassium carbonate, 22 parts of sodium carbonate, and 6 parts of powdered charcoal. These

substances find extensive practical application. When used in the form of varnish or paint they produce a fireproof and waterproof surface. When applied as a coating to a surface containing lime, they combine with the latter, forming an infusible silicate or artificial stone. This process has been taken advantage of for the preservation of frescoes, and is known as stereochromy It has also been utilized for the manufacture of artificial stone, and of a cement for consolidating siliceous sand into a hard, durable artificial sandstone, capable, before it is fired, of being molded into any desired form Owing to its water-retaining and hardening qualities water glass is extensively used as an ingredient of yellow laundry soaps. It is also employed in the manufacture of earthenware, and as a substitute for dung in the dyeing and printing of fabrics. Water glass properly diluted is recommended as a preserving liquid for eggs.

WATER GRATES (for furnaces). See SHAKING GRATES

WATER HEMLOCK. See HEMLOCK and Plate of POISONOUS PLANTS.

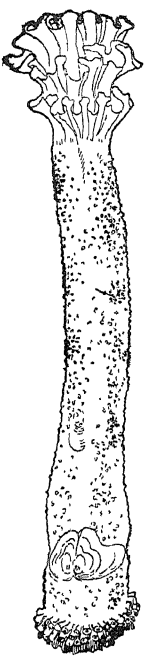
WATER HEN. Any one of several rails and gallinules (qq.v.).

WATERHOUSE, wa'tĕr-hous, ALFRED (1830–1905). An English architect, born at Liverpool. He studied with Richard Lane at Manchester, and afterward in France and Italy. His first work of importance was the Court of Assize at Manchester. His next works were the new buildings of Balliol College, Oxford, and of Caius College, Cambridge. Other important buildings are the Manchester City Hall; Pembroke College, Cambridge; Owens College, Manchester; the South Kensington Natural History Museum, London; Eaton Hall, Cheshire; and Iwerne Minster, Dorsetshire. He was one of the most noted and successful of the architects who developed the Victorian Gothic movement to adapt the mediæval styles to modern secular purposes. All his works are in the Gothic style except the Natural History Museum, which is in a free version of the French Romanesque.

WATERHOUSE, JOHN WILLIAM (1849–1917). An English figure painter He was born in Rome, Italy, and studied for a short time at the Royal Academy schools in London, but was mostly self-taught. At first he painted in the manner of the classic school of Leighton and Tadema, excelling in the poetic rendering of ideal subjects, remarkably rich in color and highly decorative in design. But his later works suggest Pre-Raphaelite influence. They include "The Oracle" (1884); "St. Eulalia," "The Magic Circle" (1886), "The Lady of Shalott" (1888), all in the Tate Gallery, London; "Hylas and the Nymphs" (1897, Manchester Art Gallery); "Echo and Narcissus" (1903, Liverpool Art Gallery); "The Soul of the Rose" (1908); "Thisbe" (1909) Waterhouse became a Royal Academician in 1895. Consult A. L. Baldry, *J. W. Waterhouse and his Work* (London, 1902)

WATER HYACINTH. See AQUATIC PLANTS.

WATERING-POT SHELL, or ASPERGILLUM. The shell and tube of a strange little bivalve (*Brechites* or *Aspergillum vaginiferum*, of the Red Sea), related to the date shells and shipworm (*Teredo*), which only as an embryo presents the appearance of a normal bivalve. From a floating egg, it ceases very early to live free, and while no more than ⅛ of an inch long sinks into the sand, or adheres to some fixed object, and begins to form a long upward-growing calcareous tube The little valves appear to be discarded and become soldered into the wall of the sheath, which enlarges upward in pace with the growth of the mantle and siphons, and for their protection, it is usually about the size of a pipe stem. Downward, the animal closes in the sheath by a disk perforated by many tubes, each secreted by a tentacle-like filament of the mantle. A dozen or more species are recognized, all Oriental, and many strangely distorted. The frills around the upper edge of the shell protrude from the sand in which the remainder is buried and exhibit stages of growth. Other species bore in rock, coral, or timber; another genus is *Gastrochæna*, in which the valves are not included in the wall of the sheath.



WATERING-POT SHELL.

WATER JET. See PILE; FOUNDATION.

WATER LEMON. See GRANADILLA.

WATER LILY, POND LILY Popular names for species of the genera *Nymphæa* and *Castalia*, of the family Nymphæaceæ. The species, of which there are about 30, are natives of temperate and tropical climates and are all perennial, aquatic herbs. They have rootstocks or tubers, which are embedded in the mud at the bottoms of ponds and shallow, sluggish streams; floating, usually round leaves, and usually showy flowers of many tints, ranging from white to red, yellow, and blue. Under the present system of nomenclature the yellow pond lilies, formerly called Nuphar, belong to the genus *Nymphæa*, while the white, pink, blue, etc., flowered ones are Castalias. They have long been favorite plants in water gardens, and a large number of hybrids and varieties have been produced. The starchy seeds and rootstocks are used for food in many parts of Africa, Asia, Australia, and tropical America. The essentials of water-lily culture are rich alluvial mud at the bottom of a shallow pond, plenty of light, and selection of kinds that are hardy in the climate. As a rule the pond should be deep enough to prevent freezing solid, at least where the lily roots are. Tender kinds may be kept in tubs, which can be sunk in the pond for the summer and stored in a greenhouse during winter. Consult H. S. Conard, *Water-lilies*, published by the Carnegie Institution (Washington, 1905), and Conard and Hus, *Water-Lilies and How to Grow them* (New York, 1907) See Colored Plate of AQUATIC PLANTS.

WATER-LILY FAMILY. See NYMPHÆACEÆ.

WATER LOCUST. See HONEY LOCUST

WATERLOO, wa'tĕr-lōō'. A town in Waterloo County, Ontario, Canada, on the Canadian Pacific and Grand Trunk railways (Map: Ontario, E 7). It has a considerable variety of manufactures. Pop., 1901, 3537; 1911, 4359.

WATERLOO, wa'tĕr-lōō'. A city and the county seat of Monroe Co., Ill., 23 miles south of

St. Louis, on the Mobile and Ohio, and the East St. Louis, Columbia, and Waterloo railroads (Map: Illinois, D 9) The leading manufactures are flour, condensed milk, cigars, and beer. Noteworthy features are the courthouse and city library. Pop., 1900, 2114, 1910, 2091.

WATERLOO. A city and the county seat of Blackhawk Co, Iowa, 53 miles northwest of Cedar Rapids, on the Red Cedar River, and on the Illinois Central, the Chicago Great Western, the Chicago, Rock Island, and Pacific, and the Waterloo, Cedar Falls, and Northern railroads (Map. Iowa, E 2). It is well laid out and has wide streets. Six parks and a Carnegie library are among the prominent features. Waterloo carries on a large jobbing and wholesale trade and has considerable industrial importance. There are beef and pork packing and corn-canning establishments, brickyards, large cream-separator works, and manufactories of concrete work, gasoline engines, farming implements, well drills, refrigerators, cigars, flour, creamery supplies, and foundry and machine-shop products. The Illinois Central Railroad maintains extensive repair and construction shops here. Waterloo was settled in 1850, and was incorporated in 1868. Pop., 1900, 12,580; 1910, 26,693; 1915 (U. S. est.), 34,131; 1920, 36,230.

WATERLOO. A village and one of the county seats of Seneca Co., N. Y., 45 miles by rail west by south of Syracuse, on the Seneca River and the Cayuga and Seneca Barge Canal, and on the New York Central and the Lehigh Valley railroads (Map: New York, D 5). It manufactures woolen goods, wagons, whisky, flour, etc. The Library and Historical Society has a collection of over 7000 volumes. There are public parks and fine county buildings. Pop., 1900, 4256; .1910, 3931; 1915 (State census), 4343.

WATERLOO, BATTLE OF. The decisive battle, the culmination of a series of engagements constituting a brief campaign, which finally annihilated the power of Napoleon. It was fought June 18, 1815, about 2 miles from the village of Waterloo, in Belgium, and 12 miles south of Brussels. Napoleon escaped from Elba in February and entered Paris March 20. His professed devotion to peace made no impression upon the allies, who suspended negotiations at Vienna (see VIENNA, CONGRESS OF) to prepare for a renewal of the struggle. Napoleon made the best preparation possible to recover his empire, but although able to count on paper an army of over 500,000 men, there were but 198,000 actually ready when the decisive moment arrived. Opposed to him were the English, Dutch, Belgian, and Hanoverian forces, with those of Brunswick and Nassau, all commanded by the Duke of Wellington, and those of Prussia, Saxony, and other smaller German states, under the veteran Blücher. These two armies were distributed in the Belgian Netherlands, Wellington having his headquarters at Brussels and Blücher at Namur. The Austrians gathered an army on the eastern frontier of France, which was to be joined by the Russian contingent, the united force to be commanded by Prince Schwarzenberg. Napoleon intended to follow the tactics of rapid and aggressive action that won his early successes. He planned to destroy his enemies on the north before the Austrian and Russian forces could be made effective, and to dispose of Wellington and Blücher separately. He would concentrate near Charleroi, and expected to meet the Germans first, counting on Blucher's aggressive character to bring him into action earliest The forces under Wellington were distributed in numerous cantonments, covering a considerable area about Brussels and to the west of the highway leading south from there. They had the seacoast for their base by way of Antwerp and Ostend. The Rhine, by way of Liége and Maestricht, was Blücher's base. Thus if either army was compelled to fall back on its base the allies would be separated, and Napoleon seems to have expected this by attacking Blücher on the right of that general's line.

The French forces on the eve of the campaign, exclusive of noncombatants, consisted of 124,588 men—89,415 infantry, 23,595 cavalry, and 11,578 artillery with 344 guns. They were distributed as follows. First Corps (D'Erlon), 19,939 men; Second Corps (Reille), 24,361; Third Corps (Vandamme), 19,160, Fourth Corps (Gérard), 15,995; Sixth Corps (Lobau), 10,465; Imperial Guard (the commander, Marshal Mortier, being ill, orders were given through the adjutant general, Drouot), 20,884; reserve cavalry (Grouchy, four corps, with horse artillery), 13,784. There seems to have been uncertainty up to the last minute regarding the wing commanders. Marshal Ney was summoned at the last moment and reached his command, the First and Second Corps, on the afternoon of June 15. Grouchy was taken from his command of the reserve cavalry after the campaign had opened and given the right wing, comprising the corps of Vandamme and Gérard. Marshal Soult served as Napoleon's chief of staff, his old chief, Berthier, having adhered to the Bourbons. Soult had held independent commands too long to be well placed in a staff position; but Napoleon's staff was always the weakest part of his army organization, and its errors on many previous occasions had been counterbalanced only by the initiative of some of his brilliant field officers.

The army under Blücher, who had Gneisenau for his chief of staff, numbered 120,954 men—99,715 infantry, 11,879 cavalry, and 9360 artillery, with 312 guns. Of these the First Corps (Ziethen), 32,692 men, was at Charleroi; the Second (Pirch), 32,704, at Namur, the Third (Thielmann), 24,456, at Ciney; and the Fourth (Bülow), 31,102, at Liége. The line was largely veterans, and Blücher was an experienced old campaigner, not brilliant, but brave, hard-headed, and reliable. The army of Wellington numbered 93,717 men—69,829 infantry, 14,482 cavalry, 8166 artillery with 196 guns, and 1240 engineers, etc. Of these the British numbered 31,253 men; the King's German Legion, 6387; the Hanoverians, 15,935; the Dutch and Belgians, with one body of Nassauers, 29,214; the Brunswickers, 6808; another regiment of Nassauers, 2880; and Nassau engineers, etc., 1240. It was a very miscellaneous body of troops, probably the least efficient in its rank and file of all the three armies.

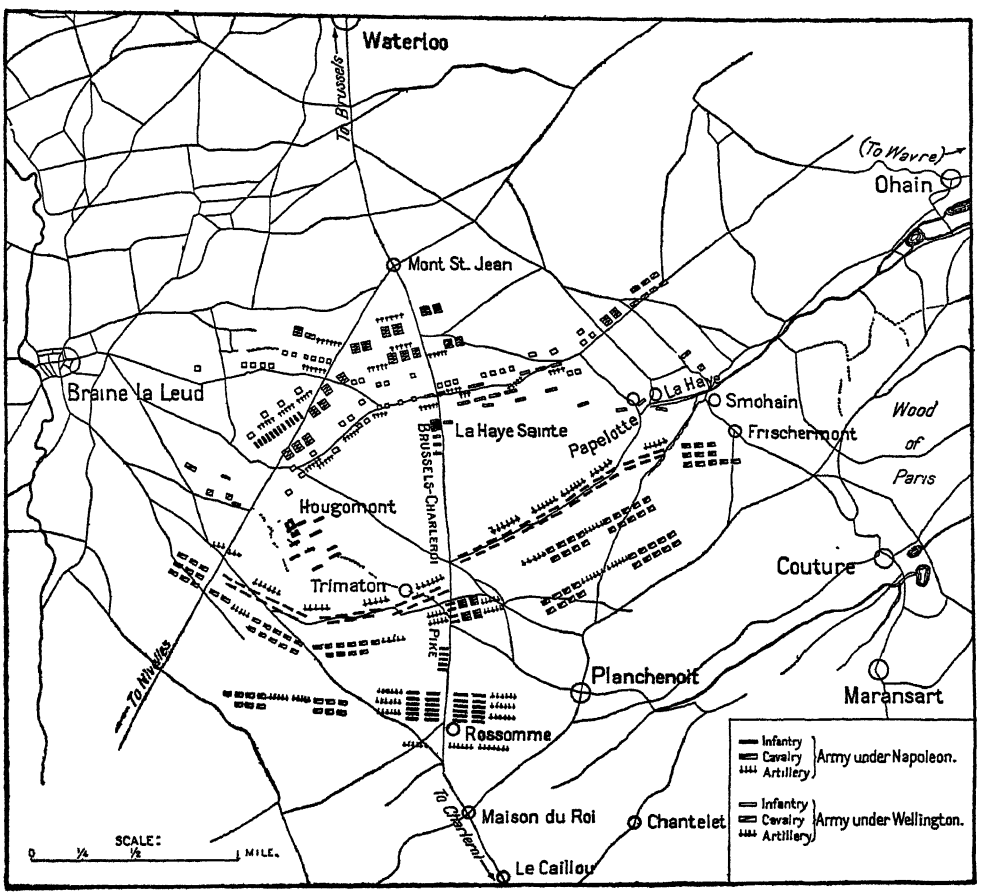
Ligny and Quatre-Bras. The Emperor's advance northward was along the line of the highway through Charleroi to Brussels. The movement began on June 13th, and on the 14th Napoleon's headquarters were at Beaumont. On the afternoon of the 15th the French army began the passage of the Sambre, moved upon Ziethen's position at Charleroi, and slowly forced him back upon Fleurus. Reille advanced on

Gosselies, and had already had an encounter with the Prussian rear guard, when Ney arrived on the field and took command of two corps (the First and Second), with the composition and officers of which he was unacquainted. He continued the advance with Reille's corps through Gosselies to the vicinity of Quatre-Bras, on the main line of communication between Blucher and Wellington. While his German allies were threatened Wellington did not change his position, lest he should uncover Brussels and Ghent. In the afternoon of the 15th learning of the movement towards Quatre-Bras, he began to concentrate his forces, bringing three divisions of about 25,000 men to Nivelles, west of Quatre-Bras. Some of the Netherland troops occupied Quatre-Bras, and they were reenforced on the morning of the 16th by General Sir Thomas Picton with his division. The French were to attack the Prussian position on the 16th in two wings, under Ney and Grouchy, and when Blücher had been disposed of Ney was to move on Brussels. About two o'clock in the afternoon Ney assailed Quatre-Bras, but, owing to reversals of orders, D'Erlon's corps did not join him until he had been forced back upon Frasnes, after hours of desperate fighting. This engagement prevented Wellington from making a flank movement against the French on the Prussian right, which he had promised to make if not himself attacked. At Ligny about 3 o'clock the French divisions of Vandamme and Gérard opened an attack upon Ziethen, who was supported by Pirch and Thielemann. After three hours of hard fighting, the Prussians were thrown into confusion by a charge of the Guard, Blucher himself was disabled, and 21 guns were captured. Napoleon assumed that the Prussians would retreat towards Namur. On the morning of the 17th he wrote to Ney that the Prussians were routed and that Pajol was pursuing them on the roads to Namur and Liége. As a matter of fact, the Prussians under Gneisenau were moving north and converging on Wavre, intending to join Wellington, with whom they were in communication. Wellington had passed the night at Genappe and was preparing to take up a position in force at Quatre-Bras, when he learned of the Prussian manœuvre, which left him in an exposed position. He therefore fell back to Waterloo. At noon of the 17th Napoleon detached Grouchy with 33,000 men to pursue and defeat the Prussians. As the latter had been already eight hours on the march and their real direction was unknown, this was no easy task. Joining Ney with the remainder of his army, Napoleon followed Wellington. Receiving information at Marbais that threw a doubt on his supposition that the Prussians had retreated to Namur, he sent instructions to Grouchy to ascertain whether they were attempting to join the British. When Grouchy received this dispatch, Blücher was nearer to Wellington than Grouchy was to Blücher. When Grouchy reached Gembloux in a heavy rain at ten that night, he knew that the Prussians had marched to Wavre and not to Namur. The main French army arrived at Waterloo late on the 17th and bivouacked opposite the enemy.

Waterloo. Napoleon inspected the position of both armies after midnight, and between 7 and 8 o'clock on the morning of June 18th he saw that his adversary was ordering his army in line of battle. The rain of the night ceased about 8 o'clock, and before nine there was a showy review by the Emperor of his lines. The attack was postponed, however, on Drouot's advice, in order that the ground might be in better condition for artillery. Wellington had the advantage of choice of position and he had taken a strong one. He awaited the attack, relying fully upon the assurance of Blücher that the Prussians would come up in time. About 10 o'clock Napoleon sent to Grouchy to move upon Wavre, but not even then does the Emperor seem to have realized that the whole Prussian force was concentrating there and preparing to aid Wellington.

The main British line stretched across the Brussels-Charleroi road, along the line of the highway from Ohain to Wavre. Outposts held the hamlets of La Haye, Papelotte, and Smohain on the extreme left, and the Château of Hougomont, a strong position, on the right. The farmhouse of La Haye Sainte in advance of the centre was also occupied. Wellington had on the field 49,608 infantry, 12,408 cavalry, and 5645 artillery, with 156 guns; but of these the British troops numbered only 23,991. The left was held by the Fifth and Sixth British divisions, the Second Netherland, and the cavalry divisions of Vivian and Vandeleur. General Picton of the Fifth probably commanded this wing. The three hamlets were held by one of the Netherland brigades under Prince Bernhard of Saxe-Weimar, and Bylandt's Netherland brigade was advanced in front of the Wavre road. In the rear of the left wing was General Ponsonby's Union cavalry brigade (Royal Dragoons, Scots Greys, and Enniskillen Dragoons). West of the Charleroi road lay Alten's Third British Division. A battalion of the King's German Legion, under Major Baring, garrisoned La Haye Sainte. Farther on the right were Cooke's First Division, a part of Byng's Second Brigade, and some of the German troops. Clinton's Second Division and the Brunswick contingent were in reserve near Merbe Braine; Chasse's Netherlanders were on the extreme right, near Braine-la-Leud; and the heavy cavalry brigade of Lord Somerset was in rear, near the Charleroi turnpike, with the Netherlands cavalry on its right. Napoleon had 48,950 infantry, 15,765 cavalry, and 72 artillery, with 246 guns. In his first line the First Corps had the right and the Second the left. According to Napoleon's plan of battle as dictated in the morning, Ney was to open the attack on the right about 1 o'clock, the object being to secure possession of the village of Mont-Saint-Jean, lying on the Charleroi Road in the rear of the British lines. An hour and a half before the time for the main attack a diversion was made in the form of an assault on Hougomont by Prince Jerome's division of Reille's corps. The first assault proving unsuccessful, other divisions were wasted on the unprofitable action, so that the Second Corps took hardly any part in the main attack on the British centre. This was made in echelon about 1.30 o'clock by D'Erlon's First Corps, after a heavy artillery fire had been directed for an hour and a half on Bylandt's exposed position. His brigade was easily routed, but the French pursuing met a terrible fire from Picton's division behind the ridge and were charged by Ponsonby's cavalry and driven back in confusion. The British troops did splendid work in meeting and repulsing this attack. Meanwhile Napoleon had discovered the advance guard of Bülow's Prussian division on the hills of Saint

Lambert, two or three miles away at his right, and the Sixth Corps was detached to hold this new enemy in check, while a dispatch was sent to Grouchy ordering him to return. This Grouchy, having moved off on his fruitless chase to Wavre, did not receive until evening. A rash and ill-managed assault on La Haye Sainte occupied part of the afternoon, and the house was finally taken at about 4 o'clock, according to Charras, or between 6 and 7, according to Heymès, Ney's chief of staff. Between 4 and 6 o'clock, under Ney's personal direction, the cavalry divisions of Milhaud, Lefebvre-Desnouettes, Kellermann, and Guyot were hurled against from Maitland's brigade, and were repulsed with terrific loss. The prompt support of General Halkett and Colonel Elphinstone protected Maitland's left and the impetuous charge of Colonel Colborne with the Fifty-second Regiment completed the disorder of the Guard The Prussians began to arrive about 7:30. Ziethen first came up from Ohain and his troops at once went into action, throwing the French right into confusion. Seeing that victory was in his hands, Wellington threw his whole line forward. The French retreat speedily became a rout. There was no more thought of resistance except by detachments of the Guard and by Lobau with

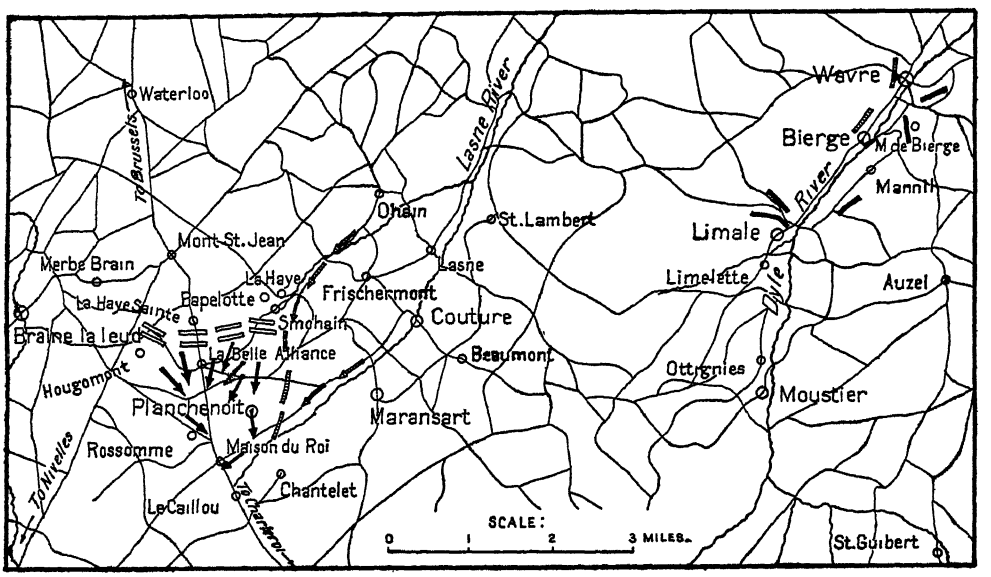


FIELD OF WATERLOO AT 11 A.M., JUNE 18, 1815.

the British right centre, but the British squares, although suffering from the French artillery fire, which supported the cavalry, maintained their formation unbroken. The cavalry were unsupported by infantry, and by 7 o'clock Ney was compelled to withdraw for lack of troops. Lobau failing to check Bülow on the right, the Young Guard was sent in between 5 and 6 o'clock and there was severe fighting around Planchenoit. A little later, believing that his right was secure, Napoleon massed eight available battalions of the Imperial Guard, supported by artillery, for a final attack on Wellington's centre, then almost shattered. General Friant led this assault. As the Guard advanced, D'Erlon made a vigorous and effective assault on the British right. The Guards met a heavy fire the Sixth Corps, who was holding back Bülow and Pirch on the right. Napoleon left the field in the centre of a square of the Guard and reached Paris on June 21st. The exact losses of the two armies are undetermined. Those of the French, in killed, wounded, and missing, probably numbered over 31,000. Official returns for the allies give their losses as 22,428.

The controverted points relating to the campaign of Waterloo provide abundance of material for the student of military science. Napoleon did not show his usual care and thoroughness in his orders, nor his usual comprehensive judgment in execution. Ney and Grouchy both failed in judgment at critical moments. It was unfortunate for Napoleon that he had as chief of staff a veteran officer who was accustomed to inde-

pendent command instead of a younger man trained in the details of staff work. Wellington, with a less efficient army, showed himself careful, alert, and resourceful, and was well supported by his division commanders at critical moments. Nevertheless, the fact remains that it was the timely coöperation of the Prussians, and especially the arrival in the evening of Ziethen's corps, that turned the scales finally against the French and gave a positive result to the splendid defense of the British position. Wellington counted on this in planning the engagement. That the junction of the allies took place so successfully was due to the masterly strategy of Gneisenau, and to the absence of Grouchy on the chase to Wavre, where it was impossible for him to arrive in time. Had he, in-



POSITIONS OF THE THREE ARMIES AT 8 P.M., JUNE 18, 1815.

stead of following his orders literally, crossed the Dyle at Moustier when he learned at Walhain that the battle was on, he might have headed off the Prussians and delayed their arrival. Whether he could have done this, in the condition of the roads, is doubtful. The wisdom of Napoleon in detaching so large a force for a pursuit that rested upon a mistaken inference, is certainly open to question. When this had been done, Napoleon failed to keep Grouchy sufficiently informed of the exact situation and its needs See NAPOLEON I.

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WATERLOO BRIDGE. A fine stone bridge over the Thames at London, built by private enterprise in 1811–1817 from designs by John Rennie and sold to the Metropolitan Board of Works in 1878. It rests upon nine arches and has a length of 1380 feet and a breadth of 42 feet.

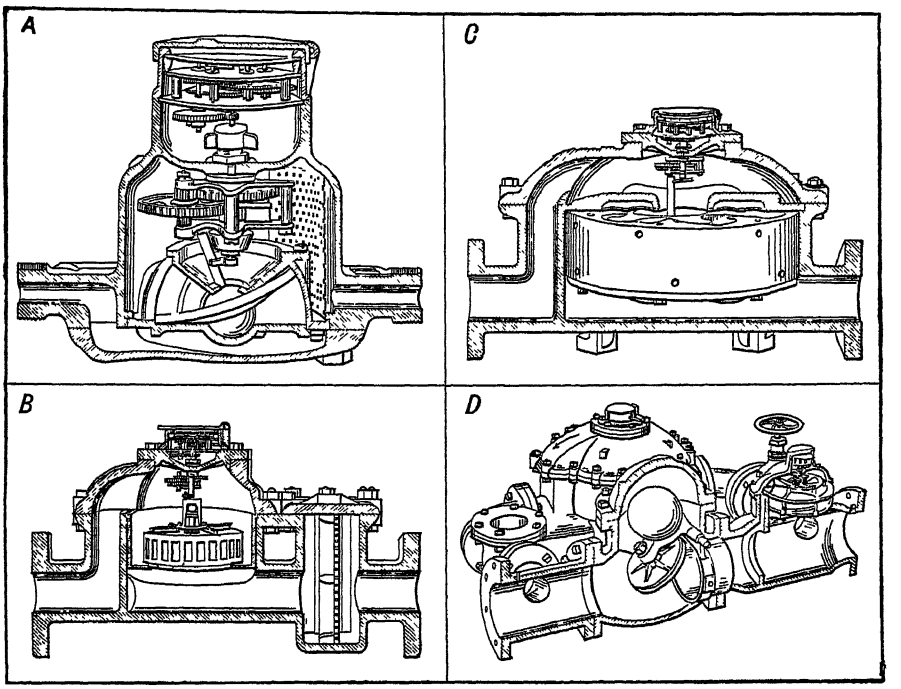
WATERLOO-WITH-SEAFORTH. A town on the southwest coast of Lancashire, England, at the mouth of the Mersey, five miles north-northwest of Liverpool. It is a favorite seaside suburb for Liverpool merchants. Pop., 1901, 23,101; 1911, 26,396.

WATERLOW, wä'tẽr-lō, SIR ERNEST ALBERT (1854–1919). An English landscape painter. He was born in London and studied at the Carey Academy, Bloomsbury, and at the Royal Academy schools, afterward traveling extensively in Germany and France. In 1890 he was elected a Royal Academician and in 1897 he became the president of the Royal Society of Painters in Water Color. His work shows the influence of Constable, but was more affected by the Barbizon masters, especially Corot. In his canvases nature is interpreted in her gentler moods, in a sympathetic and intimate manner, with a warm and harmonious color scheme and careful draftsman-

ship. Characteristic early works are: "Galway Gossips" (1887, Tate Gallery, London), "Friends or Foes" (1890); "Golden Autumn" (1896, gold medal, Berlin), "A Summer Shower" (Walker Art Gallery, Liverpool) Later works, which show increased breadth of handling, include: "The Thames from Richmond Hill" (1905); "Suffolk Marshes" (1902), "The River Blyth, Suffolk", "Sketch in Essex" (1905); and "The Banks of the Loing."

WATERMELON. An annual vine, *Citrullus vulgaris*, of the family Cucurbitaceæ, native of tropical Africa, and extensively cultivated in warm climates, particularly in southern Russia and in the United States, where more than 200,000 acres, especially in Texas, Georgia, and Missouri, are annually devoted to it. The refreshing red, greenish, or yellow pulp of its ripe fruit, which weighs from 20 to 50 pounds, and even much more under special management, contains about 93 per cent water and 2 per cent sugar. A number of varieties, especially red-fleshed ones, are in cultivation. The white-fleshed, rather solid form used in preserving is generally known as a citron or preserving melon. The watermelon is sensitive to frost and is easily stunted by cold. It thrives in a rich, warm, sandy loam well supplied with humus. About 15 or 20 seeds are planted two inches deep in well-manured hills spaced 10 to 12 feet apart each way. Later the plants are thinned out to 2 or 3 of the strongest vines in each hill. Many commercial growers plant the seed in rows 18 feet apart and thin the plants to 3 to 4 feet distance in the row. By this method fertilizers used can be easily cultivated into the soil. Thorough cultivation is given until the running vines interfere. (See MELON INSECTS.) The ripe melons are shipped to Northern markets in box cars, the smallest melons being placed on the bottom, since they are less likely to bruise than the larger. The Northern market season is from the middle of May until about Thanksgiving. See Plate of CUCUMBER ALLIES.

WATER METER. An instrument used to measure and automatically record the quantity of water or other liquid flowing through pipes. There are two general classes of meters, known as the positive and the inferential The positive meter measures the actual volume of water passing through pipes with which it is connected. The inferential meter measures some element or factor of the flow, most generally the velocity. There is what is known as the proportional meter which measures a fractional part of the full flow, thus making it possible to use a relatively small meter, set on a by-pass or pipe branching from and again joining the main pipe. It is used but little. Frequently a small positive and a large velocity meter are combined for use on industrial lines where fire service also is provided. On heavy flows the large meter is automatically switched on.



A, section through a common water meter; *B*, inferential meter; *C*, single piston rotary meter; *D*, combined large (proportional) and small (disk) meters.

Water meters are most extensively used on water-works house service lines to show the amount drawn by each customer, which quantity becomes the basis of his bill. In some places meters are placed on the supply mains and branches so that flows and consumption in various districts can be checked up and large leaks detected.

Positive meters are provided with reciprocating or rotary pistons, or else with an oscillating or gyrating disk piston. In all three classes of positive meters each complete movement corresponds to the filling and emptying of a chamber or series of chambers of known size. There is no escape for the water unless it actuates the piston. The reciprocating pistons

may be single or double If double, as is generally the case, each piston effects the reciprocal action of the other, much the same as in a duplex pump. (See PUMPS AND PUMPING MACHINERY.) If single, the return stroke is effected by means of a weight or spring. The rotary piston meters may also be double or single. The double type is much like the rotary pump, two pistons with interlocking faces revolving in an air-tight chamber. Some of the single rotary pistons have a series of curved projections and indentations on their outer surfaces. Corresponding to these are similar variations in the cylinder in which the piston revolves. The piston is not fixed rigidly at its centre The incoming water causes the piston to enter and leave successive indentations in the inclosing cylinder. In other words, a series of chambers are successively filled from the inlet and discharged towards and finally at the outlet of the meter. In place of a piston of this sort a disk or diaphragm is very commonly employed, so constructed as to give an oscillating or wabbling motion. In this way the chambers are alternately filled and emptied Inferential meters generally have as their primary moving part a series of vanes or buckets, or employ a screw. The velocity of the water is thus indicated.

The Venturi meter generally stands in a class by itself. Although a velocity and not a positive meter it is certain in its action, which depends wholly upon the increase in velocity and consequent reduction in pressure caused by contracting the diameter of a pipe through which water is flowing. It was invented by Herschel, of New York City, about 1886, but the fact that there is a relation between loss of pressure in a contracted tube and the amount of water flowing through it was discovered by Venturi in 1796. By measuring the pressures before and directly at the point of contraction, and taking into account the diameter of the pipe, the flow may be computed. The formula for flow is:

$$\frac{A_t \times A_u}{\sqrt{A_u^2 - A_t^2}} \sqrt{2gh},$$

where A_u = area of upstream cross section in square feet; A_t = area of throat cross section in square feet; h = pressure difference between sections, in feet of water head; and g = gravity acceleration, 32.2 feet per second. The contracted tube is composed of two conical-shaped pipes, generally of cast iron, with their small, truncated ends joined together with a bronze throat piece. The whole tube might be made of masonry, wood, or steel; concrete has been used in a number of instances of late. The total length of the meter is from 8 to 16 times the diameter of the uncontracted portion. The contraction has from one-half to one-fourth the diameter of the full size of the tube. The Venturi meter is available from ½-inch size up, but is most economical above 6 inches. The most notable installations are the huge ones on the Catskill Aqueduct which brings water to New York City. The largest one (and the largest in the world) is 410 feet long, 17½ feet in maximum diameter, 7¾ feet in diameter at the throat, and has a capacity of 700,000,000 gallons per day.

Registering Mechanisms. On all the types of meters described, except the Venturi, which has no working parts, the movements are transmitted through cogwheel mechanisms to a dial or series of dials; or to what is termed a straight reading register, where the actual quantity passed may be read off at a glance. The mechanism is so arranged as to convert the revolutions or other movements of the meter into any desired unit of volume. In the United States the unit employed is generally cubic feet. The registering device of the Venturi meter has two communicating mercury wells connected respectively to the upstream and throat pressure pipe. In each well is a float, and as the flow and pressure difference varies, one float rises or falls more than the other. The motion is transmitted by rack and gear to a hand moving over an indicator dial, and to a cam which governs the movement of a pen arm making its trace proportional to flow instead of pressure difference A paper chart is moved under this pen by clockwork giving a continuous record. The cam movement is also combined with a second clockwork so that the total flow passed is mechanically counted or integrated.

Waste-Water Meters or District Meters indicate the rate of consumption per unit of time, instead of the aggregate volume. A horizontal disk is so placed in a chamber shaped like the frustum of a cone as to be lifted by the flow of water upward through the chamber. The greater the volume of water passing through the pipe in which the disk is set, the higher the disk will be lifted, in order to increase the annular space through which the water must pass. The disk is connected by means of a wire with a counterweight and pencil. When the disk rises the weight and pencil fall. The pencil makes a mark on a paper placed on a drum revolved by clockwork. The paper is ruled vertically for elements of time and horizontally for units of volume; thus the device registers the rate of flow Such meters are so located that all the water of a district must pass through them. By comparing day and night rates of consumption of various districts, abnormal conditions may be detected and further steps may be taken to ascertain the cause of the waste. (See WATER WORKS.) The meter just described was invented by George F. Deacon, of Liverpool, England, and has been more widely used abroad than in America. The Venturi meter may be employed for the same general purpose. One of the earliest water meters in the United States was the double piston meter, invented by Henry R. Worthington, who also introduced the direct-acting steam pump.

Since 1900 an instrument called the Pitometer (q.v.) has been used for temporary measurements of the flow of water through the larger sizes of pipes.

The working parts of meters are made as light and durable as is consistent with accuracy and serviceability, and they are generally so designed to be supported by the water, thus reducing wear and tear and loss of head. Vulcanized rubber is the most common material for the disk and some of the rotary piston meters, but where special strength or power to resist the action of hot water or acids is required, brass or some other composition metal is employed. A variety of devices to protect from damage or clogging are used, such as frost cases and strainers to keep out fish and sediment. Extreme accuracy, greater than 2 per cent, is not usually essential in a meter, but it should be sufficiently sensitive to detect small flows or leakage, which, though minute, may amount to large quantities in the course of time. Positive piston meters come to a

standstill whenever anything prevents their registration The inferential and some of the disk meters cease registering without any effect upon the flow of water

Current Meters (q v.) are employed to measure the velocity of water in rivers and large aqueducts and also to determine the flow of sewers Consult Mansfield Merriman, *Treatise on Hydraulics* (9th ed., New York, 1911). See also the article WATER WORKS.

WATER MOCCASIN. A snake See MOCCASIN SNAKE.

WATER NET. The common name of the *Hydrodictyon,* a genus of green algæ. See CHLOROPHYCEÆ; CŒNOBIA; HYDRODICTYON.

WATER PHEASANT. See JACANA.

WATER PLANTS. See HYDROPHYTES.

WATER POET, THE. A name of John Taylor (1580–1653) (q.v.).

WATER POLO. A game played by two teams of seven swimmers each. The object of the game is to pass an inflated ball about 27 inches in circumference between the goal posts (set 10 feet apart) and under the cross bar (3 feet above the surface of the water). The players of the sides are divided into three forwards, two backs, one half back, and one goal keeper The referee starts the game by throwing the ball into the centre of the pool and giving a signal which starts the teams, who had been lined up under their respective goals, swimming towards the ball. One hand only may be used in handling the ball, and it is a foul to interfere with an opponent not in possession of the ball. There are other fouls listed, the usual penalty being a free pass by the opposing side.

WATER POWER. A term used by engineers to define the power obtained or capable of being obtained from water by its fall from a higher to a lower level; also, more specifically, the term applied to a fall in a stream which is used or is capable of being employed to develop power. Water power is perhaps, after wind power, the most natural and at the same time the most truly economic source of energy. The term water power is something of a misnomer. The real agent is gravity, the fluid itself being the medium through which the action of gravity is transmitted to the prime mover. In order that water may be available for the purpose of doing work, it must be in such a position that it can fall from a higher to a lower level (or must be under pressure produced by some external force, such as that of a weight or spring acting on the surface of the fluid through a piston or plunger, which is beyond what is here discussed). Under the former condition its utmost capacity for doing work—potential energy or energy of position—is the product of the height through which it can fall into the weight of the water falling, so that if h denote the available height of the fall and G denote the weight of the water falling per second, then $h \times G$ equals the energy available per second, i.e., the power. The horsepower in a waterfall or rapids is commonly expressed as: $0.1134\ QH$, where Q is the flow in cubic feet per second, and H is the head in feet. If the fluid is allowed to fall without resistance under the action of gravity, either free or confined in pipes, the power available is expended in imparting velocity to the water, and the potential energy of position is converted into kinetic energy or energy of motion, and in this form is available for performing work. It is, however, not necessary that the potential energy of water should first be transformed into kinetic energy in order that it may be employed for motive power. The weight of the fluid can also be allowed to act directly on the prime motor in a manner similar to that in which the weight of a body attached to one end of a rope, passed over a pulley for instance, may be made to raise another body suspended at the opposite end

A third way of using water power for doing work is by means of its pressure, but the difference between this method and the preceding method is more apparent than real. The so-called pressure of water is the result of weight or its equivalent.

The most usual source of water power in nature is a river or stream, but to make this available for practical purposes some form of works such as dams (q v.), canals (q v.), and aqueducts (q.v.) is almost invariably necessary. A river has always a certain fall or gradient, but to be able to take advantage of this fall for doing work, the portion of it utilized must be applied in one or several nearly perpendicular steps. One common way of accomplishing this object is to build a dam across the stream The effect of this dam is to raise the level of the water above it a height equal to the difference between the original level and the level of the top of the dam, while the level of the stream below the dam remains as it was. To illustrate, let us assume that the stream had originally a fall of 1 foot in 100 feet, and that a dam 6 feet high is built across it. The head which was previously expended almost entirely in overcoming the resistance of the river bed over a distance of 600 feet, while the water gradually descended 6 feet down a gentle incline, will now be available for doing a corresponding amount of useful work by a sudden drop through the same height as before. In other words, the energy originally wasted in useless friction in the gradual descent of the stream is accumulated in the form of head immediately behind the dam before the plunge of the water.

At first rather crude wheels were placed at the dams. But soon, to accommodate all the wheels that there was water for in a given place, high level canals were run out along the banks. Then if the drop was more than the 16 feet, which was then the working limit, the wheel discharges were collected in a second level canal and run through a lower set of turbines As many as five levels were used. Of this type were most of the historic mill powers of the United States, such as Pawtucket, R. I. (established 1790), Paterson (1791), Fall River (1813), and Lowell (1822).

A large number of low-head American mill powers like those at Rochester, Seneca Falls, and Ticonderoga, N. Y., were developed in cascade—with the rivers dammed in a series of long pools, the tail water of one plant immediately becoming the headwater of the next one below. On many streams in New England there once was a saw or grist mill every few miles, but nearly all of these have been abandoned for at least 50 years, the wood cribwork of the dams having given way and permitted the streams to resume their natural levels.

In the more modern development, where a considerable fall is available, the water is led from the dam in a high level conduit or canal and a pressure pipe, or the latter alone, down nearly to lowest level, where it is run in solid streams through turbines with carefully shaped

vanes (see WATER WHEEL AND TURBINE) or in several jets against tangential impulse wheels (with buckets on the periphery of a runner disk). The earliest water-power plants had a very low efficiency in use of water energy, 25 per cent to 50 per cent at best, and this was reduced to 15 per cent to 30 per cent in old age by leaks, clogging, etc. The most of the hydraulic plants now in good service probably have 60 per cent to 70 per cent efficiency; the modern ones running from 70 per cent to 80 per cent.

It is common to group modern developments into three classes: (*a*) low-head, having up to 100 feet, (*b*) medium-head, having up to 350 feet, and (*c*) high-head, reaching 5000 feet Low-head plants are necessarily close to or virtually in the dam, since the amount of water required

IMPORTANT EARLY WATER-POWER DEVELOPMENTS IN THE UNITED STATES

LOCALITY	Year	Fall, feet	Min. H. P.
Pawtucket, R. I.	1790	..	5,000
Paterson, N. J.	1791	.	
Fall River, Mass.	1813		3,000
Lowell, Mass	1822	35	11,845
Nashua, N H.	1823	36	1,200
Cohoes, N Y	1826	104	9,450
Norwich, Conn	1828	16	700
Augusta, Me	1834	17	3,500
Manchester, N H	1835	54	12,000
Hookset, N H.	1841	10	1,800
Lawrence, Mass.	1845	30	11,000
Augusta, Ga	1847	50	8,500
Holyoke, Mass	1848	50	14,000
Lewiston, Me	1849	55	11,900
Columbus, Ga	1850	26	10,000
Rochester, N. Y	1856	230	8,000
St Anthony's Falls, Minn	1857	50	15,500
Niagara, N. Y (Hy. Canal)	1861	95	15,000
Turners Falls, Mass.	1866	35	10,000
Fox River, Wis	1866	182	
Birmingham, Conn	1870	29	1,000
Bangor, Me	1876	0	1,767
Augusta, Ga.	1876	50	8,500
Palmer's Falls, N Y.	1882	30	1,125
Mechanicsville, N. Y.	1882	24	3,636
St. Cloud, Minn.	1885	14	4,500
Little Falls, Minn	1887	10	4,000
Spokane, Wash	1888	72	18,000
Howland, Me.	1888	22	6,000
Great Falls, Mont.	1890	40	16,000
Austin, Tex.	1891	68	10,000
Sault Ste. Marie, Ont.	1891	15	10,000
Folsom, Cal.	1891	53	6,200
Concord, N. H.	1894	10	5,000
Niagara, N Y. (tunnel)	1894	176	50,000
Ogden, Utah	1896	442	2,940
Helena, Mont	1897	38	10,000
Minneapolis, Minn.	1897	18	6,000
Mechanicsville, N. Y.	1898	18	3,270

is great and it cannot usually be carried far at the upper level without large investment and disproportionate loss in head. This restriction is reduced in the medium-head plants where canals and penstocks up to a mile in aggregate length are seen. In the high-head developments canals, flumes, and pipes aggregating up to five or ten miles become possible because of the greatly reduced volume for a given power.

The consolidation of the older mill-power rights and their redevelopment in one modern hydroelectric plant has been carried out in very many cases with much profit to all arising out of more efficient use of the water. The redevelopment of most mill powers offers a more attractive field for investment than entirely new schemes in unsettled territory, because of an existing market for power close to the fall so that no long transmission line is needed and no uncertainty of business is met.

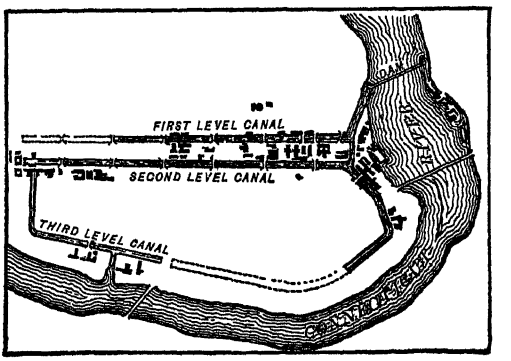
The accompanying tables show the water-power resources of the world, and the powers which were notable in the industrial development of the United States, the gap from 1861 to 1866 being due to the stagnation of industrial enter-

WATER POWERS OF THE WORLD
FROM VARIOUS AUTHORITIES, 1915

	Horse power available	Horse power developed	Percentage of utilization	Available horse power per square mile
Europe.				
Great Britain.	963,000	80,000	8 3	1 00
Germany	1,425,000	445,000	31 2	1 18
Switzerland	1,500,000	380,000	25 0	3 71
Spain	5,000,000	300,000	6 0	3 86
Italy	5,500,000	565,000	10 2	4 22
France.	5,857,000	650,000	11 1	5 80
Austria-Hungary	6,460,000	515,000	8 0	7.34
Sweden	6,750,000	550,000	8 2	7 72
Norway	7,500,000	920,000	12 3	14 12
Totals, Averages	40,955,000	4,405,000	10 7	5 44
North America				
United States	30,000,000	4,100,000	13 7	8 40
Canada				
Saskatchewan	20,000	45	0 2	0 19
Alberta	71,000	7,000	9 8	0 69
Nova Scotia	83,000	15,000	18 0	3 93
New Brunswick	280,000	10,000	3 6	10 03
Manitoba	410,000	48,000	11 7	6.37
British Columbia	1,100,000	101,000	10 1	2 81
Ontario	3,400,000	504,000	14 8	15.41
Quebec.	5,600,000	600,000	10 7	16 41
North West Territories	6,900,000		0 0	3.19
Totals, Averages	17,864,000	1,285,045	7.2	6.55

prise during the Civil War. The development of large powers since 1898 is too great to be enumerated, the cause of this development being the use of water power for the generation of electricity which can be transmitted anywhere within 300 miles At the Great Falls, Sault Ste. Marie, Niagara, Ogden, and Mechanicsville developments this plan is used Many of these old powers have been redeveloped on modern lines, notably Paterson, Cohoes, Rochester, Niagara (where there is over 300,000 horse power), and Turners Falls.

Typical Power Developments. The mill powers on the Connecticut River of Holyoke, Mass., will show a typical important canal development. Here a total fall of 61 feet is

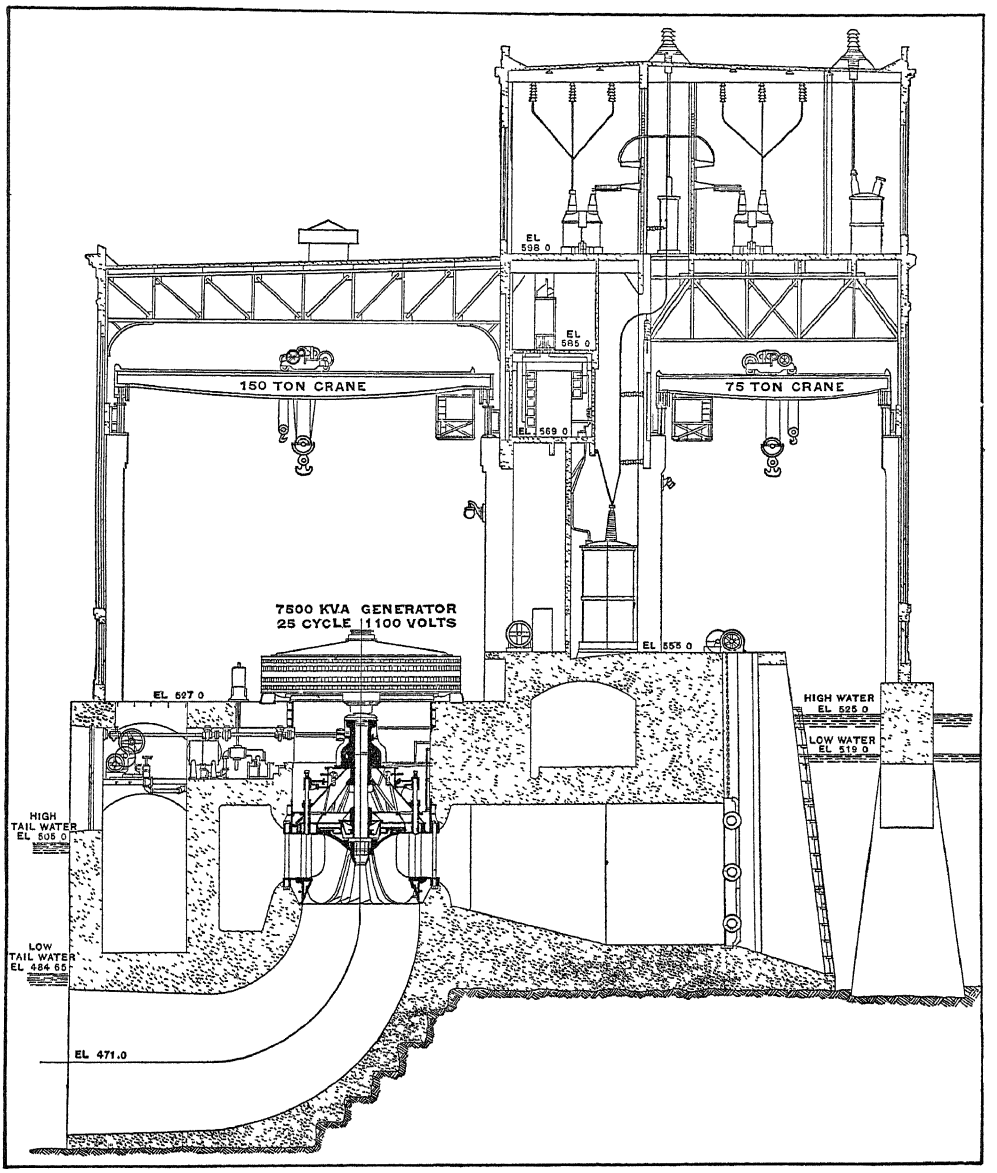


POWER CANAL SYSTEM AT HOLYOKE, MASS.

seen in some 3200 feet below the dam. The water is used in three levels, though most of the mills are on the upper two. There are some 60 mills requiring about 30,000 horse power day-

times and 15,000 at night; the canals supply 14,000 through 150 odd turbines. Conditions are favorable for a redevelopment, but the complication of various old long-term leases of land and water rights makes the consolidation difficult for years to come.

One of the most celebrated low-head plants in the world is that at Keokuk, Iowa, on the Mississippi River. A dam 4278 feet long has been thrown across the rear at the Des Moines rapids where there is a natural fall of some 23 feet and a flow varying between 20,000 and 372,000 cubic feet per second. First an arch-span viaduct (119 spans 30 feet long on piers 6 feet thick) was built and then the interpier space was closed with a concrete dam of the familiar overfall type. The east end of the dam runs into the bank, but the west end stops at the power house; between this building and the shore is a navigation lock for river boats. The power house is 123 feet wide and 1700 feet long, the length being with the stream. There is space for 30 single-runner 10,000 horse-power Francis turbines running at 57.7 r.p.m. under 32 feet normal head (which varies with the stage of the river from 21 feet to 39 feet). The wheel



SECTIONAL ELEVATION OF POWER HOUSE, KEOKUK, IOWA.

pits, spiral passages, and flaring draft tubes are all molded in the concrete foundations.

A good example of a modern high-head development is the Drum station and canal in connection with the Lake Spaulding dam of the Pacific Gas & Electric Co., Yuba Riva, California. The dam is one of the largest and highest concrete dams in the world, being 305 feet; the lake has a surface area of 805 acres and impounds 4000 million cubic feet of water.

Above the lake there are 22 regulating reservoirs on feeder streams. The water is drawn past the dam and for 4400 feet through 8-foot and 9-foot pressure tunnels, then it flows 8½ miles in canal to a forebay reservoir, where it drops 1375 feet in elevation to the generating station. The two penstocks are 72 inches in diameter at the top and of ¼-inch steel plate; at the power house the pipe is of 1¼-inch plate and is 52 inches in diameter Each penstock supplies two overhung impulse wheels each driving a 12,500 kilowatt alternator A 110-mile transmission line runs to the San Francisco district There are five other plants lower down on the river using the same water. These develop from 10,000 to 25,000 kilowatts each, a total of 77,500 kilowatts more

The highest head plant built up to 1916 was that at Lake Fully, Canton Valais, Switzerland The static head is 5412 feet and the operating head 5248 feet. At Lake Fully a dam was built to create needed pondage; from the dam a penstock descends 2 8 miles to the Rhone valley where the power house is located. The inside diameter of the pipe is 23 6 inches at the top and 19.7 inches at the bottom; the wall thickness varies from ¼ to 1¾ inches. The plant has five 3000 horse-power impulse-wheel units, each with a 10,000 volt 50-cycle generator. The wheel is built up of cast-steel buckets on a cast-steel centre, each wheel has a single nozzle with a deflector plate and needle-valve governor. The nozzle velocity is about 600 feet per second and the water is discharged from the buckets with some 20 per cent of its velocity, so that a cast-iron and steel casing was needed to prevent erosion of the discharge passages.

Under present industrial conditions hydro-electric power developments tend to become natural monopolies and public utilities, because of the benefits of interconnecting networks of plants and lines, large-scale developments requiring large investments, relationships with consumers like those of steam central-station companies, etc The proper regulation of power developments in the United States, without hindering the largest use of this natural power, is one of the problems which has been given much attention by State and Federal governments. Up to 1916, in the absence of any adequate Federal law and policy, 50-year revocable permits for development on the public land have been issued by the Secretaries of the Interior and Agriculture A small land rental was charged, based on natural power capacity of the site and the degree of utilization, and decreased according to the square of the length of transmission line. Although the permits carry prior rights of renewal and are revocable only for cause, yet it is known that the fact that they are departmental permits and not complete franchises causes the risk and interest on funds for investment to rise

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See CONSERVATION, DYNAMO-ELECTRIC MACHINERY; HYDRAULIC-PRESSURE ENGINE; WATER RIGHTS; WATER WHEEL AND TURBINE

WATERPROOFING. The coating of articles made of textile fabrics, paper, and other substances, so as to render them impervious to water. Besides a solution of rubber for waterproofing, various preparations are used, such as a mixture of beeswax and yellow rosin in boiled oil. Fabrics may also be rendered waterproof by thoroughly impregnating them with a solution of soap and then dipping them into a solution of alum. Paraffin finds extensive use, and articles of various kinds, including leather, and even wood, are made waterproof by keeping them for a time in hot molten paraffin. Several varnishes, too, are used for rendering articles waterproof Water glass, where applicable, is one of the best waterproofing agents and it likewise acts as a fireproofing medium.

WATER PURIFICATION. The art of removing any objectionable matter from water so as to render it safe for domestic consumption and fit for industrial uses. The objectionable qualities are color, taste, odor, hardness, and turbidity due to pathogenic bacteria, inert organic matter, the presence of iron or other suspended matters (See WATER WORKS, *Quality.*) The principal means of purification are *sedimentation*, which clarifies water and removes a portion of the bacteria, *coagulation*, an aid to both sedimentation and filtration, *aeration*, which removes odor and may supplement filtration; *filtration*, which removes bacteria and reduces inert organic matter, turbidity, and color; *chlorine disinfection*, also for the removal of bacteria, which has profoundly changed water treatment since its adoption, and various processes for removing or reducing hardness, carbonic acid, iron, and manganese.

Sedimentation is effected by either bringing water to rest or passing it very slowly through shallow reservoirs or basins. The first system is called the intermittent and the second the continuous system Gravity carries down some of the clay and silt which compose turbidity. The degree of clarification effected depends upon the size and specific gravity of the particles and the length of time afforded. Some waters are improved in a few hours; others are turbid after days Partly through gravity and partly through entanglement with other suspended matter a considerable percentage of bacterial reduction is effected by sedimentation. Where bacterial purification, rather than clarification, is the object, sedimentation alone is insufficient, but it may be a great aid to filtration. Storage reservoirs afford more or less sedimentation and bacterial reduction, depending upon their size as compared with the daily draft and the character of the water. The design and construction of settling reservoirs do not differ from those of other reservoirs, except in the relative shallowness of the former, the arrangement of inlets and outlets, and the provision made for removing mud deposits from their bottom. In continuous-flow basins having a number of compartments the water generally passes from one

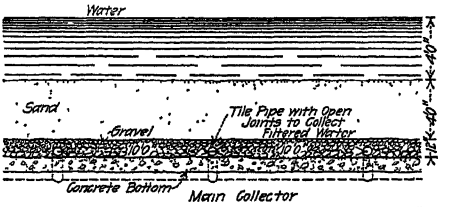
section to another in a thin sheet over a long weir. This insures the drawing of the upper and clearest layer, minimizes the disturbance of water, and may provide aeration of value If aeration is desired and the levels permit, there may be a series of steps between each weir and the next basin. Two or more compartments are usually necessary, so one may be at rest while the other is being filled; but where the constant-flow system is used for water containing but little sediment one basin may do. Provision must be made for drawing the water as quietly as possible to a level well above the deposit of sediment, to avoid disturbing the latter. The bottoms of settling reservoirs should slope to some common point, where connection should be made with a pipe for flushing when the reservoir is cleaned. The mud is often loosened by means of water under pressure, thrown from a hose, much as in hydraulic mining.

Coagulation is effected by introducing a chemical, generally sulphate of alumina, into water. The substance is broken up into alumina and sulphuric acid. The latter unites with the lime or magnesia in the water and is thereby rendered harmless. The alumina thus set free is transformed into hydrate of alumina, a white, flaky, gelatinous substance, which coagulates organic matter in the water and entangles bacteria. The agent and the impurities are deposited in the settling basin or removed from the water by filtration. It is essential that the water be sufficiently alkaline to decompose the sulphate of alumina, and that plenty of time be allowed for coagulation. If deficiencies in alkalinity are periodic, as in times of heavy floods, they may be made good by adding lime to the water. The time element is secured by providing basins or reservoirs of proper capacity.

Aëration is accomplished by forcing air into water requiring treatment, by discharging water over weirs, or by means of fountains In a few American cities stored water of surface origin is treated with compressed air delivered into the reservoir through perforated pipes. It is claimed that this practice has been effective in preventing organic growths that give bad tastes and odors. Aëration is also used to precipitate iron before filtration, as mentioned below. As a rule, aëration is merely supplementary to other processes, making good a deficiency of oxygen, and removing odor. In cases where water contains a high percentage of organic matter no amount of aëration economically applicable is sufficient for its removal. The process has little or no effect upon the bacterial contents.

Filtration plants are divided into slow sand and mechanical or rapid, according to the rate of filtration and the methods of cleaning the filters. The filtering material in either case is generally sand. *Slow sand filters* are beds of sand, supported on gravel, and provided with underdrains, the whole being inclosed in a water-tight basin or basins. The water is admitted on the top of the bed, percolates through the pores of the filtering material, is collected by the underdrains, and then passed to a clear water reservoir or to the consumer. Each bed has an area of one acre or less. The rates of filtration range from 2,000,000 to 5,000,000 gallons per acre per day, according to the character of the water and the fineness of the sand. The filtering sand is commonly two to four feet deep and rests on one to two feet of gravel. The latter is placed in layers, increasing in size towards the bottom until stones as large as hens' eggs are found. The underdrains are four inches and upward in diameter, of either tile or vitrified pipe. Automatic devices are employed to regulate the rate of filtration When the head reaches a maximum fixed by theory and experience to suit local conditions, ranging from three to six feet, one or more beds are thrown out of use for cleaning. The water is drained down to a point somewhat below the level of the top of the bed, and a thin layer of fouled sand is removed by broad shovels. This is washed immediately or else allowed to accumulate for washing at intervals. The washed sand is not replaced until the thickness of the sand bed has been greatly reduced, oftentimes to as little as 12 inches. This is made possible by the fact that the bulk of the work is done in a very thin upper layer of the bed, sometimes not more than one-eighth of an inch deep. The sand is washed (1) by playing hose upon it and allowing the sand and water to flow together through a long flume; (2) by means of running water in a revolving cylinder, provided with arms, or a screw; and (3) the more recent and economical practice, by a series of hoppers and ejectors. In this last process the sand is thrown into a wooden or steel hopper, in the bottom of which is placed an ejector. The jet of water carries the sand up with it to the top of another ejector, where the dirty water is removed. The process is continued until the sand is clean. At a few plants in the United States a traveling washer passes over the bed.

Slow sand filtration removes practically all the bacteria and suspended organic matter, a considerable amount of organic matter in solution, more or less turbidity, and a relatively small amount of color. Where the water has been polluted with sewage the chief object is to reduce the bacteria to a minimum. An average



TYPICAL SECTION OF SLOW SAND FILTER BED.

removal of 98 to 99.5 per cent of the original number is common enough, together with the removal of nearly all of bacillus coli communis, which is taken as an index of possible pollution by sewage.

If the water to be treated is very turbid it will clog slow sand filters so rapidly that keeping them clean becomes an economic and even physical impossibility. In such cases slow sand filtration is supplemented by sedimentation. If the two processes combined are inadequate, without too great an outlay for settling basins and filter beds of large area, then coagulation may be employed. In such cases it is the practice, at least in America, to substitute mechanical filtration, which almost invariably includes both coagulation and filtration, and frequently sedimentation also. In very cold climates it is essential to the best sanitary and economic results that the filter beds be covered as a protection against frost and ice. Masonry vaulting is employed for this purpose.

Mechanical Filtration is, first of all, a straining process, in which the natural capabilities of the filtering medium are aided by coagulation. The gelatinous coagulation material, combined with the sticky organic matters in the water, and with the finely divided clay and silt, form a layer on the surface of the filter and to a greater or less extent on the sides of each sand grain. Thus the effectiveness of the strainer is greatly increased by the reduction in its interstitial passages and by its adhesive qualities. After a comparatively short period, ranging from two days to 12 hours, the filter becomes clogged. The impurities penetrate the whole mass, so all the filtering material must be washed. This is done by the simple mechanical process of reversing the flow of water through the filter, so it passes upward from the bottom. The dirty water is wasted at the top. Prior to or in connection with the reversed flow the sand was formerly, and in some plants still is, loosened by means of power-driven revolving rakes, gradually lowered into the filtering material. In place of the rakes, compressed air, admitted from the bottom, is used in the larger and more recent mechanical filters and in some cases not even air is employed. The filter sand is supported on a false bottom, in which are placed the pipes for collecting the filtered and admitting the wash water. Strainers of perforated metal plates or wire netting give the water access to and permit it to flow from these pipes The coagulant is admitted to the water before it comes to the filter and is given from a few minutes to several hours' time to act before filtration takes place. If the period is brief a coagulating chamber is placed directly beneath the false bottom of each filter tank; otherwise one or at most two larger coagulating basins, or settling reservoirs in which a coagulant is used, are employed. The coagulant is made of the desired strength by proper dilution. The quantity applied to the water being treated is proportioned by ingenious devices to the changes in rate of pumpage or water consumption. Among these may be mentioned some form of pump, driven or controlled by the flow of water through the supply pipe to the basin or filter. The amount of coagulant used varies from about one-half to three grains per gallon of water, but rarely exceeds one grain except in waters with high turbidity or that have some other unusually troublesome feature. The filtering material used in mechanical filtration is confined in wooden, steel, or concrete tanks. Formerly these tanks were usually round, with diameters of from 10 to 16 feet. Larger tanks, rectangular in plan, have since been common in all except relatively small-size installations from the stock designs of manufacturers. The depth of sand is about the same or a little deeper than in slow sand filters, but the rate of filtration runs from 90,000,000 to 125,000,000 gallons an acre. The tanks and operating mechanism are almost invariably placed in a building, and are therefore quite free from the extremes of heat and from rain or snow. Under proper conditions of design and operation, mechanical filtration will remove almost if not quite as many of the bacteria as the slow sand process, more turbidity and color, but less dissolved organic matter. For many years it was more commonly applied to turbid, highly colored waters than to those which were objectionable on account of sewage pollution, but the practice afterward swung towards mechanical filters, notably after chlorine disinfection became common

The choice between the two systems depends upon such a variety of local conditions that each case should be most carefully considered on its merits before adopting either system.

History.—The history of filtration, as applied to public water supplies, dates from 1829, when James Simpson built some filter beds for the Chelsea Water Company, of London, England. After that action, slow sand filtration was at first gradually, then rapidly, adopted in England and on the Continent. It was not until about 1887 that the real action of slow sand filters was understood. Prior to that time they were supposed to be strainers only, effecting little or no chemical change upon the water and leaving the bacteria unharmed. In fact, it was not so many years before this that the relation of bacteria to disease (see DISEASE, GERM THEORY OF), and particularly of water-borne germs, was established. The perfection by Koch of methods applicable to the enumeration of water bacteria made possible the announcements by Percy Frankland and others about 1887 that filter beds removed nearly all the bacteria in water. England, Germany, and America have each played important parts in the scientific and practical development of the various aspects of the bacterial purification of water. The early work on slow sand filtration in America was done very largely by the Massachusetts State Board of Health, at its Lawrence Experiment Station (see annual reports, from 1887). Other American investigations, begun a number of years later, are mentioned farther on.

The first American city to be provided with a slow sand filter was Poughkeepsie, N. Y., where in 1870 a plant was built after plans by James Kirkwood Soon after a similar plant was built a few miles distant, at Hudson, N Y. No further progress was made in the United States for some 20 years, or until a city plant was constructed at Lawrence, Mass., based on studies at the Lawrence Experiment Station. A number of other small plants soon followed, but the first large plant typical of the more recent American slow sand filtration practice was completed at Albany, N. Y., in 1899, with Allen Hazen as engineer. This plant had a nominal daily capacity, at 3,000,000 gallons per acre per day, of 14,600,000 gallons. Numerous other slow sand filters have since been built, including one of about 125,000,000 daily capacity, built by the United States War Department for purifying the water supply of Washington, D. C., one for the city of Philadelphia, with a capacity of some 300,000,000 gallons a day at Torresdale, on the Delaware River, and a large plant for Pittsburgh, Pa. In the later filters of this type the dirty thin upper layer of sand, after being scraped up, is thrown into portable ejectors and forced by streams of water, under pressure, to ejector washers, where the dirt is removed by strong currents. The cleaned sand is replaced on the top of the filters as needed.

The first mechanical filter connected with a municipal water supply was put in operation at Raritan, N. J., in 1882, by the Somerville Water Company, which supplies Raritan and Somerville. No coagulant was used. In March, 1883, John W. Hyatt patented a filter of the same general type as the one erected at Raritan. In February, 1884, Isaiah S. Hyatt, a brother of John, patented a system of coagulation and fil-

tration combined. These and other patents granted to the Hyatt brothers formed the basis of the Hyatt and later on the New York mechanical filters. Rivals appeared in the market from time to time and much litigation ensued. The litigation was confined chiefly to the use of a coagulant. In 1897 the United States Circuit Court of Appeals, notwithstanding much expert and other testimony designed to show the prior use of coagulating materials coincident with filtration, declared the Hyatt patent valid. The patent expired early in 1901.

For a number of years the use of mechanical filters was confined almost wholly to the production of a bright, clear water. Very little disinterested evidence was available to show their efficiency in this respect and practically none bearing on their bacterial efficiency. In 1893–94 experiments on a small scale were made under the direction of Edmund B. Weston, at Providence, R. I., which indicated that mechanical filters would remove a high percentage of bacteria. In 1895–97 more extensive investigations, on a large scale, were made at Louisville, Ky., with George W. Fuller in charge. Mr. Fuller's report on these investigations (see bibliography) marked an era in water purification. It showed that a water as turbid as the Ohio, and with the large number of bacteria sometimes carried by that stream, could be rendered acceptable by means of sedimentation, coagulation, and mechanical filtration combined. Other notable experiments have since been made at Pittsburgh, Cincinnati, Washington, New Orleans, Columbus, Cleveland, and elsewhere. The new type of mechanical filters dates from September, 1902, when the Little Falls plant of the East Jersey Water Company was put in use.

Iron Removal is accomplished most frequently by simple aëration to precipitate the iron, followed by filtration for its removal. If aëration is not sufficient to effect precipitation a chemical may be employed, like milk of lime where the iron is in the form of a sulphate. Iron removal plants in the United States are nearly all located on or very near the North Atlantic seacoast, but their use is gradually spreading to all points where iron makes trouble when well waters are brought to the surface. In 1915 a plant to remove manganese as well as iron was built at Lowell, Mass.

Algal Growths, with their consequent troublesome tastes and odors, are now prevented by treating water stored in reservoirs with sulphate of copper. The method, although suggested long ago, was brought into practical use by the United States Department of Agriculture, Bureau of Plant Industry, which has published a number of bulletins on the subject, beginning in 1904.

Water Softening has long been widely used in Europe but except for railway and industrial purposes it was not employed in the United States until after 1900. The pioneer water-softening process, and one that is still largely used, was invented and patented by Prof. Thomas Clark, of Aberdeen, Scotland, about 1841. In the simplest form of this process, lime water, or milk of lime, is thoroughly mixed with the water to be treated. After 12 to 24 hours' subsidence the water is so drawn off as to leave the precipitate behind. Modifications of the Clark system include a variety of settling and filtering devices. Permanent hardness, caused by the sulphates of lime and magnesia, may be removed or reduced by using carbonate of soda as a precipitant. The earliest water-softening plants for American cities were put in use at Winnipeg, Manitoba, in 1901, and at Oberlin, Ohio, in 1904. Since then Columbus, Ohio, Grand Rapids, Mich., McKeesport, Penn., and St. Louis, Mo., among other cities, have included softening with water treatment for other purposes.

Disinfection. As a finishing process after filtration or sedimentation, as an emergency measure where there is no filtration and sometimes as a safeguard until filtration is deemed necessary or becomes financially advisable, some direct attack on possible disease germs in water may be required. This may be met by a chemical germicide, by heat treatment or by ultra-violet rays. Chlorination is an efficient and by far the cheapest of the chemical germicides. The ultimate germicidal action which it produces is really oxidation. The form of chemical employed is almost always either hypochlorite of calcium or lime (bleaching powder) or else liquid chlorine. In place of either hypochlorite of sodium may be produced electrolytically at the water-treatment plant and applied to the water while in a nascent condition, as has been done on a small scale off and on for a quarter of a century or so. Hypochlorite of lime (called hypochlorite for short) was tried more or less experimentally in Germany in the nineties; as an emergency measure during typhoid outbreaks at Maidstone, England, in 1897, and at Lincoln, England, in 1904–05; and at various other places on a small scale for sewage and water in later years. It was first put in use continuously on a large scale at the Boonton reservoir of the Jersey City waterworks to treat 40,000,000 gallons a day in the latter part of 1908. After that its use spread rapidly through the United States and Canada, both where filtration was and was not used. Since about 1912 liquid chlorine has come rapidly into use in place of hypochlorite. The latter is a powder, and has to be dissolved before use. The liquid chlorine is much more easily handled and the rate of application more readily controlled, since it changes to chlorine gas when released from the cylinders into which it is compressed for shipment. Only minute quantities of available chlorine are required per gallon of water. Until prices were raised by the great war the cost of disinfection by either hypochlorite or liquid chlorine was in round average figures some 25 cents per 1,000,000 gallons of water treated. The war doubled the price of liquid chlorine but increased tenfold the price of hypochlorite.

Ozonization is effected by the discharge of electrically-produced ozone directly through the water. In 1916 it was employed by a few small private plants in the United States and had been tried at two or three municipal water works but was not considered commercially practicable. In Europe, the water supplies of a number of scattered cities have been ozonized, beginning about 1900.

The ultra-violet ray for water treatment was in use in 1916 at a number of small private and a few public water-supply plants in the United States, after several years of test and promotion. Broadly speaking, water must be filtered before it can be successfully treated with ozone or ultra-violet rays, thus entailing considerable expense before disinfection is begun.

Distillation, owing to its high cost, is practicable only for small quantities of water under special conditions. It is used largely at arti-

ficial ice plants (see REFRIGERATION) and is sometimes used to freshen sea water In addition, it is used in connection with various industrial arts. It consists simply in evaporating water in stills by means of heat and subsequently condensing the steam The heat given off in cooling, in the best large plants, is utilized to aid in raising the water to the boiling point. The process clarifies as well as sterilizes water. Boiling, in any convenient way, is a very cheap and thoroughly effective way of sterilizing water used for household purposes. Both distilled and boiled water must be aerated, or it will be very flat and unpleasant to the taste.

Household Filters, with the exception of a very few kinds, had better be avoided whenever it is feared that there are pathogenic bacteria in the water There are numerous household filters which are more or less useful as strainers for the removal of mud, and some of the very fine-grained filter tubes do good bacterial work if properly cleaned and sterilized at intervals.

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WATER RAM. See HYDRAULIC RAM.

WATER RAT. A large vole (*Microtus amphibius*), 8½ inches in length of head and body and reddish-brown in general color, which is numerous throughout Europe It is closely related in structure and habits to the voles and American meadow mice, and has similar habits, except that it is more aquatic and diurnal than other members of the genus. It is one of the most familiar of British mammals and typical of the Muridæ

WATER RIGHTS. A general term used to denote the legal control or use of water. In its narrower sense it means the use of the water of nonnavigable streams, lakes, springs, irrigation canals, and in certain instances of the sea. The term is sometimes incorrectly used to mean the right to the use of the shore and lands under water or between high and low water mark. For the purposes of filling in, wharfing out, or landing such lands are vested in the state, although at times granted to individuals, corporations, or municipalities. See TIDE WATERS; RIPARIAN RIGHTS.

It is of the essence of the doctrine of water rights that the water itself of flowing streams, in the United States, is not deemed capable of private ownership. Every landowner has a natural right to the use and enjoyment of a watercourse which flows through his land. It includes the use of the water for all proper purposes incidental to the land, such as for watering stock, for irrigation, for power in running mills, for fishing and for draining. Such use is limited by the right of every other riparian owner above and below, to the same use. An owner must not interfere with the rights of other owners in any way, by diverting, fouling, damming, or by lessening the steady flow. Any material alteration or infringement is a nuisance which may be abated or restrained by injunction and for which actual damages are recoverable Abutting owners are entitled to a flow of pure water, subject to the reasonable use of those above

The pollution of a flowing stream, as, e g., by the unreasonable discharge of sewage, is actionable, and in some States subject to criminal prosecution. The limitation as to use extends to tributaries and springs and lakes which are sources of flowing streams In the United States the water and beds of streams may be sold separately, but unless specifically excepted pass with the land and are incidents of ownership. These same general principles apply to clearly defined water courses flowing underground. In many western States owing to changed and modern conditions of mining and irrigation the principle that the water of natural streams is incapable of private ownership has been modified. Those who first appropriated water on public lands were recognized as the owners of such waters, both by acts of Congress and by the statutes of various States, e.g, in Idaho, Montana, Nevada, Oregon, and Wyoming The immense development of irrigation canals and ditches has to a certain extent modified the law of water rights and given rise to new principles which have grown out of the local customs of miners, and been extended to irrigation. Such is the rule of first appropriation, or the right of condemnation for ditches over public or private lands Local statutes govern the distribution of water by the various irrigation companies, which are usually stock companies operated for profit, or mutual companies for the benefit of a fixed community. They are considered quasi public concerns and are usually regulated both as to the price and supply of water by water masters or commissioners The law as to water percolating through the soil or flowing in undefined channels in marshy land, or water collected in wells, cisterns, or artificial ponds, is that it is always subject to private ownership and may be bought and sold as any other commodity. Such water is regarded as part of the soil and as belonging to the owner of the land He may drain his land and collect such water, even if by so doing he cut off his neighbor's supply. So digging a well on one's own land which renders one on his neighbor's dry, unless it were maliciously done, would not give rise to a cause of action. The extended growth of large water-supply systems is modifying the law in regard to percolating water. In many States commissions of water supply have been authorized by the Legislature to regulate such subjects.

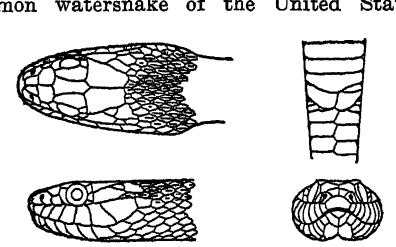
The right to take water from another's land, such as from a spring, is frequently acquired either by grant or prescription, and is defined as an easement (q.v.). Other examples would be the right to fish on a private lake or stream or to cut ice. Under the head of easements over the land of another would be the right to discharge water by drainage, or to flood the land of another by damming back a stream. They are subject to the usual rules for the acquisition of property rights. Formerly in law the theory was that surface water was a common enemy

which the land owners might fight by any means, either by discharging on the land of another or by preventing the fall on his own land, even though by so doing it injured his neighbor. In modern law the principle is that the owner of land has a legal right to a natural drainage on to lower land which may not be interfered with, and this easement has been recognized by statute in certain States. In England rights of a community over private streams or springs for drawing water or watering cattle are sometimes acquired by immemorial usage and are known as customary water rights but are not favored in the United States.

Public Water Rights. It is the general rule of law that the public is entitled to the use of waters whether private or not, which are capable of navigation or transportation for those purposes. Such would be the right to float logs but not the right to fish, to land or to cut ice. The public has the right of anchoring and fishing from boats in navigable water. It has no right of landing on the shore. On land between high and low water mark it may pass and repass, dry nets thereon, fish or take shellfish or sand. Even bathing on the seashore is not a common-law right but is governed by custom and statute. In certain States the seashore is privately owned. Consult C. S. Kinney, *Treatise on the Law of Irrigation and Water Rights* (2d ed., 4 vols, San Francisco, 1912–13), and J. W. Bingham, *Cases on the Law of Water Rights* (Indianapolis, 1916)

WATER SCORPION. Any one of the water-bugs of the family Nepidæ. These insects have swollen forelegs fitted for grasping, thus distantly resembling the cheliceres of a true scorpion. The anal end of the body is furnished with two thin, long, grooved, terminal bristles or sheaths, which when pressed together form a tube, through which the insect obtains its supply of air from above the surface of the water. The water scorpions are carnivorous, feeding upon fishes' eggs, small fish, and water insects. They are of two types: flat and oval or long and thin. The former belong to the genus *Nepa* and the latter to *Ranatra*. The eggs are pushed entirely within slits made by the ovipositor in the stems of aquatic plants. From these slits and attached to the eggs protrude two (in *Nepa*) or five (in *Ranatra*) long supposedly pneumatic filaments.

WATERSNAKE. A harmless colubrine serpent of the genus *Natrix* or *Tropidonotus*, closely related to the garter snakes (q.v.). The common watersnake of the United States is



HEAD AND ANAL PLATES OF WATERSNAKE.

Tropidonotus fasciatus, with several varieties of the species, of which all are southern except variety *sipedon*. This form is the numerous and well-known watersnake of the northern and eastern States as far west as the dry plains. Its average adult length is 3 feet, but it frequently grows larger. The color is a variable brown, with large dark-brown markings on the back and sides, and with the belly yellowish or reddish, spotted with reddish-brown rounded spots (absent in some southern varieties). These colors, together with its habits and somewhat broad head, lead to its often being mistaken for the venomous moccasin snake (q.v.), of which some naturalists consider it a mimic (See MIMICRY) This snake is semiaquatic in its habits, being usually found on the borders of the water, especially quiet millponds and sluggish streams, where it takes refuge when alarmed. It is an expert swimmer and diver, and skillful at catching fishes, on which it mainly subsists, it will also eat dead fishes. When cornered it is pugnacious, but its bite is insignificant and harmless. Its young, 16 to 33 in number, are born alive, when about 8 inches long.

The watersnake of Europe is *Natrix natrix*, which in several varieties is to be found all over Europe, western Asia, and the Mediterranean basin It is much like the American snake in form, colors, and habits, but very variable. This is the only snake except the viper in the British Isles, where it does not occur in Ireland or Scotland, and is commonly known in England as grass snake. The main difference between it and the American watersnake is that the former is more active on land, and lays eggs, which are buried in loose loam, or in manure or dust heaps, and hatch after some time. It is described at length by Hans Gadow, in "Amphibia and Reptiles," in *Cambridge Natural History*, vol. viii (London, 1901); and by Leighton, *British Serpents* (Edinburgh, 1901). Several other species of the genus occur in the Malayan Archipelago and two in Africa; some of them are large and of savage appearance, but all are harmless. Consult also E. D. Cope, *Crocodilians, Lizards, and Snakes of North America* (Washington, 1900); R. L. Ditmars, *The Reptile Book* (new ed., New York, 1914), and other authorities cited under SNAKE

WATERS OF MEROM. See MEROM, WATERS OF.

WATER SPIDER. In America any spiders, especially those of the genus *Lycosa*, living near the water and at times running over the surface or diving beneath it. The water mites, common in streams and ponds (see MITE), and the water striders (see WATER STRIDER) are incorrectly called water spiders. True water spiders are those of the genus *Desia* living among coral reefs in the Indian and Pacific oceans and *Argyroneta aquatica* of Europe and Asia. The latter makes a dome-shaped web below water, fastening it to water plants or stones. The web is filled with air carried down entangled in the long hairs of the spider's abdomen. The eggs are laid and the young hatched in these domes. A special winter nest is built in deep water, in which the spider hibernates. Consult bibliography under SPIDER.

WATERSPOUT. A small, rapidly whirling column of air, extending from a cloud down to the ocean or lake, and whose central axis becomes visible as a column of water or cloudy vapor. In some regions, in warm weather, waterspouts are of very frequent occurrence. As they often occur in calm weather, it is evident that they are not necessarily produced by wind, but that, on the contrary, the wind that accompanies them is the result of the same process that forms the spout. The formation of a waterspout is

due to a strong indraft upward beneath the base of a cumulus cloud. The air that supplies this indraft acquires a rapid rotary motion as it ascends. The resulting centrifugal tendency of air in rotation leads to a very decided low pressure in the central axis of the eddy. The rising air flowing into this region expands as it passes into places of low pressure, and is therefore cooled dynamically and becomes visible by the cloudy condensation of a part of its moisture. One may see a perfect axial cloud formed in a precisely analogous manner in the midst of a rapid dust whirl over a city street. The permanence of the waterspout axis depends largely upon the humidity of the inflowing air. A large waterspout at sea is attended by a cloud of flying salt-water spray at its base, but the spout proper consists of fresh water in the form of cloud particles or rain Heavy rain generally falls upon any vessel that runs into a waterspout, but the only real danger in that case is from the whirling wind. The firing of cannon to break up a distant spout has often been tried at sea, but it is an error to believe that it has any appreciable effect Spouts generally last but a few minutes, individually, but many of them may form and disappear in succession, owing to meteorological influences. The term "waterspout" is often erroneously applied to any very heavy fall of rain from a cloud causing local destructive floods. Such rains may deliver 5, 10, or 15 inches of water in depth over a small region within an hour's time, and cause great destruction. The popular term "cloudburst" should be applied in these cases, and not the term "waterspout." Consult: William Ferrel, *Recent Advances in Meteorology* (Washington, 1886); id., *Popular Treatise on the Winds* (2d ed., New York, 1893). The waterspout off Cottage City, Mass., Aug. 19, 1896, was most favorably located for photographing; 10 views and detailed weather descriptions will be found in the *Monthly Weather Review* (Washington, 1906), and in Julius Hann, *Handbuch der Meteorologie* (3d ed., Leipzig, 1914).

WATER STRIDER. A slender, long-legged water bug of the family Hydrobatidæ. They live upon the surface of quiet waters and dart about with great rapidity. They prey upon other insects and may even leap into the air in pursuit of their prey. The numerous species are found upon both salt and fresh water. They have prominent eyes, a stout beak, long antennæ, and an abdomen which usually tapers to the tip. Many species are dimorphic, one form being wingless and the other winged. Their eggs are attached to submerged parts of plants. A common species upon ponds and in the United States is *Hygrotrechus remigis*, a moderately stout, dark-brown insect about half an inch long. It hibernates in mud, beneath leaves upon the banks, or at the bottom of the water under stones. A very strange form common in certain portions of the United States is *Rheumatobates rileyi*. While truly aquatic, water striders are structurally more nearly related to the land bugs than to the other water bugs.

WATER SUPPLY. Water for irrigation, navigation, water works, and other industrial and domestic purposes, derived primarily from rainfall and secondarily from running streams and lakes, or surface water; and from springs, wells, tunnels, and infiltration underground. The quality of water supplied for irrigation, water power, and navigation is of small consequence, except that a polluted stream might be a general nuisance, and that the mineral contents of certain waters are harmful to crops. Water made available by water works should be above all question as to sewage pollution and should possess other qualities, natural or artificial, discussed under WATER WORKS and WATER PURIFICATION. A gravity flow is generally an essential as to supplies for navigation and water power. The same is often but not always true of water for irrigation. These limitations are due to the cost of pumping and do not apply to supplies for domestic and manufacturing purposes. Besides volume, there is a further essential to water for power, a sufficient fall to yield the requisite energy for the work. (See WATER POWER.) As has been stated, the common source of all water supplies is rainfall. Some of this finds its way to streams, ponds, and lakes; some sinks into the soil to be utilized by vegetation, or to percolate to lakes and streams; some is stored in the soil and the permeable layers below it, ready to be tapped by wells, a large part is evaporated directly from the surface, only to fall to earth again, as rain, dew, or snow. With a given rainfall in any locality the amount of water naturally available will depend upon the extent, surface slope, and geological formation of the gathering ground, or drainage area, and the nature of the vegetation on that surface. The steeper the slope and the greater the proportion of the rainfall reaching the streams, the less is available as underground supplies. With steep and impervious drainage areas, the streams rise and fall suddenly, leaving little water available for useful purposes, and threatening the stability of such water-supply works as are built. Forested and other well-covered areas retain the rainfalls for longer periods, but, in common with all vegetation, they make demands upon the water stored in the soil. Nevertheless, such areas, and also flat, sandy stretches of country, tend greatly to equalize the seasonal yield of drainage areas. Temperature and humidity are important factors in all water-supply calculations, high temperatures and low humidities increasing evaporation from both land and water. When ground is frozen, water cannot percolate into it and the surface flow, or run-off, is so rapid that little of the rainfall is available, unless there is ample storage. The percentage of water surface to total drainage area plays an important part, since the evaporation from water surfaces is much greater than from the land.

The excellent maps and reports of the United States Geological Survey and some of the State geological surveys often afford sufficient data relating to the extent, surface, and subsurface character of drainage areas for at least preliminary studies of water supplies. Where these maps are lacking or insufficient, special topographical surveys are necessary, but it may not be so easy to secure geological data. In like manner, meteorological statistics (see RAIN) may be secured from the United States, State, and local weather bureaus or meteorological stations. Still further aids are the observations on the flow of streams made for a number of years past by the Hydrographic Department of the United States Geological Survey, by some of the State engineering bureaus, by municipal water departments, and by owners of private water powers. Observations on the amount of

water required for various crops, and various phases of ground-water investigation, have been conducted for years past by the United States and the various State agricultural experiment stations, under the control or leadership of the United States Department of Agriculture.

In developing a water supply for any purpose, the first step is to determine the approximate relation between the quantity needed and the various supplies available. Where the source is to be some large river or lake, or say an artesian well from a basin of known capabilities, and in general where the required supply is obviously only a small part of the minimum yield of the source, no preliminary investigation as to quantity available will be required. But in most cases this point demands at least some consideration. The cardinal principle in estimating quantity of supply is to compare the maximum demand with the minimum supply. Averages are also of great importance, but the foregoing is the crucial test. There should be determined not only the actual or estimated yield of the source of supply during the driest month on record, but also the corresponding yield for the driest two or three years in succession. This will enable calculation as to necessary storage for use during droughts, what supplementary steam plants may be required in connection with water-supply developments, and what delays to navigation may be expected in case it is not feasible to provide all the storage indicated as necessary to maintain the levels of navigable canals or rivers. Although the yields of both surface and underground supplies depend primarily upon the rainfall, other factors vary in the two cases. Streams and lakes are supplied partly from the water that flows into them directly from the surface of the ground (hence the name surface water) and partly from water that percolates through the soil to brooks, rivers, and lakes. The underground supplies are replenished from time to time from that portion of the percolating water that does not find its way to the surface supplies, or else is intercepted by artificial means. The drainage areas of surface supplies are well defined and the flow of streams may be readily measured. The drainage areas of underground sources are not so easily determined, particularly deep-seated waters, and the determination of their volume is often difficult and generally only an approximation. Instead of a stream flowing in a well-defined channel, as is true of surface supplies, underground waters follow a tortuous course through thousands of tiny channels in the voids between the separate grains that compose their water bed. The size of these channels, the general slope of the underground water surface, the depth of the water-bearing stratum, or absence of the pressure that gives rise to artesian conditions, all play their part in the possible yield of wells and springs.

The safest and often the only practicable means of determining the yield of an underground source of supply is to measure it, or a portion of it. In the case of springs this may be done by means of a weir (q.v.). Where wells are proposed one or more may be sunk and tested experimentally, but unless the test is for a long period and the deductions made in the light of the best engineering and geological knowledge the results are certain to be misleading and the future yield grossly exaggerated. If a relatively small supply is all that is required one or more test wells may settle the question of capacity with sufficient definiteness at the outset, with the understanding that when the supply, as finally developed, proves inadequate, the plant will be enlarged. If, however, a quantity close to the probable safe yield of the underground basin be desired, the test wells may be so located as to determine approximately the slope of the water level, the velocity of the underflow of water, and the porosity of the water-bearing material. The velocity may be determined by inserting some easily detected chemical in a well and noting the time that elapses before it appears at a lower well. From these facts combined with other data, an estimate of available supply may be made. The effect of a well is to lower the water level for a greater or less distance around it as a centre, so the new water level in this zone assumes the shape of a flat inverted cone, which has had its surface curved somewhat in the vicinity of the well. The more the water is lowered the flatter in proportion becomes the cone and the greater the area of the zone of influence, until the water practically fails through exhaustion or diminution due to increased friction. In determining the possible yield of surface supplies the first step is to ascertain what gaugings, if any, of the actual flow are available, and particularly whether such gaugings cover a series of years of minimum rainfall. Where no gaugings are to be had it is desirable that a gauging station or stations should be established. If this cannot be done all the available rainfall records in and near the drainage area should be gather and studied. These figures may be compared with the rainfall and corresponding yield, or run-off, of other drainage areas, as nearly similar as possible. Deductions may then be drawn as to the average, minimum, and maximum yields. The latter must be known to make possible the provision of adequate means for the passage of flood waters without damage to any of the structures connected with the supply works.

Storage reservoirs may often be provided to make good the deficiency of run-off or stream flow in dry periods. The extent to which this is feasible will depend partly upon the character of the available reservoir sites and largely upon the economic value of the water thus conserved. Absence of proper reservoir sites frequently turns the scales in favor of some other source of supply. The yield of underground water supplies may be supplemented by storage, also, but to a very small extent, as compared with the storage of surface supplies, since most underground waters would have to be pumped as well as stored, and the conditions for water storage on a large scale are rarely favorable in the vicinity of underground sources. Moreover, underground sources are chiefly used for public water supplies, and ground water in storage for more than brief periods is liable to deteriorate unless protected from the light. The expense of covering large reservoirs would be prohibitive. Relatively small supplies of well water are sometimes stored for irrigation (q.v.).

The yield of drainage areas is expressed in a variety of ways, depending somewhat upon the uses to which the water is put. For preliminary studies the yield may be stated in inches of depth, or in percentage of the total rainfall. The former is readily converted into cubic feet per second, hour, or day, per mile of drainage area, or into millions of gallons per square mile.

The gallon is the most convenient unit where water works are involved, and the cubic foot where water is to be applied for power or navigation. In the case of irrigation either cubic feet or acre feet may be employed. (See IRRIGATION.) Stream gaugings are recorded, primarily, in cubic feet per second. Springs may sometimes have their flow increased by digging a basin or well around them, or by driving a tunnel or gallery into a hillside. By these means the flow of a number of springs may often be united. Walling up and covering in of springs is frequently desirable to exclude foreign matter and to keep the water cool Underground waters other than springs are developed by sinking wells, building infiltration galleries, driving tunnels, and occasionally by constructing submerged dams. The latter have been employed to intercept percolating waters flowing through valleys in the West, chiefly for use in irrigation Well sinking, dam building, and tunnel driving are described under their proper heads. Infiltration galleries are generally formed by digging a trench and walling up its sides with timber, brick, or stone, laid with open joints. The top is generally tightly covered and the bottom left open. The water of running streams is sometimes diverted to the canal, headrace, or intake pipe by means of a dam, or in the case of a large stream by a wing dam, extending only part way across. Intake pipes are often laid on the bed of large streams or lakes until a point of sufficient depth or remoteness from the shore is reached, where they terminate in a crib or other arrangement for the protection of the exposed end and the strainer frequently placed upon it Beneath rivers and for a number of the cities on the Great Lakes, the water supply is sometimes drawn through tunnels. These terminate at the shore end in the pumping station and at the river or lake end in a vertical shaft, protected above by a timber and stone crib and tower. Pumping plants are often important parts of water-supply systems Their relation to water works and irrigation are described under those heads, and the various classes of pumps are treated under PUMPS AND PUMPING MACHINERY.

Estimates of the probable yields of drainage areas should be made only after due consideration of all the factors reviewed above. This is particularly true of underground supplies. It is a rare thing to find a single group of wells that yield, year after year, more than 5,000,000 to 10,000,000 gallons a day, but sometimes a number of groups may be made tributary to one water-supply system by proper pipe connections and pumping plants.

The yield of surface supplies, as has been stated, is far better known than that of underground waters. A fall of 1 inch of rain on a square mile of area is equal to 2,323,200 cubic feet, or about 17,375,000 gallons. A total flow of 1 cubic foot per second is equal to 646,300 gallons a day. A more detailed study of the records would show that after making allowance for evaporation from water surfaces, there would be a negative yield in some months; or, in other words, the river would run dry were it not for artificial or natural storage. It is to meet just such contingencies that storage reservoirs are provided. There are two ways of considering storage: (1) The amount required to supplement the natural flow so as to give the required daily supply; (2) the economic limit of the storage development. The deficiency is then to be made good by establishing the storage capacity indicated, provided the expense involved is not so great as to render some other source of supply cheaper The amount of storage will range all the way from nearly the whole run-off of very small streams to a few months' supply for medium-sized ones and nothing for large rivers But whenever an attempt is made to utilize a large percentage of the total run-off, storage will also have to be provided in large quantities. With adequate storage an average daily yield of 500,000 to 700,000 gallons per square mile may be expected in the New England States, New York, and New Jersey, where all the problems involved have been most carefully studied.

Consult: F. E. Turneaure, *Public Water Supplies* (2d ed., New York, 1908); A. C. Houston, *Studies in Water Supply* (ib, 1914), G. F Swain, *Conservation of Water by Storage* (New Haven, Conn., 1915); United States Geological Survey, *Water Supply and Irrigation Papers* (Washington, 1896 et seq.); also references given under IRRIGATION; WATER POWER; WATER WORKS. See also ARTESIAN WELLS; RAIN, RIVER; SPRING; WATER. For the development of water supplies and their useful application, see AQUEDUCT, DAMS AND RESERVOIRS, IRRIGATION; WATER POWER; WATER PURIFICATION; WATER WORKS, and WELL SINKING

WATER THRUSH. A name very suitably applied in Great Britain to the ouzel (q v), and transferred in the United States to the terrestrial warblers of the genus *Seiurus*. also better called water wagtails. They are large, handsome birds, golden or olive brown above and satiny white below, with spotted breast. Three species are observable during the irrigation seasons in the eastern United States, where one remains during the summer as a numerous and familiar resident (see OVEN BIRD). All show a fondness for the vicinity of water, frequently ponds and forest streams, near which they make their nests and practice songs surpassed by few American birds in brilliance and melody.

WATER-TIGHT COMPARTMENTS OF VESSELS. See SHIPBUILDING; SAFETY AT SEA.

WATER TOWER. See FIRE PROTECTION.

WATERTOWN. A town in Litchfield Co., Conn., 6 miles northwest of Waterbury, on the New York, New Haven, and Hartford Railroad (Map: Connecticut, C 3). The most important manufactured products are silk goods, umbrella trimmings, hardware, wire goods, and wool mats and dusters. Pop, 1900, 3100; 1910, 3850.

WATERTOWN, wa'tẽr-toun. A town, including several villages, in Middlesex Co., Mass., 7 miles west of Boston, on the Charles River, and on the Boston and Maine Railroad (Map: Massachusetts, E 3). It has a large public library and a United States arsenal. A prominent residential suburb of Boston, it is also largely interested in manufacturing. The leading products are automobiles, rubber goods, shirts, soap, woolen goods, stoves, furnaces, etc Watertown was settled and incorporated in 1630, and in 1632, when called upon to contribute toward the erection of a fort at Cambridge, made the first protest ever made in America against arbitrary taxation. In 1775–76 the second and third Provincial Congresses of Massachusetts met here, and here the people of Boston, driven from their homes by the British during the Revolution, held several town meetings. Pop.,

1900, 9706; 1910, 12,875; 1915, 16,515; 1920, 21,457. Consult: Francis, *An Historical Sketch of Watertown* (Cambridge, 1830); Hurd, *History of Middlesex County* (Philadelphia, 1890).

WATERTOWN. A city and the county seat of Jefferson Co., N Y, 73 miles north of Syracuse, on the Black River, and on the New York Central and Hudson River Railroad (Map: New York, E 3). Among the prominent buildings are the county courthouse, State armory, post office, and the Young Men's Christian Association building. A memorial library and a bronze monument to ex-Governor Roswell P. Flower and a handsome high-school building are also noteworthy. The charitable institutions include the Henry Keep Home for the Aged, two hospitals, and two orphans' homes. There are several small parks, and a city park covering more than 600 acres. There are, in its vicinity, extensive deposits of iron and limestone It also has large and varied industrial interests, being especially known for the manufacture of paper and wood pulp, ammunition, and foundry and machine-shop products. The New York Air Brake Company has an extensive plant here Other establishments include carriage and wagon factories, flouring and grist mills, lumber mills, steam-engine works, farm-implement works, etc. Abundant water power is furnished by the Black River, which has a fall of 112 feet within the city limits Watertown has adopted the commission-manager form of government, effective in 1918. Pop, 1900, 21,696; 1910, 26,730; 1915 (State census), 26,895; 1920, 31,285.

WATERTOWN. A city and the county seat of Codington Co., S D., 214 miles, almost due west, from Minneapolis, on the Big Sioux River and on the Chicago and Northwestern, the Chicago, Rock Island, and Pacific, the Great Northern, the South Dakota Central, and the Minneapolis and St. Louis railroads (Map: South Dakota, G 3). It is in a region of attractive scenery, but 3 miles from Lake Kampeska, one of the most picturesque lakes in the State Noteworthy features are the Carnegie library and two hospitals. The city is an important shipping point for the farming and cattle-raising district adjacent. There are large grain elevators and warehouses, flouring mills, and manufactories of leather, foundry and machine-shop products, agricultural implements, carriages and wagons, oatmeal, etc. Watertown has adopted the commission form of government. Pop., 1900, 3352; 1910, 7010.

WATERTOWN. A city in Wisconsin, on the boundary line between Jefferson and Dodge counties, 44 miles west by north of Milwaukee (Map: Wisconsin, E 5). It is on the Rock River, and on the Chicago, Milwaukee, and St. Paul, and the Chicago and Northwestern railroads. Watertown is the seat of Northwestern College (Lutheran), opened in 1865, and of Sacred Heart College (Roman Catholic), established in 1872. Other prominent features include the city hall, the high-school building, and the public library. The city manufactures apiary supplies, beer, malt, cheese, lumber products, gas fixtures, flour, shoes, and cigars. It received a city charter in 1853. Pop., 1900, 8437; 1910, 8829; 1915 (U. S est.), 9034.

WATER TURKEY. See DARTER, or SNAKE BIRD.

WATERVALLEY. A city and one of the county seats of Yalobusha Co., Miss., 98 miles by rail south by east of Memphis, Tenn., on the Illinois Central Railroad (Map: Mississippi, F 2). It derives considerable commercial importance from its location in a district extensively engaged in lumbering and cotton growing, and has railroad repair and construction shops, thread and twine mills, a foundry, cotton mills, and broom manufactories Pop, 1900, 3813; 1910, 4275.

WATER VAPOR PROCESS. See REFRIGERATION

WATERVILLE, wą'tẽr-vĭl. A city in Kennebec Co., Me, 81 miles north by east of Portland, on the Kennebec River, and on the Maine Central Railroad (Map: Maine, D 6) It is the seat of Colby College (q v) and of Coburn Classical Institute and contains a Carnegie library. Waterville is engaged to a considerable extent in manufacturing, the most important products being cotton and woolen goods. There are also railroad shops, ironworks, tanneries, carriage, boat, shirt, and cigar factories, etc. In Winslow, on the opposite bank of the Kennebec, are large paper and pulp mills. Pop., 1900, 9477; 1910, 11,458; 1915, 12,501; 1920, 13,351.

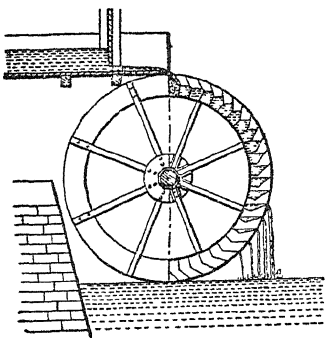
WATERVLIET, wą'tẽr-vlēt'. A city in Albany Co., N. Y., on the Hudson River, opposite Troy, with which it has bridge and ferry connection, and on the Delaware and Hudson Railroad (Map: New York, G 5). It is also near the termini of the Erie and the Champlain canals. The most interesting feature is the United States Government Arsenal, occupying a large tract of land along the river front. The plant was established in 1807 and includes extensive foundries and shops for the manufacture of guns and other war material. Iron and lumber products, bells, harness, wagon and automobile specialties, collars and cuffs and woolen goods are also manufactured in the city. Pop., 1900, 14,321; 1910, 15,074, 1915, 14,990; 1920, 16,073.

WATER WHEEL AND TURBINE. A wheel for utilizing the weight of falling water to perform mechanical work (See WATER POWER.) The term "water wheel" is properly applied to all hydraulic motors that rotate, but it has come to be restricted to wheels which act mainly by the weight of water that they receive on their circumferential parts only, which turn on horizontal shafts, and which move with a low velocity and a velocity that has no relation to the head of water under which the wheel works. In all these respects water wheels, as the term is used here, differ from turbines. Water wheels are designated as overshot, breast, undershot, or current types, according as they receive the water at the top, near the centre, or at the bottom; this is shown by the illustrations.

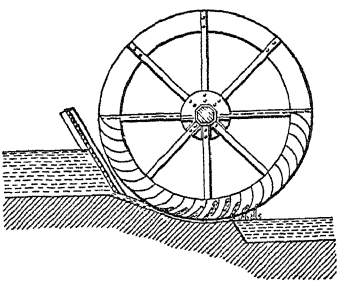
The overshot wheel has a series of buckets arranged on its circumference so that, as the wheel rotates forward, the buckets on the descending side have their top upward. The water is led to the wheel by a trough or flume which discharges at the top of the wheel just forward of a vertical through its axis. This water fills the buckets and its weight causes the wheel to rotate forward. Each bucket is filled as it comes under the discharge from the flume, and each is emptied as the rotation brings it near the bottom. The object of this is to have the weight of each bucketful of water act throughout the entire vertical distance of the fall. The earlier forms of overshot water wheels were built of wood and were enormously massive and clumsy-looking structures. At a later period iron was substituted for wood, with material gain in

lightness and appearance Overshot wheels were often of enormous size, one of the largest being 72½ feet in diameter, located at Saxey, on the Isle of Man.

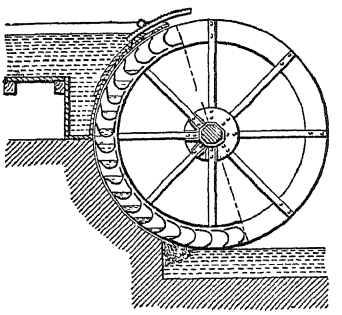
The breast wheel, like the overshot wheel, has a series of buckets on its circumference, but they



OVERSHOT WHEEL.



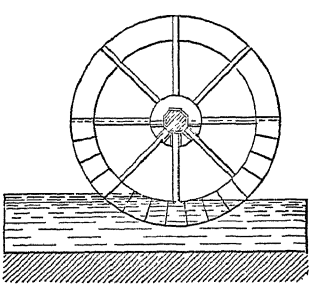
UNDERSHOT WHEEL



BREAST WHEEL.

are so arranged that the wheel revolves backward. In the overshot wheel, using the dial of a watch as an illustration, the water enters the bucket at about the point where number I on the dial is located and leaves it about the point where number V is located; in the breast wheel the water enters the bucket at about X and leaves it at about VII; in the undershot wheel the water hits the paddle at about VII and leaves it at about V.

An undershot wheel has instead of buckets a series of vanes or paddles on its circumference, and the water flows under the wheel and pushes the paddles forward. The current wheel is the simplest form of undershot wheel; the paddles are radial and the wheel is set so that they dip just their full depth into the current of a flowing stream. In the more approved form of



CURRENT WHEEL.

undershot wheel the water passes under the wheel in a rectangular sluice concentric with the wheel, in which the paddles revolve with as little clearance as is consistent with movement

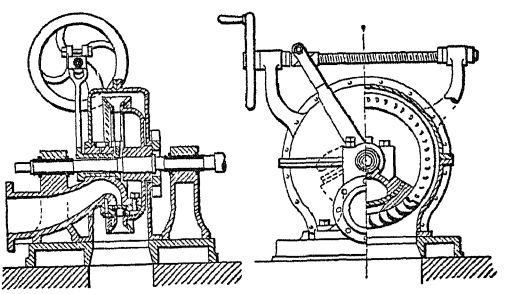
The numerous disadvantages of the water wheels which have been described have caused them to be superseded by the turbine for all large and important work. They occupy much more room than turbines of the same power, and must be inclosed in buildings to prevent obstruction by ice in winter. Backwater affects them injuriously, not only by diminishing the head, but by drowning them and causing them to expend their power uselessly in wallowing, a source of loss from which most turbines are wholly free. The necessarily low velocity with which they move necessitates cumbrous and expensive gearing to raise the speed to the requirements of industry, which is constantly calling for increased rates of speed. But for small farm powers they have a good field of service, a water wheel as built to-day having an efficiency of from 70 to 92 per cent, and working well with varying flows of water.

HYDRAULIC TURBINES

The turbine comprises a wheel with buckets or vanes, into which water is directed, and a casing carrying nozzles or vanes to direct the flow. As water flows past the wheel the velocity of the liquid is changed in direction and magnitude, therefore it exerts a turning force on the wheel. Unlike the simple water wheel, motion of the water relative to the buckets at all times is essential to operation.

Turbines are variously classified: (1) according to the action of the water as impulse or reaction; (2) according to direction of flow as radial outward, radial inward, axial or parallel, mixed (combined radial and parallel) and tangential, (3) according to the position of the shaft as vertical and horizontal.

In radial turbines the water in passing through the wheel flows in a direction at right angles to the axis of rotation, or approximately

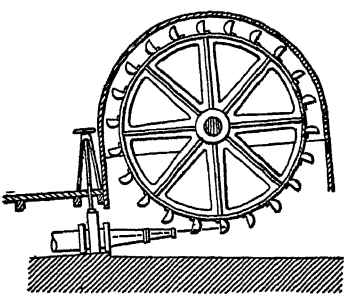


GIRARD IMPULSE TURBINE.

radially. In axial turbines, or parallel-flow turbines, the water flows through in a direction generally parallel with the axis of rotation. In combined or mixed-flow turbines, both the previously described systems are combined. In a reaction turbine all parts are entirely filled or drowned with moving water; in the impulse turbine the construction is such that the buckets are only partly occupied by the water passing through them, the atmosphere having free ac-

cess to the remaining space A reaction turbine is driven by the dynamic pressure of the flowing water, which at the same time may be under a certain static pressure, due to the fact that the inflow takes place under pressure, since the wheel is always filled with water. In the impulse turbine the flow past the runner takes place freely under air pressure only.

The Pelton wheel is the only impulse turbine to secure continued use under American conditions. This is classed technically as a tangential turbine but in America it is common to refer to it as a "wheel" in distinction to turbines, the latter term then being generally understood to apply to reaction turbines. In the Pelton wheel the shaft carries a spider or disk bearing on its periphery a series of cups or buckets which receive a stream coming at maximum velocity from a nozzle. The bucket turns the direction of the jet as nearly through 180° as is mechanically possible, and the reaction of the jet on the bucket gives motion and power The absolute velocity of the water as it is discharged from the buckets is only from three per cent to 10 per cent of the initial velocity. The efficiency of Pelton wheels as now built is about that of a high-grade turbine—75 to 90 per cent. While it is commonly held that impulse wheels



EARLY PELTON WHEEL.

are best used for comparatively high heads, say over 300 feet, yet very successful ones have been developed for as low as 110 feet—e.g., those in Cross Cut Station, Salt River Irrigation Project, Ariz., (1916) where 1000-horse-power units showed an efficiency of 83 per cent. The highest head wheels are the 5412-foot machines in the Lake Fully plant, Switzerland. See WATER POWER.

The speed of Pelton wheels is regulated by using a needle, with a conical head, inside the nozzle to reduce the area of opening. As this changes the flow and if rapid in action is apt to set up dangerous water hammer in the penstocks, it is frequently supplemented by a deflector which drops down in front of the jet to divert more or less of the stream from the buckets. The first impulse wheels were crude affairs (called hurdy-gurdies) built in California in the early mining days (1849) but their design has now been developed to as great a degree of accuracy as the reaction type.

The Girard impulse turbine is a European development which has not had much use in America. When a reaction-turbine runner is not completely filled with water—as happens sometimes, with machines elevated above the tail race, when the gates are nearly closed—then the only effect of the stream is from its velocity as it strikes the runner vanes, and thereupon the machine becomes an impulse turbine. When Girard-type turbines are designed to act on the impulse principle water is admitted to but a few of the buckets or vanes (which resemble those of the reaction wheel) and maximum velocity is developed in the guide passages. Since the discharge from a Pelton wheel or a Girard turbine needs to be free, to prevent wallowing of the runner, no draft tube (the use of which is shown later in connection with reaction turbines) ordinarily is used, though by putting the runner in an air-tight case and running the discharge out in a pipe of proper size the effects of a draft tube can be secured Practically, however, the difficulties of keeping air out of the case are too great for complete success of the draft tube applied to impulse machines.

Barker's mill (q.v.), invented about 1740, was the first reaction turbine; this was a simple contrivance consisting of a chamber with a pair of arms spouting water out of orifices on opposite faces. The next step gave the Scotch turbine in which the arms were curved. The number of arms was increased and the orifice enlarged until the vaned wheel resulted. In 1826 Fourneyron placed central guide vanes on the wheel to guide the water out towards the vanes. The Jonval turbine was an old parallel-flow type with fixed guides or vanes above the vanes on the runner wheel.

The Francis turbine is the type which has become practically universal in America—this type indeed being known commonly as the American. There were several early turbines made by American mill-wrights with the water entering the wheel around the periphery and discharging downward parallel to the axis; but these had flat vanes and showed an efficiency of only about 35 per cent so that they were only impulse turbines. Samuel B. Howd of Geneva, N. Y., in 1838 patented a wheel of this sort with curved runner vanes

J. B. Francis, the eminent hydraulic engineer, about 1849 improved on this early machine, preserving the inward radial flow but shaping the vanes to secure the reaction effect. The bucket shape has since been changed by extending the vanes and bending them so that the water passes down parallel to the shaft and again turns to leave at an angle of some 80° to the shaft Credit for this has usually been given J. B. McCormick.

The obvious advantages of this type as now designed are many and important: (1) the runner is more compact, can be cast in one piece for all except the largest units, and gives good mechanical construction; (2) higher speed and capacity can be obtained with the same amount of material, which cheapens the cost of construction per horse power; (3) the control gates or wickets are accessible and naturally by their shape cause smaller energy losses by interference with smooth flow; (4) a draft tube can be more easily constructed and efficiently used.

Whether vertical or horizontal shaft turbines are used depends on local conditions and demands. The vertical machine requires less floor space but is less accessible; where it is desired to place the driven machinery above the turbine the vertical shaft type will meet the needs; for large units the bearings are simple. Ordinarily the vertical shaft arrangement is used with low heads.

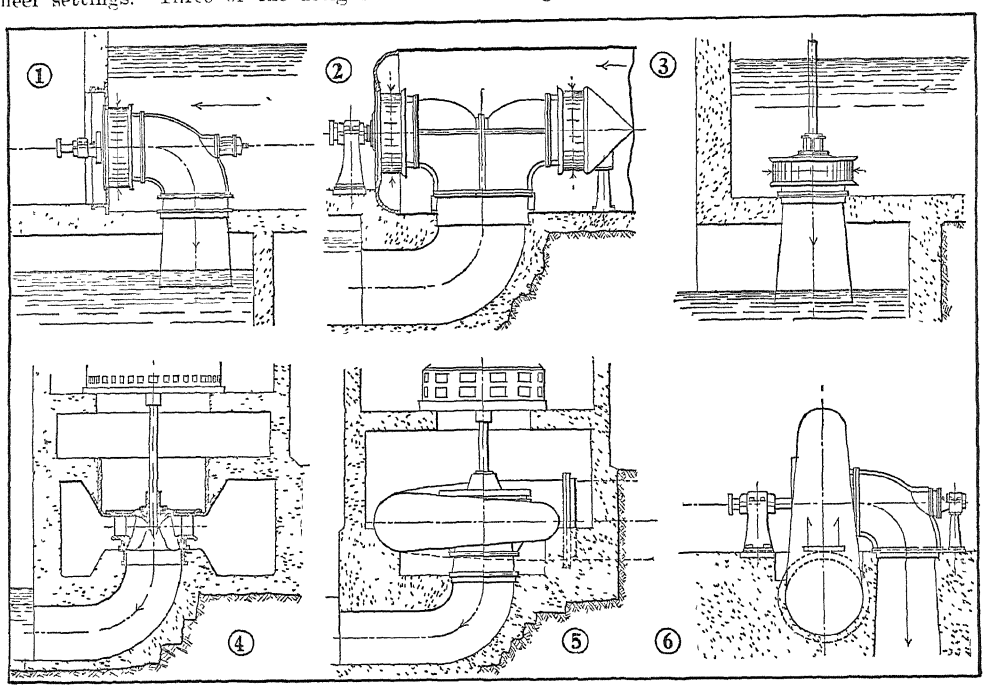
The extensive use of horizontal shaft units is possible because of the development of draft tubes which make useful the head between tur-

bine discharge and tail race. Draft tubes, however, are now an essential part of both high and low head reaction-turbine plants. The draft tube is a section of pipe in which the falling column of water tends to produce a vacuum in the turbine, the effect is to increase the effective head by an amount more or less approaching the drop between turbine and tail race. With simple straight tubes the effective head is appreciably reduced by the velocity of the water, but by flaring the tube up to 1 foot in 3 feet length the velocity at final discharge can be kept down to that required to sweep out the discharge passages. With many vertical shaft machines the draft tube is bent around in a gentle curve so as to discharge its flow parallel to the stream; this helps to efficient operation.

The accompanying sketch shows six typical wheel settings. Three of the designs are more or less antiquated. Three others show accepted practice to-day. The tendency is toward single runners as there is enough interference in the discharges of twin runners on one draft tube so that the efficiency is appreciably reduced.

Structurally, a reaction turbine consists (1) of a ring or a pair of rings, to which are attached the curved vanes arranged uniformly around the circumference, revolving on a shaft or spindle to which the ring or pair of rings is connected by a boss and arms or other suitable means, and (2) of a casing which incloses the part just described, and which generally is provided with guide vanes between which the water enters the wheel, and which cause the water to enter in the desired direction. The supply of water to the turbine is regulated by wickets or gates, which can partially or entirely close the entrances to the guide-vane passages. The guides and wheel with the gates and the surrounding cases are made of iron, steel, or bronze. Numerous forms of turbines with different kinds of gates and different proportions of guides and vanes are on the market They are made of all sizes from 6 inches to 18 feet in maximum runner diameter.

The speed of rotation of a turbine is regulated by opening and closing the gate which admits the water to the wheel. Where the used power fluctuates, the speed will fluctuate unless some method is adopted to adapt the power developed to the power utilized. This is usually done by means of a governor, which is so devised that when little power is being used the resulting increase in speed will actuate it to close partly the gate, and when much power is being used the decrease in speed will actuate it to open the gate wider



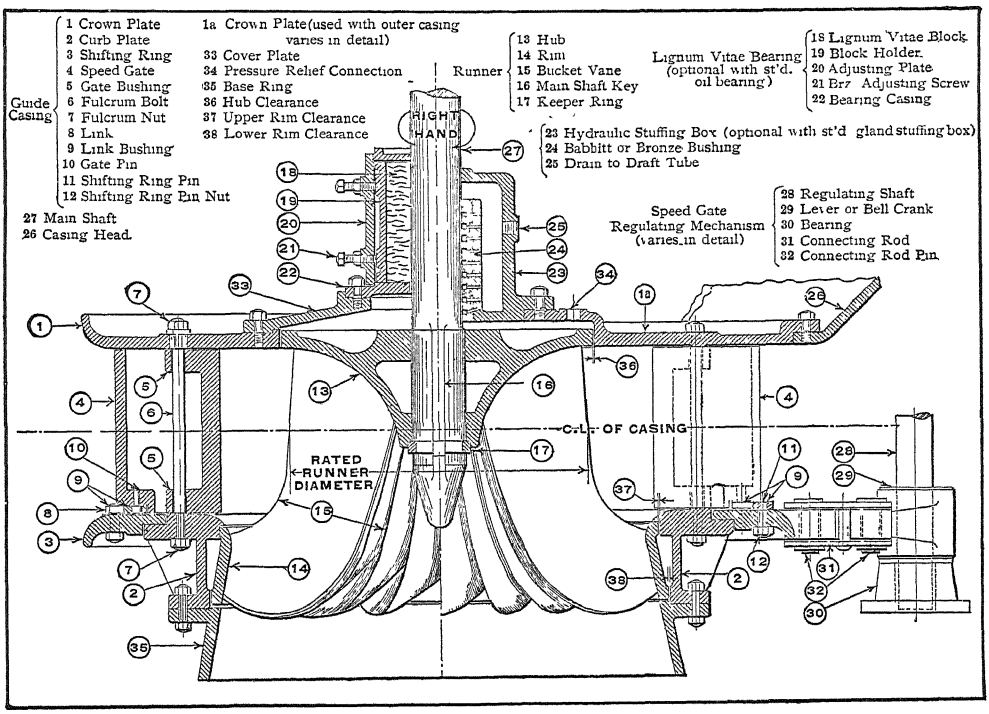
TYPICAL SETTINGS OF FRANCIS TURBINES.

1, low-head open single runner, 2, low-head double runner in casing, 3, vertical shaft low-head single runner. These settings are being more or less superseded by types similar to 4 and 5. 4, vertical shaft low-head runner with entrance passages molded in foundation concrete; 5, vertical shaft high-head runner in spiral casing, 6, horizontal shaft high-head runner with casing set in generator room.

In the selection of a turbine for a specific installation there may be desired any conceivable combination of power, speed and head, and it could hardly be expected that a single type of runner,—a line of homologous units having the same proportions, bucket angles, etc.,—would meet all demands. To study runners by speed alone or by capacity alone does not help, but studying the combination does. This is done by employing the "type characteristic" which is "the speed which would be attained by a runner if it were reduced in all its dimensions so as to develop one horse power under one foot head," i.e.:

$K_T = \frac{\text{R.P.M.}\sqrt{\text{H.P.}}}{\text{H}^{\frac{5}{4}}}$, since (1) the power of a given machine varies as the $\frac{5}{4}$ power of the head, and (2) the speed and discharge vary as the square root of the head. When a manufacturer

produces a desirable new design of runner he will usually build a stock line of homologous runners in common sizes, say from 6 to 75 inches in diameter, and from this line a runner of diameter suited to the speed and power of a specific case could be picked. If a turbine was needed giving 250 horse-power maximum at 220 revolutions per minute and 25 foot head then the type characteristic, K_T, comes out as 63. Therefore a line having this characteristic specific speed should be selected and out of it a runner having a diameter such that its peripheral speed is $\frac{8}{10}$ the maximum theoretical velocity of water falling through this head ($\sqrt{2g \text{ head}}$)—since experience shows that this proportionate speed gives highest efficiency



SECTION THROUGH FRANCIS TURBINE, WITH NAMES OF PARTS.

(For a medium head $\phi = \frac{7}{10}$ and for high speed $\phi = \frac{6}{10}$ would be used.) The diameter in inches computed by the resultant expression $D = \frac{1840\phi\sqrt{\text{Head}}}{\text{R.P.M.}}$ gives a value in the assumed case of 33½ inches. If the data as to required power, speed and head demand a K_T less than about 12, experience shows that an impulse wheel will be better than a reaction turbine. Runners of $K_T = 12$ to 25 are best suited for high heads; runners of $K_T = 25$ to 45 are best for medium heads; and runners of $K_T = 45$ to 90 are suited to low heads. Where the data would demand a runner with K_T much over 90 the capacity has to be split and two runners or turbines used to bring the K_T down to that of practical and successful runners.

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WATER WITCH. Any of various birds quick at diving, as a grebe, bufflehead duck, or dipper.

WATER WORKS. The various structures and devices used to provide water for domestic and industrial uses, fire protection, and other public services. The term is here restricted to plants for the supply of municipalities. Works limited to the needs of a single establishment generally differ little in principle from municipal works, but are smaller and simpler. The main points to be discussed in this article are the quality and quantity of water to be provided; the source and mode of supply, the latter involving a choice between gravity and pumping; the size and character of pumping works, reservoirs, tanks, and standpipes; the distribution system; and various details of public policy.

Quality, or the fitness of water for its various uses, includes freedom from the specific germs of disease and from minor substances deleterious to health, an absence of turbidity and color, unpleasant taste or odors, and of all mineral matters in sufficient quantities to interfere with the various household and industrial purposes for which the water is designed. The most serious menace to water supplies is sewage pollution, which may at any time cause an epidemic of typhoid fever and is likewise one of the chief agents in the spread of cholera. Sedimentary matter, otherwise known as muddiness or turbidity, is generally caused by clay and silt suspended in the water. It is more offensive than dangerous. Color is still more

wholly a matter of offensiveness to the eye, instead of a menace to health, than is sediment. The latter gives rise to an apparent color, which disappears with the sediment True color, as used in water terminology, is generally a stain, rather than matter in suspension. It is frequently due to infusions of vegetable organic matter, like leaves, grass, and peat Odor, in any considerable degree, is less frequent and far more troublesome than either sediment or color. It is commonly due to the life processes of minute organisms in the water and is frequently seasonal in its appearance. Sediment, color, odor, and taste, as well as the evil effects of sewage pollution, each yield to proper treatment, as described under WATER PURIFICATION.

Water Analyses and their Interpretation. As an aid to the study of the quality of water recourse is had to an inspection of the drainage area and all possible sources of pollution, and to physical, chemical, and biological examinations of samples of the water. The physical examinations involve observations on temperature, color, odor, and turbidity. Color is generally determined by comparing the samples of water with fixed color standards based on chemical solutions of known composition and regularly varying strength The most commonly accepted measure of turbidity is the depth at which some bright object will disappear from view if gradually lowered in water. High temperatures give rise to troublesome organic growths. As a rule, however, temperatures are quite beyond control, except in choosing between different sources of supply and in locating the depths of the pipes through which water is drawn from deep lakes and reservoirs. Deep temperature readings are taken by means of the thermophone. Absence of color, odor, and turbidity, combined with low temperatures, are most desirable qualities, but all of them together are of vastly less importance than freedom from organic impurities. Unfortunately, no method of analysis has been discovered which will do more than indicate the probable safety or danger of a given water. Chemical analyses point to past contamination, and give some evidence of its nearness or distance in point of time and whether it was of animal or vegetable origin. Bacterial analyses are of comparatively little avail except to show the numbers of bacteria present, and to throw some light on their probable origin. The differentiation of the typhoid germ, the chief object of fear in America, from the harmless water bacteria is a long, tedious, and at best a very uncertain operation. The more direct microscopical examination of forms of life above the bacteria, although of much future promise, is limited chiefly to determining the absence or occurrence of those growths that cause bad tastes and odors. But when such growths are detected the most that can be done, ordinarily, is to shut off the water in question, take steps for its purification, or exclude light, when the latter is an essential to troublesome visitors. As an aid to detecting organic impurities, chemical determinations of albuminoid and free ammonia, nitrates, and chlorine are made. The first four substances indicate past contamination. Their relative amounts, in the order named, throw some light upon the degree of natural purification, as measured chemically, that has taken place. The chlorine, if above the local normal for unpolluted water, indicates that the organic matter came from sewage. High nitrates and chlorine combined, especially if accompanied by large numbers of bacteria, render water very suspicious. If, in addition, bacillus coli communis, a kind of bacteria found in large quantities in the human intestine, is present, the evidence against the water is often held to be conclusive. It may be accepted as quite so if it is learned that sewage is being discharged into the stream or lake above the point of inlet. See DISEASE, GERM THEORY OF.

Determinations of the mineral contents of surface waters are rarely made unless they come from limestone or alkaline regions and excessive hardness is feared. Underground waters are so likely to contain the sulphates and carbonates that cause hardness, or else other troublesome mineral salts, particularly iron compounds, that it may be well to test for at least those substances when examining well water. Lead poisoning is not due to lead normally in the water, but to lead taken up by the passage of certain water through, and more particularly by its standing in, lead pipes or cisterns. Very soft waters are especially liable to attack lead pipe. Chemical standards for water are very misleading. The best chemists and engineers interpret each set of analyses in the light of all other known facts and attempt to lay down no arbitrary standards. A minimum of 100 to 500 bacteria per cubic centimeter has been set by various authorities; but this, also, depends on all the other local conditions. Hardness is chiefly a question of more or less soap in connection with water used for household purposes, and of scale formation in steam boilers. If excessive, the supply may be rejected, or a softening plant may be supplied. The substitution of pure mountain for contaminated Passaic River water at Newark in 1892, and of filtered for unfiltered water at Lawrence, Mass., in 1893, and at Albany, N. Y., in 1899, caused a marked decline in typhoid mortality.

Quantity, while not affecting so vitally the health of a community as quality, since only a small fraction of the total water supply is devoted to hygienic uses, is nevertheless of great importance from the standpoint of health, comfort, æsthetics, and industry. In a purely residential town, with lawn sprinkling for grounds of moderate size, an average daily consumption of 35 to 50 gallons per capita is not only ample for legitimate use, but makes provision for what is termed unavoidable waste. With a moderate amount of manufacturing the consumption ought not to go above 75 gallons; while for all but exceptional conditions 100 gallons per capita should be considered excessive rather than merely ample. For well-managed works, where popular sentiment permits the use of meters, figures no higher than these are reported in America, and still lower ones abroad, but it is no uncommon thing in the United States to hear of cities using (and wasting) all the way from 100 to 200 gallons per capita, while some cities go up to 250 gallons or over, and very likely would go higher still if the capacity of their works were not overtaxed by the excessive demands upon them. Under present conditions few American engineers deem it safe to plan for a water supply of less than 100 gallons per capita, with a provision for some increase in the near future. The tendency of nearly all

American cities for years past has been to show rapid increases in per capita water consumption.

Pressure is that quality which is imparted to mobile liquids, like water, through differences of elevation or head, and is due to the force of gravity; or it may be produced artificially by the use of pumping machinery, and a high-pressure fire service may involve the use of a special pumping, supply, and distribution system. It is essential in water-works systems that the pressure be ample to give a full and constant supply for all domestic and industrial purposes, and particularly for protection against fire. This may be effected by choosing a source of supply far enough above the general level of the community for the difference in level to overcome the pipe friction and cause the water to rise to the upper stories of buildings for ordinary service, and be sufficient to throw several fire streams over the tops of the highest buildings. Where natural pressure cannot be had pumping is necessary.

Source and Mode of Supply. Modes of supply are classed as gravity or pumping, and the latter mode is subclassified as pumping direct to the distributing mains and consumers, to standpipe, to tank, or to reservoir. In some cities a combination of two or all these modes is in use. Where there are marked variations in the levels of a city it is customary to divide the works into high and low and perhaps intermediate services. This saves strain on the street and house pipes in the lower levels, and where the water is pumped it may greatly reduce plumbing expenses. In addition, lower pressures result in less leakage at defective joints and pumping fixtures. Several pumps in one station may raise water to different levels, or the water may be repumped for the higher districts. Whatever the source and mode of supply, an ample quantity of water should always be available near the centre of population and fire risk. To accomplish this end storage reservoirs, or, in the case of pumping plants, duplicate pumps may be required, and several independent lines of main pipes may also be essential.

The choice between the various classes of supply, such as springs, wells, streams, and lakes, will be governed by the relative availability of each possible source to meet the three essentials of quality, quantity, and pressure. For large cities surface supplies are most commonly the chief reliance, and in such cases, for all cities not on the larger rivers and lakes, impounding reservoirs are generally employed. Even relatively small supplies from wells are liable to yield less, after a few years, than their original rated capacity. In point of quality, underground waters, except when drawn from wells in populous areas, are generally free from dangerous organic matter, but they may have, or give rise to, bad tastes and odors, and their water may be hard, or may contain iron in such large quantities as to make it unfit for use. Tastes and odors are liable to develop in water from underground sources when exposed to the light. This is due to the life processes of microscopic organic growths, mostly of vegetable origin. Water containing iron compounds, on exposure to the air, may become fairly red with a precipitate resembling iron rust. Surface waters are generally soft, unless from limestone drainage areas. They sometimes, on storage, foster odor and taste producing organisms. Their chief danger is from sewage pollution. Surface supplies are relatively warm, and underground waters cool. Surface supplies are also liable to be high in color and turbidity. Swampy or peaty gathering grounds, heavily wooded areas, and improperly cleaned sites for storage reservoirs give rise to color, while readily eroded clay or silt lands contribute turbidity. The Ohio, Mississippi, and many Southern and Western rivers are notable for their turbidity. Swamps may sometimes be drained, or cut out of the collecting area. Soils rich in organic matter may be removed from reservoir sites. See WATER SUPPLY.

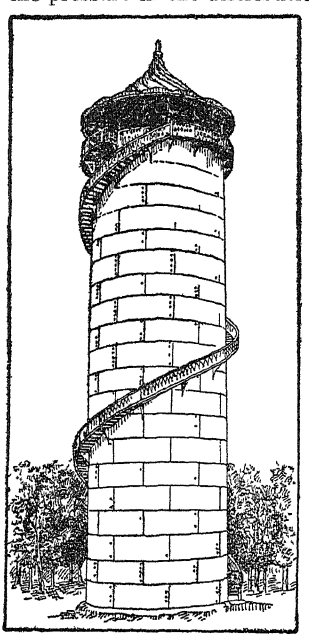
Pumping Works vary in character with the source and mode of supply, the motive power, the cost of fuel, if fuel is used, and the working pressure on the pumps. The latter is determined by the elevation to which the water is lifted and the frictional resistance in the pipes through which the water is forced. The chief bearing of the source of supply on the pumping plant is the depth of the water below the surface of the earth. If the water is drawn from a depth of more than say 20 to 25 feet as a maximum the pumps must be lowered correspondingly. If the water be very deep-seated some form of deep-well pump, or else the air lift, is required, in order that the motive power may be kept at the surface. In addition to the depth of the source of supply, the necessity of purifying the water is a factor in determining the character of pumping plants. (See WATER PURIFICATION.) Thus, it may be necessary to lift the water from a river to a settling basin, or from a river or other source to filters, after which it will have to be repumped to the distributing system.

Variations in the mode of supply, the extremes of which are direct pumping, with its liability to great and perhaps sudden changes in working pressure, and pumping to a reservoir, against an almost constant head, have important bearings on the choice of pumping machinery. Direct-pumping plants must be quick to respond to sudden changes in pressure, without injury to the machinery. This calls for variable speeds, automatically regulated, and for strong and simple working parts. If, however, water is pumped against a fairly constant head and at either a uniform rate of speed or under such conditions that the rate may be changed gradually, economy in design and operation may receive more consideration. Questions of motive power, particularly as between steam and water, are frequently settled in advance by nature. If ample water power is at hand it is inevitably chosen, on account of its cheapness. If it is not available the year around it may be supplemented with steam power, or possibly storage reservoirs may be constructed to equalize the stream flow. Since the development of the electrical transmission of power it is sometimes possible to utilize waterfalls remote from pumping plants. Electrically driven pumps may also be used where the dynamos are driven by steam engines or steam turbines, but this is not economical except under special conditions, such as pumping plants remote from coal supplies, or located in the residence districts, where a boiler plant for the generation of steam power would be undesirable, or for special emergency service as in high pressure fire service, where the pumps are started on receipt of an alarm. Compressed air may be transmitted for the operations of small plants at a distance from

the main pumping station or it may be used in the air lift, for raising water from driven and artesian wells. Pumps are also operated by oil or gas engines. Small quantities of water may be lifted by windmills. These various forms of motive power may be applied to any one of a number of kinds of pumps, as explained under PUMPS AND PUMPING MACHINERY.

The vast majority of water-works pumps, however, are driven by steam, the motive power and pump being combined in operation in one machine which is known as a pumping engine. The more expensive becomes the fuel the greater the reason for adopting a high-duty pumping engine, or one which, by means of better and more expensive design and workmanship, performs a relatively large amount of work for a small amount of coal. Uniform rates of pumping, as nearly as may be at the full normal capacity of the pumping engine, aid in securing the maximum duty from any sort of pumping machinery. Pumps working under high pressures are selected with special care as to strength of working parts and cylinders, and if of the reciprocating type they have a slow piston and valve movement. For very high pressures plunger pumps are used. The dividing line between high and low pressures is rather arbitrary, but 50 pounds or under might be termed low, 50 to 100 pounds, medium; while anything above the latter figure might be called high.

Reservoir Tanks and Standpipes are employed to insure a reserve supply of water, to maintain the pressure in the distribution system



STANDPIPE WITH ROOF, DES MOINES, IOWA.

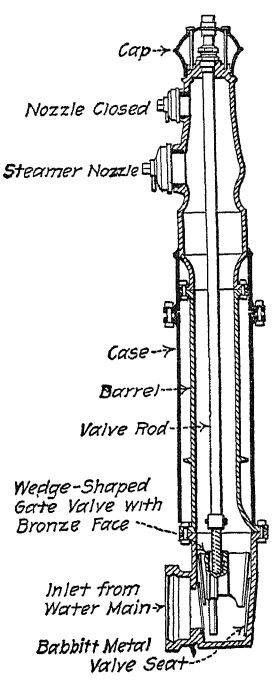
at or above a minimum point, and to equalize both the rate of pumping and the head on the pumps. Tanks and standpipes are forms of reservoirs, but the term "reservoirs" is almost invariably restricted to receptacles built in or partially in the earth, with either earth embankments, masonry walls, or a combination of the two. Tanks and standpipes are built above ground, of wrought iron, steel, or (since about 1905) of reinforced concrete, except that small tanks are very often of wood. Tanks are generally placed on wooden, metal, or masonry towers, and both tanks and standpipes are sometimes inclosed with masonry and covered with some sort of roof. Standpipes rest on masonry foundations, the tops of which are level with or a few feet above the surface of the ground. Metal tanks and standpipes are made from one-fourth to one inch plates of wrought iron or steel, the latter being most commonly employed of late. The plates are riveted together to form the sides and bottom. In recent years the bottoms of elevated steel tanks have been curved to various forms and supported at the circumference of the tank. This is a gain in economy and in appearance. Standpipes are relatively tall for their diameters, a frequent size being from 12 to 20 by 100 feet. Ordinarily only the upper portion of their contents is available, the rest being too low for effective pressure.

Distribution Systems comprise the various pipes used to convey the water to the points of use, the valves and hydrants which control the flow and delivery of water, and the meters for recording the consumption. Sometimes the term includes reservoirs, tanks, and standpipes, and more rarely even the pumping plant.

The pipe system consists of one or more trunk mains and numerous branches and subbranches, continually diminishing in size. Pipes are commonly divided into mains and services, the former including all the pipes laid in the streets and the latter the small pipes laid from the street mains to the several buildings supplied. A trunk line which simply feeds other street pipes, but no service pipes, is called a supply main. The latter term is also applied to pipe lines which convey water from a source of supply to the distributing system or to a reservoir feeding the latter. Where water is pumped through such a pipe line it is called a force main. Mains are most commonly of cast iron. Wood is also used. Wrought-iron pipe, coated and lined with cement, was extensively used some years ago, but most of it has been replaced with cast iron, on account of the frequent failures which occurred. Steel pipes made from thin plates, riveted both circumferentially and longitudinally, have been used for large supply and force mains since about 1890, superseding the wrought-iron pipe of an earlier date. (See PIPE.) The size of main pipes depends upon the volume and velocity of the water conveyed. Cast-iron pipes range from 4 to 48 inches in diameter, with occasional sizes up to 72 inches. Steel and wood supply mains and steel force mains may be built of almost any size. Bored wood pipes are generally confined to relatively small sizes. Pipes which are to afford fire protection should never be less than 4 inches in diameter, and that size should be restricted to a few hundred feet on a short street with only one fire hydrant. In the best distributing systems the area served is gridironed with pipes of liberal size, so arranged that any section may be fed from several directions and pipes in case of heavy local drafts for extinguishing fires. Service pipes are most commonly of lead, wrought iron, or steel, the latter having largely displaced wrought iron since the beginning of the twentieth century. Lead is more expensive than iron, but its flexibility, smooth interior surface, relative noncorrosiveness, and great durability are in its favor. Its chief

objection, aside from high first cost, is the ease with which it decomposes when exposed to certain waters. (See *Quality*, above.) Plain wrought-iron pipe corrodes so rapidly as to be out of the question. Galvanized, or zinc-coated, wrought-iron pipe is fairly durable when used for some waters, but corrodes so rapidly with others as to become almost filled with rust after only a few years. Among the various other methods of treating wrought-iron pipe, besides galvanizing, a japan, or baked varnish, coating has been employed of late. Wrought-iron and steel service pipes are quite frequently lined with lead, tin, or cement to avoid corrosion and clogging and to give the smooth inner surface which is a quality of such materials.

Valves are used in distributing systems to control the flow of water to and through the mains and from the mains to the house services. The latter are generally called corporation cocks, and are set at or near the curb, with a service box for protection and access. The usual type of valve consists of either a disk or wedge, which is lifted vertically or slid horizontally by means of a screw rod and proper gearing. The latter, in the case of large sizes, may be worked by hydraulic pressure from the water main in which the valve is set. Valves are also operated by electricity, particularly when it is desired to open or shut them from a distance. A free use of valves throughout a distributing system contributes greatly to the reliability of the water-works service and the ease of making repairs to the pipe system. Check valves close against a backward flow of water and are used on pumping mains and for the protection of meters against back pressure. Reducing valves are automatic devices for relieving the lower levels of a city from excessive pressure where proper division into high and low service is impracticable. The Venturi principle (see WATER METER) is occasionally profited by to reduce the cost of valves on large mains. That is to say, a 48-inch main may be gradually contracted to 36 inches, and a valve of that size placed, then the main be increased by degrees to its former size. A slight loss of pressure only will result, and where there is pressure enough and to spare a considerable sum of money may be saved.



SECTION THROUGH A WATER-WORKS HYDRANT.

Hydrants consist of a valve set at or near the curb line, on a branch pipe. A vertical tube or barrel extends from the valve to and generally above the ground level, with one and more often two or more nozzles for the attachment of fire hose. Hydrants should rarely if ever be placed more than 500 feet apart, and in closely built business sections may need to be much closer together.

Meters are self-registering devices for measuring the quantity of water supplied to a whole city, a section of it, or a single consumer. They afford the most equitable if not the only fair means for dividing the cost of the water service between the several consumers, and are most efficient agents for the detection of leaks and the prevention of waste. Their construction and operation is described in the article WATER METER. They are set in the line of the service pipe, just inside the cellar or house line; or, where there is no danger of frost, at a convenient point on the house service between the house and the curb, as beneath the sidewalk. In the latter case the meter is set in a box and a dial extension is attached to the registering mechanism, so as to bring the dial up where it may be read with ease.

Waste Prevention is essential to economy of operation of a water-works plant. As suitable water supplies become more scarce and distant, the conservation of quantity becomes almost as essential as the preservation of the purity of water. The first step in waste prevention is good workmanship in the construction of the plant, particularly in all the underground portions where leaks are difficult to detect and costly to repair. The next step is to insist on high-grade self-closing plumbing fixtures, including all faucets or spigots for drawing hot and cold water, and particularly the flushing devices of water closets. To detect leaks or other causes of waste inside the house line either meters or house-to-house inspection may be employed. The latter can be made only at long intervals, at best causes friction, and is insufficient and unsatisfactory. Meters not only detect leaks, but they make the consumer liable for any neglect in stopping them and likewise debit the consumer with all wastefulness due to letting the water run to prevent freezing in cold weather, or to secure cooler water in summer, or because of mere carelessness. Service pipes may be inspected by means of a steel rod with a telephone receiver or similar device at its upper end. The rod is inserted through the service box and placed on the corporation cock. If ever so small a stream of water is running the ear of the trained observer will catch the sound and an inspection is made. Water-waste surveys of a comprehensive sort are now quite commonly effected in the United States with the photopitometer. (See PITOMETER.) With this instrument the volume of flow can be determined at a given point—either the delivery of a pump, or the flow through a section of the water distribution system. By such means a water-work system may be gone over, district by district, from larger to smaller, and waste or leaks located, the process ending with observations on the individual house service. The most thorough, because continuous and self-recording, means of waste control is a large permanent meter on the source of supply, district meters where and if necessary, and a consumer's meter on each consumer. Such simple plans as observing the rate of pumping or the fall of water in reservoirs during the hours of minimum night consumption, or the relative day and night pressures, often assist in proving that waste is taking place.

Public Policy. The only points under this head that can be considered here are the apportionment of the cost of service between the various classes of consumers and one or two phases of the municipal-ownership question Apportionment of cost of service involves not alone the quantity of water consumed by the various users, but the heavy capital charges incurred to make very large rates of consumption available for the few minutes or at most hours at a time when water is used for the extinguishment of fires. Large reservoirs, pumping plants, and mains are provided for fire protection, and used in the aggregate for a short time only in each year. This makes high capital charges, even though the cost of operation for fire protection is small The other public uses to which water is put, like street sprinkling, sewer flushing, and the supply of parks and school buildings, may be paid for on the same general basis as water supplied to private consumers. It is a rare thing under either public or private ownership to find a scientific adjustment of the cost of public and private service between the general taxpayers and private consumers, respectively. But equity demands such an adjustment. The fire, school, street, and other departments should be debited and the water department, in the case of municipal ownership, credited with the value of the services rendered to each. The taxpayer should not be called upon to meet bills of private consumers, nor should the man who uses water for a bathtub and lawn sprinkler have included in his bills for these services the heavy cost of fire protection in the business district. As between different individual consumers in the same class the meter is the best means of apportioning the charges for water. So-called fixture rates are arbitrary guesses and compel the careful water user to pay for the waste of the careless. With the growth of public-utility regulation (q v.) a more equitable division of the cost of the water service between public and private consumers and more equitable rates generally are being required in some States. Outside of Wisconsin, however, the public-utility commissions control the rates and services of privately owned works only, as a rule, leaving municipally owned works to their own devices. Nevertheless, water-rate conditions have improved materially, owing largely to committee reports, papers, and discussions before the various water-works organizations.

Public Ownership demands for its proper consideration, from the economic standpoint, accurate detailed figures of expenses and revenue, on a comparative basis. Such figures are rarely available.

The sanitary interests of a community, depending as they do largely upon police measures, are generally considered to be safer where water works are under public rather than private control, but the differences are less marked than formerly now that State boards of health and State-utility commissions have large measures of control over the character of public water supplies. The course of public ownership in the United States during the past century is shown below in the table giving the number of works at the close of each half decade

Complete figures for later intervals are not available, but some figures for the United States, Canada, and England may be found under MUNICIPAL OWNERSHIP.

History. The water works of the cities of western Asia, Greece, Carthage, Rome, and the European countries under Roman dominion all depended upon gravity for delivery of water, and were notable chiefly for their aqueducts. Most of the aqueducts were of masonry. (See AQUEDUCT.) The water within the cities was conveyed by means of lead, wood, and more rarely bored stone or baked-clay conduits (See PIPE) Some of the earliest pumping works for city supplies, notably those erected at London Bridge in 1562 by Peter Maurice, are described

NUMBER OF PUBLIC AND PRIVATE WORKS IN THE UNITED STATES

AT THE END OF EACH HALF DECADE, BEGINNING WITH 1800

(Compiled from *The Manual of American Water Works* for 1891 and 1897)

YEAR	Public	Private	Total	PER CENT OF TOTAL	
				Public	Private
1800	1	15	16	6 3	93 7
1805	2	21	23	8 7	91 3
1810	5	21	26	19 2	80 8
1815	5	21	26	19 2	80 8
1820	5	25	30	16 6	83 4
1825	5	27	32	15 6	84 4
1830	9	35	44	20 5	79 5
1835	15	39	54	27 8	72 2
1840	23	41	64	35 9	64 1
1845	27	43	70	38.6	61 4
1850	33	50	83	39.7	60 3
1855	48	58	106	45 3	54 7
1860	57	79	136	41 9	58 1
1865	68	94	162	42 0	58 0
1870	116	127	243	47 7	52 3
1875	227	195	422	53 8	46.2
1880	293	305	598	49 0	51.0
1885	447	569	1013	44.1	55.9
1890	806	1072	1878	42 9	57 1
1896	1690	1489	3196	53 2	46 8

Include 12 of joint and 5 of unknown ownership

in the article on PUMPS AND PUMPING MACHINERY. In 1613 water was brought into London from a distance by Sir Hugh Myddleton, who with others secured a charter for the New River Company in 1619. The most notable feature consisted of a water-supply canal about 40 miles long, which brought in water from springs distant, in an air line, about 20 miles. The canal was about 18 feet wide, 5 feet deep, and had an average fall of some 4 inches per mile. Valleys were crossed, for the most part, by means of timber flumes, lined with lead. Subsequently the flumes were replaced by earth embankments. A sale of some of the stock of the New River Company, which for many years shared with seven other companies the profits of supplying the Metropolitan water area, brought a fabulous sum, a few years ago, as compared with the original par value.

The first public water supply in America was introduced in Boston in 1652 by the Water Works Company. It consisted of a reservoir about 12 feet square, to which water was conveyed through wooden pipes from neighboring springs and drawn upon for both domestic and fire purposes. The second American water-works plant was built at Bethlehem, Pa. It was begun in 1754 by a Danish millwright named Hans Christopher Christiansen and was finished in 1761. Water from a spring was piped for 350 feet to a cistern, or well, from which a wooden pump, 5 inches in diameter, forced it through bored hemlock logs to a wooden tank in the village square, 70 feet above the pumps,

In 1761 Christiansen and others built larger works, including three simple-acting iron force pumps, 4 inches in diameter and with a stroke of 18 inches, driven by an undershot water wheel The new pipe from the pump to the tank was of gum wood, and the distributing pipes were of pitch pine. In 1769 the latter had to be renewed and in 1786 lead pipes were substituted for both the force pump or force main and most of the distributing pipes In 1813 iron pipes were introduced, with leather-packed joints, clamped together with iron. The pumps installed in 1761 were used for 71 years, when they were supplanted by 5 × 36-inch double-acting pumps, which were in use as late as 1887. Steam was not substituted for water power until 1868. In 1871 the borough bought the works from their private owners, the Bethlehem Water Company.

To the close of the year 1800 there had been built in the United States 16 water-works plants. All but one of these were originally owned by private companies, but during the nineteenth century 14 of the 15 remaining cities changed from private to public ownership. The names of the 16 cities, the dates the original works were constructed, and the years of change to public ownership are as follows:

WATER WORKS IN THE UNITED STATES AT THE CLOSE OF 1800

(From *The Manual of American Water Works* for 1891)

Located at	Date built	Change to public ownership
Boston, Mass	1652	1848
Bethlehem, Pa.	1761	1871
Providence, R I	1772	1871
Geneva, N. Y.	1787	1896
Plymouth, Mass.	1796	1855
Salem, Mass	1795	1875
Hartford, Conn.	1797	1854
Portsmouth, N. H.	1798	1891
Worcester, Mass.	1798	1852
Albany, N Y	1798 or 1799	1851
Peabody, Mass.	1799	1873
New York, N Y	1799	1845
Morristown, N J.	1799	Still private
Lynchburg, Va	1799	1828
Winchester, Va	Before 1800	Always public
Newark, N. J	1800	1860

See AQUEDUCT; DAMS AND RESERVOIRS; FILTER AND FILTRATION; MUNICIPAL OWNERSHIP; PIPE; PUMPS AND PUMPING MACHINERY; WATER METER; WATER PURIFICATION; WATER SUPPLY; WINDMILL, and references there given.

Bibliography. M. N. Baker, *Manual of American Water Works* (New York, 1897); John Goodell, *Water Works for Small Cities and Towns* (ib., 1899); E. S. Gould, *Elements of Water Supply Engineering* (ib., 1899); J. N. Hazlehurst, *Towers and Tanks for Water Works* (2d ed., ib., 1904); J. T. Fanning, *Practical Treatise on Hydraulic and Water Supply Engineering* (16th ed., ib., 1906); Turneaure and Russell, *Public Water Supplies* (2d ed., ib., 1908); A. P. Folwell, *Water Supply Engineering* (2d ed., ib., 1909); *McGraw Water Works Directory* (ib., 1915).

WATER YAM. See LATTICE-LEAF.

WATFORD, wŏt'fẽrd. A market town in Hertfordshire, England, picturesquely situated on the Coln, 17 miles northwest of London (Map: London, B 3). It has fine public buildings, including a restored Perpendicular church and the well-known London Orphan Asylum. There are silk, paper, and flour mills. Pop., 1901, 29,023; 1911, 40,939.

WATKIN, wŏt'kĭn, SIR EDWARD WILLIAM (1819–1901). An English railway promoter, born at Salford. In 1845 he became secretary of the Trent Valley Railway, retaining this position when the line became a part of the London and North-Western Company. He was also appointed in 1853 general manager of the Manchester, Sheffield, and Lincolnshire Railway (later the Great Central), which he extended to London, and in 1867 he assumed the chairmanship of the South-Eastern. He sat in Parliament (1857–58, 1864–68, and 1874–95), and was knighted in 1868 and created a baronet in 1880. Sir Edward was author of *Canada and the States* (1887).

WATKINS, wŏt'kĭnz. A village and the county seat of Schuyler Co., N. Y., 22 miles north by west of Elmira, on Seneca Lake, and on the New York Central and the Pennsylvania railroads (Map: New York, D 6) The vicinity abounds in picturesque lakes and mineral springs, but is better known for its numerous glens and ravines. Watkins Glen, with its cascades and waterfalls, acquired by the State for a park in 1906, and the group of springs known as the Glen Springs, are especially noteworthy. Other features are the Glen Springs Sanatorium and the public library. The village has large salt works and manufactories of flour, grape juice, baskets, and iron and lumber products. Pop., 1900, 2943; 1910, 2817.

WATKINS GLEN. See WATKINS.

WATLING'S (wŏt'lĭngz) **ISLAND.** A small island of the Bahamas, situated in the east central part of the group, 46 miles southeast of Cat Island (Map: West Indies, D 1). It is generally identified with Guanahani or San Salvador, the first landing place of Columbus.

WATLING STREET (AS. *Wætlinga stræt*). A celebrated Roman highway of Britain, beginning at Dover, passing through Canterbury and Rochester to London, and thence through Wroxeter and Chester to Caer-Seiont, the ancient *Segontium*, in Caernarvonshire. From Wroxeter a branch proceeded north by Manchester, Lancaster, and Kendal, into Scotland, but many antiquaries deny that this is part of the original Watling Street. Traces of the ancient road exist and in some parts of its course it is still an important highway. It forms the boundary between Warwickshire and Leicestershire. The origin of the name is uncertain; the original name was probably Stratum Vitellianum. See FOSSWAY.

WATROUS, wŏt'rŭs, HARRY WILSON (1857–). An American figure and genre painter. He was born in San Francisco, Cal., and studied with Bonnat, Boulanger, and Lefebvre in Paris. Returning to America, he settled in New York and became well known for his small, highly finished, sometimes bizarre, figure compositions of modern city life. He was elected a member of the National Academy in 1895 and in 1898 became its corresponding secretary. Good examples of his work include "Passing of Summer" (Metropolitan Museum, New York); "A Study in Black" (St. Louis Museum); "An Auto Suggestion" (Buffalo Fine Arts Academy); "The Drop Sinister" (1914); "Who Cares" (1915); "The Line of Love" (1915). He was awarded a gold medal at St. Louis in 1904.—His wife, ELIZABETH NICHOLS WATROUS, painted pictures resembling her husband's.

WATSON, wŏt's'n, DAVID THOMPSON (1844–1916) An American lawyer Born at Washington, Pa., he graduated from Washington (now Washington and Jefferson) College in 1864, and from Harvard (LL.B) in 1866. After 1868 he practiced law at Pittsburgh, Pa. Watson was United States counsel before the Alaska Boundary Commission in 1903, and also counsel for the government in the merger cases, his brief on the Standard Oil case being published in 1910.

WATSON, HENRY BEERETON MARRIOTT (1863–1921). An English novelist, born at Caulfield, a suburb of Melbourne, Australia, where his father was then settled as a clergyman He was educated at Canterbury College, New Zealand, went to England in 1885, and soon became a journalist. He is known through his contributions to *The National Observer* and as assistant editor of *Black and White* and of the *Pall Mall Gazette* His writings, mostly stories of adventure, sometimes with a historical setting, include· *Marahuna* (1888), *Lady Faintheart* (1890), *The Web of the Spider* (1891); *Diogenes of London* (1893); *Galloping Dick* (1895); *At the First Corner* (1896), *The Heart of Miranda, and Other Stories* (1898), *The Adventurers* (1898); *The Princess Xenia* (1899); *Chloris of the Island* (1900); *The Rebel* (1900); *The Skirts of Happy Chance* (1901); *The House Divided* (1901); *Godfrey Merival, Being a Portion of his History* (1902); *Hurricane Island* (1905); *Twisted Eglantine* (1905); *At a Venture* (1911); *The Big Fish* (1912); *Rosalind in Arden* (1913); *The House in the Downs* (1914), *Chapman's Wares* (1915). For his wife, see WATSON, ROSAMUND.

WATSON, HEWETT COTTRELL (1804–81). An English botanist, born at Firbeck, Yorkshire, and educated at the University of Edinburgh. In 1831 he won the professor's gold medal for an essay on the geographical distribution of plants, a subject which later became his chief scientific interest. He went with a survey to the Azores, where he spent three months collecting specimens, several of which were entirely new in the British Gardens. His writings include: *The New Botanist's Guide to the Localities of the Rarer Plants of Great Britain* (1835); *The London Catalogue of British Plants* (6th ed., 1867); and *Cybele Britannica, or British Plants and their Geographical Relations* (1847–60).

WATSON, JAMES CRAIG (1838–80). An American astronomer, born in Ontario, Canada, of American parents. He graduated at the University of Michigan, 1857, and was instructor there in mathematics and assistant at the observatory. He became professor of astronomy in 1859, of physics and mathematics in 1860, and director of the observatory in 1863. He discovered many planetoids (q.v), and had charge of the American expedition to observe the transit of Venus at Peking, China, 1874. He prepared astronomical charts, but his principal work was his *Theoretical Astronomy* (1868). This is now a classic treatise on the theory of the motions of comets and planets. Watson left a large sum of money to the National Academy of Sciences (the Watson Fund), its interest to be used to further astronomical research.

WATSON, JOHN (1847–). A Canadian philosopher. He was born at Glasgow and graduated at Glasgow University in 1872. In the same year he was appointed professor of logic, metaphysics, and ethics at Queen's University, Kingston, Canada He is to be classed as an intellectual idealist. Apart from his constructive work he made a valuable contribution in his exposition of Kant Aside from numerous papers in philosophical journals, his publications include: *Kant and his English Critics* (1881); *Schelling's Transcendental Idealism* (1882); *The Philosophy of Kant as Contained in Extracts from his Own Writings* (1888), *Comte, Mill, and Spencer* (1895), *An Outline of Philosophy* (1898); *The Philosophical Basis of Religion* (1907); *The Philosophy of Kant Explained* (1908), *The Interpretation of Religious Experience* (1912).

WATSON, JOHN (1850–1907), better known as IAN MACLAREN. A British Presbyterian clergyman and author He was born of Scottish parents at Manningtree, Essex, and studied at Edinburgh University, New College (Edinburgh), and Tübingen Licensed by the Free Church of Scotland in 1874 he became assistant at the Barclay Church, Edinburgh. The following year he was ordained minister of the Free Church at Logiealmond, Perthshire In 1877 he went to Free St Matthew's, Glasgow, and from 1880 to 1905 was in charge of Sefton Park Presbyterian Church, Liverpool He became widely known for his humorous, sympathetic, and entertaining stories descriptive of Scottish life and character, among the best of their kind. These include· *Beside the Bonnie Brier Bush* (1894); *The Days of Auld Lang Syne* (1895); *Kate Carnegie* (1896); *A Doctor of the Old School* (1897); *Afterwards* (1898); *Rabbi Saunderson* (1898); *Young Barbarians* (1901); *His Majesty, Baby* (1902). In 1896 Watson gave the Lyman Beecher lectures at Yale, published under the title *The Cure of Souls* (1896), and in 1907 he again lectured in the United States, and during this tour he died. He wrote also· *The Upper Room* (1895); *The Mind of the Master* (1896); *Companions of the Sorrowful Way* (1898); *Doctrines of Grace* (1900); *The Life of the Master* (1901); *Inspiration of our Faith: Sermons* (1905); *Children of the Resurrection* (1912). Consult W. R. Nichol, *"Ian Maclaren"· Life of the Rev. John Watson* (New York, 1908).

WATSON, JOHN BROADUS (1878–). An American psychologist, born at Greenville, S. C. He was educated at Furman University (A.M., 1900), and at the University of Chicago (Ph.D, 1903), where he was afterward assistant and instructor in psychology till 1908, when he was appointed professor of experimental and comparative psychology at Johns Hopkins. Watson became joint editor of the *Journal of Animal Behavior*, and was editor of the *Psychological Review* after 1908. Besides contributions to animal psychology he wrote *Animal Education* (1903) and *Behavior—An Introduction to Comparative Psychology* (1914).

WATSON, JOHN CHRISTIAN (1867–). An Australian politician and labor leader, born at Valparaiso, Chile. He worked early as a typesetter, was a member of the New South Wales Assembly from 1894 to 1901, and served as president of the Sydney Trade and Labor Council in 1893–94 and of the Australian Labour Federation in 1895. He was leader of the powerful Federal Labor party in the Commonwealth Parliament in 1901–07, having been elected to the first Commonwealth Parliament in 1901, and reëlected in 1903 and 1906. In 1904 he was

Premier and Treasurer of Australia. In 1910 he retired from politics

WATSON, JOHN CRITTENDEN (1842–1923) An American naval officer, born in Frankfort, Ky. He was educated at the United States Naval Academy, became a master in the navy in 1861, and served throughout the Civil War, after July, 1862, as a lieutenant. He became a captain in 1887 and a commodore in 1897, and in the Spanish-American War commanded the blockading squadron on the North Cuban coast from May to June, 1898, when he was made commander in chief of the Eastern Squadron, which was to threaten the Spanish coast and thus force the return of the Spanish fleet, under Camara, bound for Manila. News of the movement having reached Spain, Camara was recalled before Watson could execute his orders, and Watson subsequently resumed charge of the blockade of the northern coast of Cuba. He was then commandant of the Mare Island Navy Yard from October, 1898, to May, 1899, became rear admiral in March, 1899, was commander in chief of the naval forces on the Asiatic Station from June, 1899, to April, 1900, and president of the Naval Examining and Retiring Boards in 1902. He retired from active service in 1904.

WATSON, RICHARD (1737–1816). Bishop of Llandaff. He was born at Heversham, Westmoreland, England; graduated at Trinity College, Cambridge, 1759; obtained a fellowship, 1760; was appointed professor of chemistry, 1764; regius professor of divinity, Cambridge, and rector of Somersham, 1771; Archdeacon of Ely, 1779; and Bishop of Llandaff, 1782. He is now chiefly remembered for his *Apology for Christianity, in a Series of Letters, addressed to Edward Gibbon, Esq.* (1776); and his *Apology for the Bible, in a series of Letters, addressed to Thomas Paine* (1796). His autobiography, edited by his son, appeared at London in 1817.

WATSON, RICHARD (1781–1833). An English Wesleyan theologian. He was born at Barton-upon-Humber, England, joined the Methodists, 1796; and became a member of the Conference, 1800. He joined the Methodist new connection (1803), returned to the regular Wesleyan connection, and edited the Liverpool *Courier* (1808); was one of the secretaries of the missionary society in London (1816); and was elected president of the Conference in 1826. He published: *Remarks on the Eternal Sonship of Christ* (against Adam Clarke, 1818); *Theological Institutes* (1823–29; new ed., 1877); *Biblical and Theological Dictionary* (1831); and *Life of Rev. John Wesley* (1831). His works were edited with a *Life* by Thomas Jackson (12 vols., London, 1834–37; new ed., 13 vols., 1847). Consult also J. Bunting, *Memorials of the late Richard Watson* (London, 1833).

WATSON, ROBERT SPENCE (1837–1911). An English economist and educator. He was born at Gateshead and was educated at the Friends' School, York, and at University College, London. From 1890 to 1902 he was president of the National Liberal Federation. In 1910 he became president of Armstrong College, Newcastle. He wrote: *History of English Rule and Policy in South Africa* (1879); *Irish Land Law Reform* (1881); *Boards of Conciliation and Arbitration* (1886); *The Peaceable Settlement of Labor Disputes* (1889); *Labor, Past, Present, and Future* (1889); *The Recent History of Industrial Progress* (1891); *The Duties of Citizenship* (1895); *The Reform of the Land Laws* (1906).

WATSON, ROSAMUND (1863–1911) An English author, wife of H B Marriott Watson (q v). She was born in London Her writings include: *Ballad of The Bird-Bride* (1889), *A Summer Night* (1891), and *Vespertilia* (1895), collections of verse; *After Sunset* (1895); *The Art of the House* (1896); *The Heart of a Garden* (1905). Consult William Archer, *Poets of the Younger Generation* (London, 1902).

WATSON, SERENO (1826–92). An American botanist, born at East Windsor Hill, Conn, and educated at Yale and the medical department of the University of New York. He was botanist of the United States Geological Survey under Clarence King, collecting in the Great Basin region, and publishing his results as a volume of King's *Report* in 1870. Upon his return from this survey, he became an assistant in the Gray Herbarium at Harvard, and at the death of Dr Asa Gray in 1888 he was made curator. He also wrote *Botany of California* (1876), with Professor Gray and W. H. Brewer; *Bibliographical Index to North American Botany* (1878), numerous papers entitled *Contributions to American Botany* (1873–91); and with J M. Coulter revised and extended Gray's *Manual of Botany* (1890).

WATSON, THOMAS (?1557–92). An English poet, born probably in London, and probably a student at Oxford. Watson's first appearance as an English poet was in the *Passionate Century of Love* (1582), made up of a series of poems, which have the aspect of sonnets, but are really composed of three six-line stanzas each. This was followed by his best volume, a collection of true sonnets entitled *Tears of Fancy* (posthumous, 1593). Meres couples his name with the names of Shakespeare, Peele, and Marlowe as a tragic writer, but no play of Watson's is extant. Watson translated into Latin the *Antigone of Sophocles* (1581) and Tasso's *Aminta* (1585). Consult Arber, *English Reprints* (London, 1870; reissue, 1895).

WATSON, THOMAS E(DWARD) (1856–1922). An American politician and author, born in Columbia Co., Ga. He was educated at Mercer College, was admitted to the bar in 1875, and served in the Georgia Legislature in 1882–83, and in Congress as a Populist in 1891–93. In 1896 he was vice-presidential nominee on the Democratic ticket with W. J. Bryan. In 1904 he was nominated for President by the People's party. He was editor and publisher of *Tom Watson's* magazine in 1905–06, and of the *Weekly Jeffersonian* thereafter. In 1915 he carried on a virulent editorial campaign against Leo M. Frank, who was serving a life sentence for murder, and Frank was later lynched. His publications include: *The Story of France* (2 vols., 1898); *Napoleon* (1902; new ed., 1913); *Life and Times of Thomas Jefferson* (1903); *Bethany, a Story of the Old South* (1904); *Life and Times of Andrew Jackson* (1907); *Handbook of Politics and Economics* (1908); *Life and Speeches of Thomas E. Watson* (1908); *Is Roman Catholicism in America Identical with That of the Popes?* (1914); *The House of Hapsburg* (1915).

WATSON, WILLIAM (1858–). An English poet, born at Burley-in-Wharfedale, Yorkshire. His *Epigrams of Art, Life, and Nature* (1884) was his first book to attract attention. During the following year he published in the *National Review* a series of sonnets entitled *Ver Tenebrosum*, in which he attacked the British

policy in Egypt. In 1890 appeared his poem "Wordsworth's Grave" and in 1892 "Lachrymæ Musarum," a fine ode in memory of Tennyson. In 1913, after the death of Alfred Austin (q.v.) it was thought by many that Watson would be appointed poet laureate; instead Robert Bridges (q.v.) received the honor. His verse is careful, delicate, and sure in workmanship and is reflective in tone. His sonnets in the *Purple East* contain some of his best work. Among his later books are *Lyric Love* (1892), *The Eloping Angels* (1893); *Excursions in Criticism* (1893); *Odes and Other Poems* (1894); *The Father of the Forest* (1895); *The Purple East* (1896); *The Year of Shame* (1896), a forceful and ringing indictment of England's policy in the Orient; *The Hope of the World* (1897); *Ode on the Coronation of King Edward VII* (1902); *Collected Poems* (2 vols., 1906), *New Poems* (1909), *Sable and Purple* (1910), *The Heralds of the Dawn* (1912); *The Muse in Exile* (1913). Consult Collins, *Studies in Poetry and Criticism* (New York, 1906).

WATSON-GORDON, Sir John. See Gordon, Sir John Watson-.

WATSONVILLE. A city in Santa Cruz Co., Cal., 53 miles south of San José, 5 miles from Monterey Bay, on the Southern Pacific and the Pajaro Valley consolidated railroads (Map: California, D 6). It ships large quantities of apples, apricots, and berries. The city has a Carnegie library. Pop., 1900, 3528; 1910, 4446.

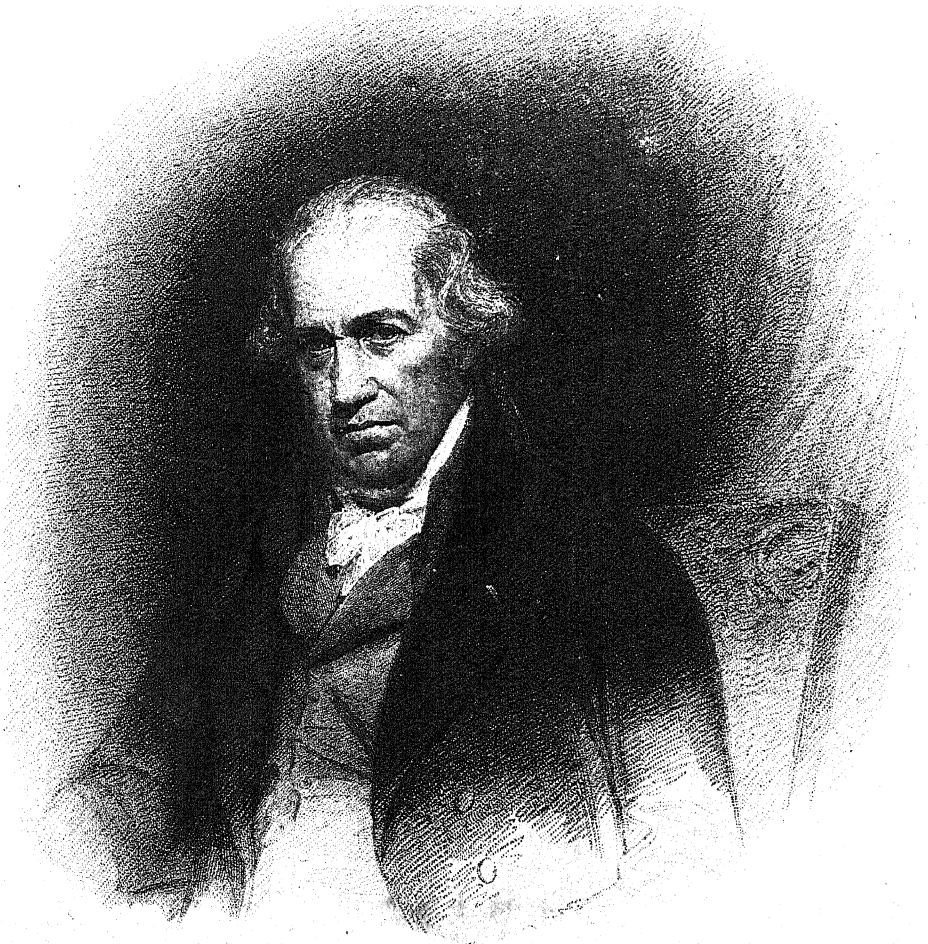
WATSON-WENTWORTH, Charles. See Rockingham, Marquis of.

WATT, wŏt (named in honor of James Watt). The practical unit of power (q.v.) or activity. The C. G. S. unit of power is 1 *erg* per second, and the watt is 10^7 of these units, or 1 *joule* per second. A horse power is 33,000 foot pounds per minute and therefore equals 746 watts approximately; 1 watt = 0.0013406 horse power. The kilowatt, or 1000 watts, is the unit in ordinary use, for the rating of electric machinery. See C. G. S. System.

WATT, James (1736–1819). A British mechanical engineer, famous for his improvements on the steam engine, which were so important and fundamental as often to lead to his being styled its inventor. He was born at Greenock, Scotland, the son of a carpenter and merchant, who occasionally held such town offices as treasurer and chief magistrate. His early education was at the town schools, which he was unable to attend regularly on account of ill health. At this time he was learning the use of wood and metal working tools and constructing ingenious models and original mechanisms. He evinced a taste for mathematics and a fondness for reading which he maintained through life. When eighteen years old Watt went to Glasgow to learn the trade of an instrument maker, but soon proceeded to London, where he followed this calling for a year. In 1756 he returned to Glasgow, but experienced difficulty in starting in business on his own account, owing to the opposition of workers in the same trade. He became connected with the university as an instrument maker, and remained until 1760, when he established himself independently, working also at times as a civil engineer. While at the university he became acquainted with the various professors and students and received from them instruction and suggestions. As early as 1759 he turned his attention to the construction of a steam carriage, and in 1764 he was called upon to repair the model of the Newcomen engine in the cabinet of the university. Studying this machine thoroughly, he soon realized its defects and lack of efficiency, and determined that the losses of heat in the cylinder could be corrected, and the imperfect method of condensing the steam could be improved. He contrived an independent condenser where the steam was exhausted and condensed after doing its work on the piston, instead of being condensed by a jet of cold water in the cylinder, as in the Newcomen engine. To develop this Watt secured the financial cooperation of Dr. John Roebuck, the founder of the Carron Iron Works, and in 1765 constructed a small engine, which was operated with some success. Watt was in the meanwhile spending all of his resources, but also making considerable progress in engine building, until financial misfortunes deprived him of the cooperation of Dr Roebuck. At this time (1767) an enterprising manufacturer, Matthew Boulton (q.v.), joined with Watt, and their names were subsequently associated in the manufacture and improvement of steam engines that resulted from the partnership.

In 1774 a steam engine was completed, noteworthy in that it embodied the essential features of the modern steam engine. So much time had been spent in the development of the engine that in 1775 an act to prolong the life of Watt's original patent until 1800 was passed by Parliament, and during this interval other valuable patents were acquired and many engines were manufactured and sold to mines and collieries. Next to the external-condensation principle the important features were: The making of the engine double-acting by the addition of valves, instead of having the steam act only on one side of the piston, which was then returned to its original position by a counterweight; and the use of steam expansively. With the double-acting engine by the use of a flywheel it was possible to have continuous rotary motion through the medium of a crank, which, while claimed as an invention of Watt, was actually patented by one Pickard, a former employee of his, and disposed of to a Mr. Washbrough of Bristol. To meet this deficiency Watt contrived various devices, of which the sun and planet gear wheels were the most successful, for changing the reciprocating into rotary motion. The application of the centrifugal governor to the steam engine, the invention of the water gauge, the mercury steam gauge, and the indicator are but a few of the many improvements contributed by Watt to the steam engine. With his many improvements and additions to the steam engine it was somewhat singular that Watt did not employ steam at high pressures, as was suggested by Trevithick and others, and which was the next important step in the development of the steam engine. The invention of the steam hammer naturally resulted from his work on the steam engine, but the copying press, a spiral oar or screw propeller, the discovery of the composition of water, a machine for reproducing sculpture, and numerous physical instruments and methods show the diversity of his researches and the breadth of his talents.

Retiring from business in 1800, he turned over to his two sons his interest in the large and remunerative business which had been built up at Soho by Boulton's effort. He died at Heathfield, in Staffordshire, on Aug. 25, 1819. He was elected a fellow of the Royal Society of Edin-



JAMES WATT

FROM AN ENGRAVING BY C. PICART, AFTER A DRAWING BY W. EVANS

burgh in 1784, a fellow of the Royal Society of London in 1785, and in 1808 a corresponding member, and afterward a foreign member of the Institute of France. The University of Glasgow conferred on him the degree of LL.D. in 1806. A statue, the funds for which had been raised by public subscription, was erected at Birmingham, while a national monument was placed in Westminster Abbey, on which an appropriate inscription written by Lord Berryham was inscribed. Consult: J. P. Muirhead, *Origin and Progress of the Mechanical Inventions of James Watt* (London, 1854); id., *Life of Watt* (ib., 1858); Andrew Carnegie, *James Watt* (New York, 1905); Samuel Smiles, *Lives of the Engineers*, vol. iv (ib, 1905); and "Some Unpublished Letters of James Watt" in *Journal of Institution of Mechanical Engineers* (London, 1915).

WATTEAU, vȧ'tō', ANTOINE (1684–1721). A French genre painter, the most important of the eighteenth century. He was born at Valenciennes, Oct. 10, 1684, the son of a roof slater, and at first studied with a local painter named Gérin. At 18 he went to Paris, where he worked with the theatre decorator Claude Gillot. About 1708 he became associated with the painter Claude Audran, custodian of the Luxembourg Palace, whose graceful decorations and designs considerably influenced Watteau's subsequent style. Through his vivid impressions of the many fêtes and gatherings of the court in the picturesque Luxembourg gardens, he was inspired to originate the style which he himself called *Peinture de fêtes galantes*. Much of his mastery of color and freedom of execution is probably the result of his study of the works of Rubens and Veronese in Luxembourg palace. Failing of the Prix de Rome in 1709, he retired to Valenciennes; but returning to Paris, he was befriended by La Fosse, the director of the Academy, through whose influence he became a member of the Academy in 1717. His diploma piece was the celebrated "Embarkment of Cythera" (Louvre), probably his masterpiece, of which an excellent replica with more numerous figures is in the Royal Palace, Berlin. His fame spread over Europe, and he labored unremittingly until his untimely death from pulmonary consumption at Nogent sur Marne, July 18, 1721.

Watteau was the most original genius of French rococo painting. His pictures, in spite of their gayety and frivolity, are imbued with haunting, wistful sentiment. The figures, solidly and carefully modeled, are bathed in a wonderfully bright and lambent atmosphere, giving an ethereal effect, the composition is charmingly irregular, the color scheme warm and glowing, combining daintiness with richness of effect. Next to the Louvre, which contains 12 of his works, including "Gilles," "Assembly in a Park," "L'Indifferent," and "Jupiter and Antiope," Watteau may be best studied at Berlin and Potsdam, which together have fifteen examples. Of these the most notable are perhaps "The Village Bridal Procession" (c 1715, San Souci), with more than a hundred figures, the "Picnic" (Berlin Museum), and "Gersaint's Sign," his last work (Royal Palace, Berlin). He is represented in nearly all the large public galleries of Europe, including the Hermitage, St. Petersburg, with eight; the Dresden Gallery, the Prado, Madrid; Chantilly Museum, Paris; the National galleries of Scotland and Ireland; the Dulwich Gallery, London; Buckingham Palace, London, with the beautiful "Concert Champêtre," and "The Surprise"; and especially in the Wallace collection, London, with 10 examples, including the "Village Fête." Engravings after Watteau's works comprise more than 560 plates, many by famous masters. The most important of his followers were Lancret and Pater (qq.v.).

Bibliography. De Goncourt, *L'art du XVIIIme siècle* (Paris, 1883); Claude Phillips, *Antoine Watteau*, in "Portfolio" series, No. 18 (London, 1895); Adolf Rosenberg, "Antoine Watteau," in *Kunstler-Monographien*, vol. xv (Bielefeld, 1896); G. Séailles, *Watteau: biographie critique* (Paris, 1902); Edgcumbe Staley, *Watteau and his School*, in "Great Masters in Painting and Sculpture" (London, 1902); *Masters in Art*, vol. iv (Boston, 1903), containing a bibliography; Camille Mauclaire, *De Watteau à Whistler* (Paris, 1905); id, *Antoine Watteau* (Eng. trans., New York, 1905); J. J. Foster, *French Art from Watteau to Prud'hon* (London, 1905); Edmond Pilon, *Watteau et son école* (Brussels, 1912).

WATTENBACH, vät'en-bag, WILHELM (1819–97). A German historian and paleographer. He was born at Ranzau, in Holstein, and studied in 1837–42 at the universities of Bonn, Göttingen, and Berlin. In 1862 he was called to Heidelberg as professor of history, and in 1872 to Berlin. His publications include: *Beitrage zur Geschichte der christlichen Kirche in Bohmen und Mähren* (1849); *Deutschlands Geschichtsquellen im Mittelalter* (1858; 6th ed., 2 vols., 1893–94); *Anleitung zur griechischen Palaographie* (1867; 3d ed., 1895); *Anleitung zur lateinischen Palaographie* (1869; 4th ed., 1886); *Das Schriftwesen im Mittelalter* (1871; 3d ed., 1896); *Geschichte des romischen Papsttums* (1876). He directed the *Monumenta Germaniæ Historica* after 1872.

WATTENSCHEID, vät'en-shīt. A town of the District of Arnsberg, Prussia, 4 miles west of Bochum. Pop., 1900, 20,295; 1910, 27,636.

WATTERSON, wät'ẽr-sŭn, HENRY (1840–1921). An American journalist and orator. He was born in Washington, D. C, and was educated for the most part privately. He entered journalism in Washington as reporter and editorial writer for the *States*, served in the Confederate army in 1861–62 as private soldier and aide-de-camp successively to generals Forrest and Polk, and in 1862–63 edited the Chattanooga *Rebel*. In 1864 he was again in military service as chief of scouts to Gen. Joseph E. Johnston. He edited the *Republican Banner* of Nashville in 1865–68 and then became editor in chief of the Louisville *Journal* which with the *Democrat* he and W. N. Haldeman combined in 1868 to make the *Courier-Journal*, of which Watterson became the editor. Under his direction this newspaper came to occupy a foremost place in American journalism. He was perhaps most widely known as an advocate of conciliation between North and South, an opponent of the Ku Klux Klan (q.v.) movement, a leader in the Liberal Republican movement of 1872, and an opponent of the Greenback and Free Silver parties. In 1876–77 he represented the Louisville district in Congress as a Democrat and in 1876 was temporary chairman of the National Democratic Convention at St. Louis, and in various other national conventions was chairman of the Platform Committee. He was considered to be the author of the phrase "Tariff for revenue only." In 1896 he declared himself a Gold Democrat. He denounced the trusts and capitalistic organi-

zation of industry. In later years he lived much of the time in Europe, but kept in active touch with his paper. In 1912 he became involved in the disagreement between Woodrow Wilson (q.v.) and Colonel Harvey. He opposed Wilson's nomination and only casually supported the Democratic ticket, but in 1915 the President and he were partially reconciled. In the same year he denounced the hyphenated Americans of divided allegiance, and supported a vigorous foreign policy. He was sometimes spoken of as "Marse Henry" Watterson. His publications include *Oddities in Southern Life and Character* (1882), *History of the Spanish-American War* (1899), *The Compromises of Life. Lectures and Addresses* (1903; new ed., 1906).

WATTLE. A method of marking range cattle for identification, at one time used in addition to the brand (see BRANDING) as a substitute for, or in addition to, the earmark (q.v.). The wattle was made by slitting the dewlap in such a manner that when the animal was viewed in profile, characteristic knobs, loops, or pendants would show. Wattles were occasionally made on the jaw or shoulder by making a cut thus Λ. The small flap of skin would hang down and heal into a projecting hairy lump.

WATTLE. See ACACIA.

WATTLE BIRD. An Australian honey-eater (*Anthochæra carunculata*) about the size of a magpie, grayish brown above, each feather striped, and bordered with white; the tail brown, long, wide, and graduated. It derives its name from a pendulous reddish wattle on each side of the throat, half an inch long. An allied species in Tasmania has the wattles an inch long.

The wattle crow or kokako of the Maoris, of New Zealand, is a very different bird, nearly allied to the jays, with gray and brown plumage and a black face. It sings well. There are two species, *Callœas cinerea* of the South Island and *Callœas wilsoni* of the North Island.

WATTLE GUM. See GUMS.

WATTLESS CURRENT. See TRANSFORMER.

WATTRELOS, vä'tr'lō'. A town of the Department of Nord, France, on the Belgian frontier, two miles northeast of Roubaix (q.v.), of which it is a suburb. Pop., 1901, 25,884; 1911, 29,089.

WATTS, ALARIC ALEXANDER (1797–1864). An English journalist and poet, born in London. He was editor of the *Leeds Intelligencer* (1822–25) and the *Manchester Courier* (1825–26), took part in establishing the London *Standard* (1827), a Conservative newspaper, and founded the *United Service Gazette* (1833). In the meantime he had begun the *Literary Souvenir* (1824), which was one of the most successful of the annuals down to its suspension in 1838. During the next 10 years he was engaged in starting several provincial newspapers in the Conservative interest. Though these undertakings led to bankruptcy (1850), he had organized the subsequently popular plan of supplying sheets of general news printed in London to supplement the local news of country newspapers. In 1856 he projected and edited *Men of the Time*, a useful biographical dictionary of contemporary men, which, under varying titles, was continued till 1901, when it was incorporated with *Who's Who*. As an agreeable poet, Watts enjoyed a wide reputation for *Poetical Sketches* (1823; privately printed 1822), and *Lyrics of the Heart* (1850). Consult *Alaric Watts: A Narrative of his Life*, by his son, A. A. Watts (London, 1884).

WATTS, GEORGE FREDERIC (1817–1904). An eminent English painter and sculptor. He was born in London, and while still a boy was admitted to the schools of the Royal Academy, and also spent some time in the studio of the sculptor Beanes. He learned far more, however, from his study of the Elgin marbles in the British Museum, the influence of which may be seen in the classical outlines and ideal character of his figures. A prize obtained in 1842 in the competition for the decoration of the new Houses of Parliament enabled him to visit Italy (1843–44). Here he was chiefly influenced by the Venetians, especially Tintoretto. In 1847 he obtained another prize with his cartoon "Alfred Inciting the Saxons to Prevent the Landing of the Danes," now in the committee room of the House of Lords, which also led to the commission for the fresco, "St. George and the Dragon," in the Hall of Poets. Watts lived a quiet, simple life, devoted to his art. An early union with Ellen Terry, the actress, was dissolved, and in 1886 he married Miss Mary Fraser-Tytler, whom he greatly assisted in her well-known art pottery works at Compton, Surrey. With a disinterested spirit he devoted himself to the artistic interests of the nation. He gratuitously decorated the dining hall of Lincoln's Inn (one of the Inns of Court) with the fine fresco "Justice: a Hemicycle of Lawgivers." He built the first memorial wall at St. Botolph's, in honor of those who had lost their lives in saving others, for which he received the Order of Merit upon its institution by the King in 1902. Refusing to sell the best part of his work, with the intention of presenting it to the nation, he was enabled to see it form the nucleus of the National Gallery of British Art (Tate Gallery), the best portraits going to the National Portrait Gallery. An Academician in 1867, he twice declined a baronetcy; he took first class medals at Paris and Antwerp, and was elected to the French Institute in 1903.

Watts's art is didactic in the extreme. Each canvas is a kind of sermon; but they are usually invested with a strong artistic element. Although deficient in academic training, Watts's drawing is good in a large constructive sense, while at times his color is powerful and pure. His most interesting work is perhaps the symbolical pictures forming his message to the age —the danger of riches, the cruelty of greed, and, above all, the power of love and the fallacy of the fear of death. The Tate Gallery possesses 27 examples, including "Love and Life" (1885), replica in the White House, Washington (1916), which the artist said best portrayed his message to the age; "Love and Death" (1877–96); and "Love Triumphant" (1898); "Hope" (1885); "Faith" (1890); "Time, Death, and Judgment." Others are: "The Good Samaritan" (City Hall, Manchester), "Sir Galahad," "Orpheus and Eurydice." There are modern portraitists of greater technical ability than Watts, but in force of expression, in freedom and simplicity of technique he is unsurpassed, and will even bear comparison with Tintoretto. No other has depicted so many distinguished contemporaries. His sitters include Gladstone, the Duke of Devonshire, Lord Salisbury, John Burns, Tennyson, Browning, Swinburne, Matthew Arnold, William Morris, John Stuart Mill, Carlyle, Meredith; himself (many times), Lord Leighton, Rossetti,

and Burne-Jones; and foreign celebrities like Garibaldi, Thiers, Guizot, and Jerome Bonaparte.

In his few works of sculpture Watts stands unsurpassed among modern Englishmen in boldness and breadth of treatment, and in nobility of style Such works are: the bust of "Clytie"; "Bishop Lonsdale," in Lichfield Cathedral; "Lord Lothian," in Bickling Church; "Hugo Lupus," a large bronze equestrian statue at Eaton Hall, "Physical Energy" (1902, Matoppo Hills), symbolizing the character of Cecil Rhodes, and Lord Tennyson (1902), for Lincoln's Inn. Consult: W C Monkhouse, *British Contemporary Artists* (London, 1889); G F Bateman, *Watts* (New York, 1901); Otto von Schleinitz, "George Frederick Watts," in *Kunstler-Monographien, No. 73* (Bielefeld, 1904); Mrs Russell Barrington, *G. F. Watts: Reminiscences* (London, 1905); Arthur Symons, *Studies in Seven Arts* (New York, 1906), G. K. Chesterton, *G F. Watts* (New York, 1909); Mary S. Watts, his wife, *George Frederic Watts: The Annals of an Artist's Life* (3 vols., London, 1912).

WATTS, Henry (1815–84). An English chemist, born in London. He was educated at University College, London, and was for years assistant in chemistry there. His writings on chemistry are numerous and very extensive. He translated from the German Gmelin's voluminous *Handbook of Chemistry*, edited Fownes's *Manual of Chemistry*, and was for many years editor of the *Journal of the Chemical Society*. He is best known for his excellent and comprehensive *Dictionary of Chemistry* (5 vols., completed 1868; new ed, rev. by Muir, Morley, and others, 1907–12).

WATTS, Isaac (1674–1748). An English Independent minister and hymn writer. He was born at Southampton, and was educated at an academy at Stoke-Newington In 1696 he became tutor in the family of Sir John Hartopp, at Stoke-Newington, with whom he remained five years During the latter part of this time he officiated as assistant to the Rev Dr. Chauncey, minister of the Independent Church in Mark Lane, London, whom he succeeded in 1702. His health was infirm; and in 1712 he was prostrated by an illness from which he never thoroughly recovered. A visit which he paid in 1712 to Sir Thomas Abney, at Theobalds, for change of air, resulted in his remaining there till his death. In theology he was practically an Arian. He was a popular writer and his theological works were numerous. His *Catechism* (1730) and *The Improvement of the Mind* (1741) are still remembered, and his treatise on *Logic* (1725) had in its day a considerable reputation. But upon his hymns his permanent reputation rests. His poetical works are. *Horæ Lyricæ* (1706); *Hymns and Spiritual Songs* (1707); *Psalms of David in the Language of the New Testament* (1719); and *Divine and Moral Songs for Children* (1720). A complete collection of his works by Jennings and Doddridge in six volumes was published at London in 1753; with memoir by Burder, 1810. Consult: Julian, *Dictionary of Hymnology* (2d ed., New York, 1907); Thomas Wright, "Isaac Watts and Contemporary Hymn-Writers," in the *Lives of the British Hymn-Writers*, vol. iii (London, 1914); L. F. Benson, *The English Hymn: Its Development and Use in Worship* (New York, 1915). See Hymnology.

WATTS, Mary (*née*) Stanbery (Mrs. Miles Taylor Watts) (1868–). An American novelist, born in Delaware Co., Ohio, and educated in Cincinnati Her work is characterized by frank, faithful, and sympathetic portrayal and interpretation of American life Her first novel, *The Tenants* (1908), was followed by *Nathan Burke* (1910), an historical novel of the Mexican War; *The Legacy* (1911); *Van Cleve* (1913), set in the time of the Spanish-American War; *The Rise of Jennie Cushing* (1915), applying a very modern touchstone to moral values; *The Rudder* (1916).

WATTS, Sir Philip (1850–1926). A British naval constructor. He was educated at the College of Naval Architecture and was then a constructor at the Admiralty till 1885. In this year he succeeded (Sir) William White as chief constructor in charge of the recently organized shipbuilding department of the Armstrong Works at Elswick and he remained there for 16 years During this time his department was very greatly increased in size and importance and he designed and built many notable ships. His successful work at Elswick led to his appointment as director of naval construction in the Admiralty in 1901, again succeeding Sir William White (q.v.). While acting in that capacity he revolutionized naval tactics and battleship design by bringing out the *Dreadnought* and the first battle cruisers. He resigned the directorship in 1911, but from 1912 was an adviser on naval construction.

WATTS, Robert (1820–95). An Irish Presbyterian minister and theologian, born at Moneylane, County Down. He came to the United States in early manhood, and graduated at Washington College, Lexington, Va, in 1849, and at Princeton Theological Seminary in 1852. He founded at Philadelphia in 1852 a Presbyterian mission which was organized under his pastorate as the Westminster Church in 1856. In 1863 he accepted a call to the Lower Gloucester Street Church, Dublin. He became professor of systematic theology in the Assembly's College, Belfast, in 1866. Watts was a strong conservative in theology, and was especially opposed to the influence of German exegesis. He published: *Calvin and Calvinism* (1866), *Utilitarianism* (1868); *What Is Presbyterianism?* (1870); *Arminian Departures from Reformation Principles* (1871); *Dr. Briggs's Theology Traced to its Organific Principle* (1891); and *Driver's Introduction Examined* (1892).

WATTS, Thomas Hill (1819–92). An American lawyer and political leader, born in Butler Co., Ala. He graduated from the University of Virginia in 1840, and in 1841 was admitted to the bar. In politics he was a strong Henry Clay Whig, and as such was elected from Greenville, Ala., to the State Legislature in 1842, 1844, and 1845. In 1847 he settled in Montgomery, which he represented several terms in both Houses of the Legislature. As the Civil War approached, he exerted himself continually to keep his State in the Union, but after it had seceded supported the Confederacy. For a time in 1861–62 he served in the field as colonel of the Seventeenth Alabama Infantry, but in April, 1862, entered the cabinet of Jefferson Davis as Attorney-General. From the fall of 1863 until the end of the war he was Governor of Alabama. After the war he devoted himself to his law practice, and save for a single term in the State Legislature in 1880–81 never held public office.

WATTS, William Whitehead (1860–). A British geologist. He was educated at Den

stone College, and at Sidney Sussex College, Cambridge, of which he was a fellow in 1888–94, and he was also an extension lecturer of the university in 1882–91 He taught geology at Oxford in 1888, and at Birmingham University from 1897 to 1906, when he accepted the chair of geology at the Imperial College of Science and Technology, South Kensington. In 1891–97 he was a member of the Geological Survey. Watts served as secretary (1898–1909) and as president (1910–12) of the Geological Society, which organization awarded him the Murchison medal in 1915. He edited *British Geological Photographs*, and published *Geology for Beginners* (1898) and numerous papers and memoirs.

WATTS-DUNTON, THEODORE (1832–1914). An English critic, romanticist, and poet. He was born at St. Ives, in Huntingdonshire, and was privately educated in Cambridge. In 1897 he added his mother's name Dunton to his father's. He studied law, and was called to the bar in 1863, but soon turned to literature. His sonnets attracted the attention of Rossetti, under whose influence he studied art in Italy. Returning to England, he joined the staffs of the *Examiner* (1874) and the *Athenæum* (1875), and soon became one of the most influential literary and art critics of the day, contributing important critical articles to works of reference and to the more important magazines and reviews. Rossetti, depicted as D'Arcy in *Aylwin* (1898; 19th ed., 1900), Watts-Dunton's romance, dedicated to him his *Ballads and Sonnets*. Swinburne was also an intimate friend; the two were housemates for 30 years. As a poet Watts-Dunton displays rare power of thought and a fine technique, particularly in the sonnets. Other writings than those mentioned include: *Jubilee Greeting at Spithead to the Men of Greater Britain and Other Poems* (1897); *The Coming of Love: Rhona Boswell's Story* (1897; 8th ed., 1907); *The Christmas Dream*, a dramatic idyl (1901); *David Gwynn's Story* (1901); *The Renaissance of Wonder: A Treatise on the Romantic Movement* (1903); *The Work of Cecil Rhodes: A Sonnet Sequence* (1907). Posthumously appeared his recollections, *Old Familiar Faces* (1916), and *Poetry: The Renascence of Wonder* (1916), essays. His editorial work was of the highest quality, and he edited many English classics admirably. Out of his full knowledge of gypsy lore, came his introductions and notes to Borrow's *Lavengro* and *Romany Rye*. Consult J. Douglas, *Theodore Watts-Dunton* (New York, 1904), and A. H. Miles, ed., *The Poets and the Poetry of the Nineteenth Century*, vol. iv (12 vols., ib., 1905–07).

WAT TYLER. See TYLER, WAT.,

WAUBESA, wą-bē'sȧ, LAKE. One of the so-called "Four Lakes" (q.v.) of Wisconsin.

WAUGH, wą, ARTHUR (1866–). An English author, born at Midsomer Norton, Somersetshire. He was educated at New College, Oxford, where he won the Newdigate prize for English verse in 1888, and graduated with classical honors in 1889. Settling in London in 1890, he became subeditor of the *New Review* (1894), and then literary adviser to the publishing house of Kegan Paul & Co., until 1902. Subsequently he was managing director of Chapman and Hall, Ltd. His writings include: *Gordon in Africa* (1888); *Schoolroom Theatricals* (1890); *Alfred, Lord Tennyson, a Study of His Life and Work* (1892); *Legends of the Wheel* (1898); *Robert Browning* (1900), in the "Westminster Biographies"; *Reticence in Literature* (1915). He edited Johnson's *Lives of the Poets* (6 vols., 1896), the *Pamphlet Library* (1897), *George Herbert* (1907), in "World's Classics," and the works of other English writers

WAUGH, BENJAMIN (1839–1908). An English philanthropist, born at Settle, Yorkshire. He studied at Airedale College, Bradford, and after entering the Congregational ministry held charges at Newbury (1865–66), Greenwich (1866–85), and New Southgate (1885–87). He is remembered chiefly for his part in establishing in 1884 and in promoting the interests of the London Society for the Prevention of Cruelty to Children, of which he was honorary secretary and, from 1889 to 1905, director. Waugh was largely instrumental in obtaining needed legislation for the protection of children He wrote *The Gaol Cradle: Who Rocks It?* (1873).

WAUGH, FREDERICK JUDD (1861–). An American marine painter and illustrator. He was born in Bordentown, N. J., and studied at the Pennsylvania Academy, Philadelphia, and in Paris. From 1892 to 1907 he lived in Europe, exhibiting at the Paris Salon and the Royal Academy, London, and illustrating for the London papers. Upon his return to the United States he settled in Montclair, N. J., and soon became one of America's foremost marine painters. His art is characterized by firm, careful execution, realistic treatment, and a cold, well-modulated color scheme. He is represented in most American and in some English public collections, among his paintings being "The Great Deep" and "The Roaring Forties" (Metropolitan Museum, New York); "The Outer Surf" and "Surf and Fog, Monhegan" (Art Institute, Chicago); "After a North Easter" and "Southwesterly Gale, St. Ives" (National Gallery, Washington), and "The Blue Gulf Stream" (Pennsylvania Academy, Philadelphia) In 1911 he became a member of the National Academy of Design, and he was awarded various prizes.

WAUKEGAN, wą-kē'gan. A city and the county seat of Lake Co., Ill., 35 miles north of Chicago, on Lake Michigan, and on the Chicago and Northwestern, and the Elgin, Joliet, and Eastern railroads (Map: Illinois, J 1). It is situated at an elevation of more than 100 feet, on a bluff overlooking Lake Michigan. The streets are well paved and for the most part beautifully shaded The city is a popular summer resort, with excellent bathing facilities and mineral springs, and is the home of many Chicago business men. Sheridan Drive extends along the lake front, affording a magnificent view. The most prominent buildings are the county courthouse, public library, Y. M. C. A., high school, and the Masonic Temple. Waukegan has a fine harbor. A considerable trade in farm and dairy products is carried on. It is especially known for its manufactures of wire and tannery products. There are also brass and iron works, a sugar refinery, a brewery, and manufactories of ladies' garments, boats, electric scales, sashes, doors, and organ stops. It has adopted the commission form of government. Pop., 1900, 9426; 1910, 16,069; 1915 (U. S. est.), 19,571; 1920, 19,226.

WAUKESHA, wą'kē-shȧ. A city and the county seat of Waukesha Co., Wis., 17 miles west of Milwaukee, on the Little Fox River, and on the Chicago, Milwaukee, and St. Paul, the Chicago and Northwestern, and the Minneapolis, St Paul, and Sault Ste. Marie railroads (Map:

Wisconsin, E 5). It is the seat of Carroll College (Presbyterian) and of the State Industrial School for Boys. Other features include the courthouse, the Waukesha Springs and the Rest Haven sanitariums, the public library, city hospital, and three parks—Bethesda, Silurian, and Cutler. Waukesha has gained considerable prominence as a health resort owing to its numerous mineral springs. The preparation and shipment of mineral waters is one of the most important industries of the city. There are also iron works, steel bridge works, plow works, motor works, furniture manufactory, etc. Pop., 1900, 7419; 1910, 8743; 1915, 9436; 1920, 12,558.

WAUPACA, wą-păk'ą. A city and the county seat of Waupaca Co., Wis., 131 miles northwest by north of Milwaukee, on the Minneapolis, St. Paul, and Sault Ste. Marie and the Waupaca-Green Bay railroads (Map: Wisconsin, D 4). It is the seat of the Wisconsin Veteran's Home, and contains the Danes Home, Bethany Orphan School, a Carnegie library, and several beautiful lakes, which have given the city some popularity as a summer resort. Pop., 1900, 2912; 1910, 2789.

WAUPUN, wa-pŭn'. A city in Dodge and Fond du Lac counties, Wis., 18 miles southwest of Fond du Lac, on Rock River, and on the Chicago, Milwaukee, and St. Paul Railroad (Map: Wisconsin, E 5). It has important manufactures, including boots and shoes, carriages and wagons, tire vulcanizers, windmills, umbrellas, and knit goods. The Carnegie library, the State Prison, and State Hospital for the Insane are noteworthy features. Pop., 1900, 3185; 1910, 3362.

WAURIKA, wą-rē'ką. A city and the county seat of Jefferson Co., Okla., 100 miles south by west of Oklahoma City, on the Chicago, Rock Island, and Pacific Railroad (Map: Oklahoma, D 4). It contains a well-equipped library and good schools. Repair shops and yards of the Rock Island system constitute the chief industrial interests. There are also a cotton compress and cotton gins. Pop., 1900, 696; 1910, 2928.

WAURIN, Jehan de. See Wavrin.

WAUSAU, wą'są. A city and the county seat of Marathon Co., Wis., 180 miles by rail northwest of Milwaukee, on the Wisconsin River, and on the Chicago, Milwaukee, and St. Paul and the Chicago and Northwestern railroads (Map: Wisconsin, D 4). It is on elevated ground on both banks of the river. There are a fine natural park, the Marathon County Training School for Teachers, the County School of Agriculture and Domestic Science, the County Asylum for the Chronic Insane, St. Mary's Hospital, the County Home for Poor, a tuberculosis sanitarium, and a public library. It has three paper mills and extensive granite quarries. Other manufactured products include sashes, doors, and blinds, furniture, toys, veneer, boxes, sandpaper, sawmill machinery, bridges, cereals, flour, leather, canned vegetables, etc. Good water power is furnished by the Big Bull Falls. Pop., 1900, 12,354; 1910, 16,560; 1915 (U. S. est.), 18,778; 1920, 18,661.

WAUSEON, wą'sē-ŏn. A village and the county seat of Fulton Co., Ohio, 33 miles west by south of Toledo, on the New York Central, the Wabash, and the Detroit, Toledo, and Ironton railroads (Map: Ohio, B 2). Among the important public institutions are the Carnegie library, city hospital, courthouse, and county normal school. There are flour mills, a milk condensery, and manufactories of malleable iron castings, windmills, cement stave silos, etc. Cattle, hogs, and eggs are shipped in large quantities. Pop., 1900, 2148, 1910, 2650.

WAUTERS, vō'târ', Emile (1846–). A Belgian portrait and historical painter. He was born in Brussels and studied there at the Academy under Portaels, and under Gérôme in Paris. Later he traveled in Italy and Germany. His reputation started with a series of historical paintings, chief among which are "The Madness of Hugo van der Goes" (Brussels Gallery) and "Mary of Burgundy before the Magistrates of Ghent" (Liége Museum). He attended the opening of the Suez Canal and revisited Egypt in 1880; the fruits of these sojourns in the East were numerous Oriental scenes and the fine panorama "Cairo and the Banks of the Nile" (Parc du Cinquantenaire, Brussels). In 1890 he removed to Paris and devoted himself almost exclusively to portrait painting in oil and pastel, numbering among his sitters Mesdames Somzée, Melba, and John Astor; Princess Clementine of Belgium (Brussels Gallery); Baron Lambermont (Brussels Gallery), General Goffinet and M. Schollaert. His paintings are naturalistic, forceful, and well composed; his portraits are powerful in characterization and color, but he lacks temperament and depth of feeling. He received many honors and awards.

WAUWATO'SA. A city in Milwaukee Co., Wis., one and one-half miles west of Milwaukee, on the Chicago, Milwaukee, and St. Paul Railroad (Map: Wisconsin, F 5). It has the county hospital and almshouse, the Milwaukee Insane Hospital, two sanitariums for nervous diseases, a tuberculosis sanitarium, the Harwood Library, an agricultural school, and the Kinderheim. Among the industrial establishments are planing mills, a pickle factory, stone quarries, chemical works, a patent-leather factory, and a brick kiln. Pop., 1900, 2842; 1910, 3346.

WAVELLITE, wā'vel-īt (named in honor of its discoverer, William Wavel, an English physician of the early nineteenth century). A mineral hydrated aluminium phosphate crystallized in the orthorhombic system, but very seldom found in distinct crystals. It has a vitreous lustre, and is yellow or green, varying to brown and black, in color. It occurs on the sides and cracks of schistose rocks, frequently in little spherical aggregates which are made up of convergent crystals.

WA'VERLEY, or 'Tis Sixty Years Since. A novel by Scott published anonymously in 1814. It attained immediate success and gave the name to Scott's series. The identity of the author was successfully concealed for 13 years. The title was suggested by an abbey, near Farnham.

WAVERLEY NOVELS. See Scott, Sir Walter.

WAVERLY. A city and the county seat of Bremer Co., Iowa, 71 miles northwest of Cedar Rapids, on the Cedar River, and on the Chicago Great Western, the Illinois Central, the Waterloo, Cedar Falls, and Northern, and the Chicago, Rock Island, and Pacific railroads (Map: Iowa, E 2). It has the Wartburg Teachers' Seminary and Academy, the Lutheran Orphans Home, St. Joseph's Mercy Hospital, and a Carnegie library. Waverly carries on a large trade in its manufactured products, which include condensed milk, butter, canned goods, fruit, etc. Pop., 1900, 3177; 1910, 3025; 1915 (State census), 3547.

WAVERLY. A village in Tioga Co., N. Y., 18 miles southeast of Elmira, on the Cayuta Creek, and on the Erie, the Lehigh Valley, and the Delaware, Lackawanna, and Western railroads. It manufactures furniture, tools, railway supplies, car wheels, gloves and mittens, paints, cereals, and metal shingles. Waverly is also an important distributing point for the Wyoming Valley coal field and has extensive sand and gravel works. Pop., 1900, 4465; 1910, 4855.

WAVES (AS. *wafian*, to wave, fluctuate, waver, MHG. *waben*, to wave, Bavarian Ger. *waiben*, to waver, totter). Wave motions are of two kinds: one is the advance of a disturbance into a medium, and the other is its advance along a surface. Illustrations of the former kind are given by waves produced in air or in the interior of water by a vibrating body such as a bell, and those produced in the ether by an electrical vibration; illustrations of the latter kind are given by waves on the surface of a lake or ocean. The former class of waves are due to the elasticity and inertia of the medium; and the velocity with which the disturbance spreads out from the vibrating centre depends upon these two properties of the fluid alone. Elastic waves in homogeneous media have a velocity given by the formula, velocity $= \sqrt{\frac{E}{d}}$ where E is the coefficient of elasticity and d is the density. See ACOUSTICS; ETHER; ELECTRICITY.

Waves on the surface of a liquid are due to the action of gravitation, which tends to make the surface of a liquid horizontal (to the surface-tension if the waves are nothing but ripples), and to the inertia of the liquid. (For a discussion of these water waves, see HYDROSTATICS.) The wave front of a train of waves is the surface which at any instant includes all those points of the medium which the disturbances have just reached, or, more generally, it is a surface in the medium including those points where the motion is in the same phase. The wave front from a point source is a sphere in the case of an elastic wave in an isotropic medium; it is a circle for waves on the surface of water.

Since all waves consist in the motion of portions of matter, and since the medium carrying the waves is not in its natural position or condition, there is both kinetic and potential energy associated with wave motion. This energy is lost by the vibrating source and gained by the body absorbing the waves. The intensity of the waves is defined to be the energy carried in unit time through an area of one square centimeter of surface at right angles to the direction of advance of the waves. Thus, if the source of waves is a point and if the energy emitted per unit time is E, the intensity of the waves at a distance, r_1 is $I_1 = \frac{E}{4\pi r_1^2}$, because the area of the surface of a sphere of radius r_1, inclosing the point source as a centre, is $4\pi r_1^2$. Similarly, the intensity at a distance r_2 is $I_2 = \frac{E}{4\pi r_2^2}$. Therefore

$$\frac{I_1}{I_2} = \frac{r_2^2}{r_1^2},$$

or the intensity of the waves from a point source varies inversely as the square of the distance.

Since waves are due to some vibrating centre, the simplest type of train of waves will be one produced by the simplest vibration, that is, a simple harmonic vibration, such as that of a tuning fork in the case of aerial waves. A train of waves produced by a simple harmonic vibration is called a simple harmonic train. It is characterized by its amplitude and its wave length or wave number. The amplitude is the extent of the displacement of any individual particle of the medium owing to the passage of the waves. The wave length is the distance from any one point in the medium to the next point, in the direction of advance of the waves, where the conditions are at any instant exactly the same—both in displacement of the particle of the medium and in its velocity. The wave number is the number of complete vibrations which each particle of the medium makes in one second; or, what is the same thing, it is the number of waves which pass any one point of the medium in one second. The velocity of the train of waves is, then, obviously the product of the wave length and the wave number. Moreover, since, in the case of waves due to the elasticity of a homogeneous medium, their velocity depends upon the elasticity and inertia alone, it is the same for waves of all lengths. Therefore, for a given medium, if the wave length is known, the wave number may be at once calculated. If the medium is not homogeneous, waves of different length have different velocities. (See LIGHT and DISPERSION.) It is not difficult to prove that the energy carried by a train of waves varies as the square of the amplitude; and, since in the case of waves emitted by a point source the intensity of the waves varies inversely as the square of the distance from the source, the amplitude of the waves must vary inversely as the distance itself.

A complex vibration, made up of several simple harmonic vibrations, will produce a complex train of waves which is equivalent to the superposition of several trains of simple harmonic waves. The characteristics of such a complex train of waves are, first, the number of the component trains, and, secondly, their amplitudes, wave numbers, and relative phases. By relative phases is simply meant their relative positions in the medium. (See ACOUSTICS.) As trains of waves pass through any medium some energy is always absorbed, as is shown by the gradual decrease in amplitude. This is called attenuation; and it is found that long waves are less attenuated than short ones in general. Consequently, as a complex train of waves advances, its different component trains are attenuated to different degrees, and the shape of the wave changes. This is called distortion. If the inertia of the medium is very great, the attenuation is diminished, and the distortion almost vanishes. Waves along stretched cords are special cases of elastic waves. See ACOUSTICS.

Stationary Waves are the particular kind of vibration observed in stretched cords, the air in organ pipes, etc. (See ACOUSTICS.) It is evident that, if waves are sent down a stretched rope towards the end which is fastened to some rigid support, they will be reflected when they reach the end. Consequently, if waves are continued to be produced, there will be in the rope at any instant two trains of waves of the same wave length, velocity, and amplitude, but advancing in opposite directions. It must happen at certain points in the rope that one train of waves neutralizes the action of the other; and it is evident that these points must lie at a distance of half a wave length apart. These posi-

tions of no motion are called nodes; and the fixed end of the rope is one. In between two nodes the rope vibrates exactly like a short rope of a length equal to the distance from node to node and fastened at its two ends. A point midway between two nodes is called a loop. If a long rope is hanging vertically from a balcony, with its lower end free, waves sent down it will be reflected; and there will be nodes and loops as before, only in this case the free end is a loop. Such a vibration is called a stationary wave, an extremely poor name, because it is not a wave motion at all. The vibrations of the air in an organ pipe are of this kind, the nodes are points where there is the least motion but the greatest fluctuation in pressure, while the loops are the points of greatest motion but the least change in pressure. The open end of an organ pipe is a loop. The effect of opening a hole in a flute is to make that point a loop. Stationary waves may be produced by the ether waves, as has been shown by Wiener and others

The electromagnetic waves or periodic disturbances in the ether resulting from the variation in an electric current and the corresponding modification of the electric and magnetic forces travel out into space with a definite and finite velocity. Thus from the variation of current in a Hertz oscillator (see WIRELESS TELEGRAPHY) waves are sent out disconnected from all electric conductors and become purely electromagnetic radiations in the dielectric Under other conditions waves may be manifested on the conductor or in its vicinity, while in the case of the waves of wireless telegraphy periodic disturbances occur both in the dielectric above the earth surface and in the form of electric current in the earth itself. Consult: J. A. Fleming, *Waves and Ripples in Water, Air, and Ether* (London, 1902); D. du B. Gaillard, *Wave Action in Relation to Engineering Structures* (Washington, 1904); W. H. Wheeler, *Practical Manual of Tides and Waves* (New York, 1906); Vaughan Cornish, *Waves of the Sea and Other Waves* (Chicago, 1910); id., *Waves of Sand and Snow and the Eddies which Make Them* (London, 1914). See LIGHT; ELECTRICITY, paragraphs on *Alternating Currents* and *Electrical Waves Along Conductors.*

WAVRE, vä'vr'. A town of the Province of Brabant, Belgium, on the Dyle, 15 miles southeast of Brussels (Map: Belgium, C 4). There are breweries, tanneries, paper mills, and cotton manufactures. Pop., 1899, 8200; 1910, 9102. Here on June 18, 1815, after their defeat at Ligny (q.v.), the Prussians under Thielmann repulsed a greatly superior force of the French under Grouchy, and thereby prevented the latter from bringing timely assistance to Napoleon at Waterloo (q.v.).

WAVRIN, vä'vrăn' (or WAURIN), JEHAN DE, SEIGNEUR DU FORESTEL (c.1394–c.1474). A French chronicler of England, whose work covers the history of Great Britain, both real and fabled, from the earliest time to 1471. It has been edited by Sir W. Hardy and translated by E. L. C. P. Hardy, under the title "Recueil des Croniques et anciennes Istories de la Grant Bretaigne à présent nommé Engleterre" ("Master of Rolls Series," 1864–91). Consult *Anciennes croniques d'Engleterre, choix de chapitres inédits*, edited by Mlle. Dupont (published by the Société de l'Histoire de France, Paris, 1858–63).

WAX. See WAXES.

WAX, MINERAL. See OZOKERITE; ASPHALT.

WAXAHACHIE, wäks'ä-hăch'ē. A town and the county seat of Ellis Co., Tex., 30 miles south of Dallas, on the Missouri, Kansas, and Texas, the Trinity and Brazos Valley, and the Houston and Texas Central railroads (Map: Texas, D 3). Cotton gins, cottonseed-oil mills, a flour mill, and lumber yards are among the more important industrial establishments. Noteworthy features are Trinity University, the N. P. Sims Library, and the courthouse. Pop., 1900, 4215; 1910, 6205

WAXBILL. One of several weaver birds (q.v.) having a coral-red, waxy beak, especially the astrild (*Estrilda astrilda*), a near relative of the amidavad (q.v.)—a common cage bird.

WAX CLUSTER. See GAULTHERIA.

WAXES. A class of substances of animal or vegetable origin containing mainly one or more esters (q.v.) composed of higher monatomic or diatomic alcohols and higher fatty acids. They have a somewhat characteristic consistence, similar to that of their prototype, beeswax, although some (as the so-called sperm oil) are liquid, and others (carnauba wax) are so hard that they can be pulverized in a mortar. The principal chemical difference between waxes and fats consists in the fact that the alcohol found combined in the latter is invariably glycerin (a triatomic alcohol) which never occurs in waxes. The term "waxes," as used commercially, is often extended to substances having a waxy consistence, but containing no ester of a monatomic or diatomic alcohol. Thus the so-called Japan wax is really a fat, almost entirely composed of glycerin and palmitic acid; the so-called myrtle wax consists of about 20 per cent of tripalmitin (i.e., the fat composed of glycerin and palmitic acid) and about 80 per cent of free palmitic acid. On the other hand, the term "oil," which is generally applied to the true liquid fats, is in commercial usage extended also to liquid waxes, like the sperm oil mentioned. Free fatty acids (as well as free monatomic or diatomic alcohols and hydrocarbons) are found also, in limited quantities, in the true waxes. But if waxes are at all to be classed separately from the fats, the term "waxes" should not be applied to materials containing glycerides, and the term "oils" should not be applied to materials containing no glycerides and composed chiefly of the substances that characterize the true waxes Of course, since the true waxes contain no glycerin, the latter does not appear among their saponification products, nor can acrolein be produced during their combustion. (See FATS.) Another difference between waxes and fats becomes apparent when they are subjected to processes of saponification. Thus, while any fat may be more or less readily saponified by alkalies dissolved in water, waxes can hardly be thus saponified at all, so that it is necessary to use potash or soda dissolved in alcohol when it is required to effect the saponification of a true wax. The following paragraphs describe the principal waxes. They may be divided into liquid and solid waxes, the former including sperm oil and bottlenose oil, both of animal origin. Solid waxes may be subdivided into those of animal and those of vegetable origin. The former include spermaceti, beeswax, wool wax, and serum wax. The solid waxes of vegetable origin include carnauba wax, Chinese wax, opium wax, palm wax, ocuba wax, getah wax, ocotilla wax, and cottonseed wax.

Sperm Oil is derived from the head matter of the sperm whale (*Physeter macrocephalus*). The

blubber (the material containing the wax) when tried out yields a crude oily liquid composed chiefly of sperm oil and spermaceti (see below), the latter being subsequently removed by chilling and pressure. Sperm oil is a pale yellow thin liquid with a slight odor. Its specific gravity is from 0.875 to 0.880. If of good quality it contains very little free fatty acid Its composition is as yet in dispute. By some authorities it is said to contain dodecatyl and cetyl alcohols. Its viscosity, which is high for a low-gravity oil, does not change materially with rise of temperature as is the case with fatty oils, and, as it is a nondrying substance and not liable to become rancid, it has long been a favorite lubricant for light high-speed machinery. Sperm oil is often adulterated, mainly with other fish oils. These are usually quite easy to detect by their odor, especially on heating. Mineral oils can be best detected by the flash test (See OIL) As an illuminant sperm oil has been almost entirely superseded by the cheaper mineral oils.

Bottlenose Oil is derived from the so-called Arctic sperm whale (*Hyperoodon rostratus*) It is a liquid darker than sperm oil and has a peculiar and characteristic taste and odor. It is more likely to gum than sperm oil But chemically considered the two liquid waxes are probably identical, the main constituent of either being the ester composed of dodecatyl alcohol and doeglic acid. Bottlenose oil is chiefly used as a lubricant and as an adulterant for sperm oil.

Chinese Wax is secreted by the *Coccus ceriferus* (an insect) and deposited on the twigs of the Chinese ash. It is removed by hand and melted in hot water to remove mechanical impurities. It is a hard, white, crystalline solid, without taste or smell, resembling spermaceti, but harder and more fibrous. It is slightly soluble in alcohol and completely so in light hydrocarbons. It consists chiefly of ceryl cerotate. Its specific gravity is 0.970 and its melting point is 82° to 83° C (about 180° F.). Chinese wax is used in the East as a substitute for beeswax, but is rarely brought to the United States.

Wool Wax is obtained as a by-product in the wool-washing process, either by alkaline water or by some hydrocarbon solvent. Wool wax is in reality the sweat of the sheep exuding from the skin of the animal, and is a very complex mixture, but contains among other compounds large quantities of the stearic and palmitic esters of cholesterin and isocholesterin, and potassium salts of various fatty acids. As prepared by acidifying the wash waters, or distilling off the organic solvent, it is a dark-brown compound with a disagreeable odor resembling that of the sheep; by repeated washing in water the soluble compounds are removed, the residue is melted over water, cooled, and allowed to solidify. In this purified state wool wax is a pale-yellow, soft, translucent substance with little odor Its specific gravity is 0.973. A most remarkable property of this substance is its capacity for combining mechanically with as much as 80 per cent of its weight of water. The neutral wax with 22 to 25 per cent of water is sold under the name of lanolin and is used in pharmacy as a basis for ointments. Wool wax is used as a leather dressing and as a lubricant for wool yarn.

Carnauba Wax is derived from the carnauba palm (q.v.) (*Copernicia cerifera*) indigenous to Brazil. The wax forms a coating on the leaves and is removed by shaking and pounding the trees. The raw wax is of a dirty greenish-yellow color and so hard as to pulverize readily. When pure it is odorless and tasteless, melts at 83° to 88° C. (186.5° to 190.5° F.), and has a specific gravity of 0.990 to 0.999 Its composition is very complex The main ingredient is myricyl cerotate, with small quantities of free cerotic acid and myricyl alcohol Besides these, there are present a hydrocarbon melting at 59° C (138° F.), a diatomic alcohol, and carnaubic acid. The wax is chiefly used in the manufacture of candles and wax varnishes, and as an admixture with commercial stearic acid, cerasin, and paraffin, for the purpose of raising their melting points. See BEESWAX and SPERMACETI for treatment of those materials See also ESTERS; FATS, OIL.

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WAX INSECT. A name for two or more scale insects, but also equally applicable to several other insects. *Ericerus pela*, called by the Chinese lah-shoo, which makes the so-called Chinese white wax, is found about the beginning of June on the branches of an ash (*Fraxinus sinensis*) and certain other trees. It has long been cultivated in China for its wax, which is used chiefly in candle making, although the industry has declined since the introduction into China of kerosene oil. Though little is known of the insect, it is altogether likely the females produce larger quantities than the winged males, which are popularly reputed to be producers It is said that the wax is scraped off of the branches towards the end of August, melted with boiling water, and strained through cloth. The insect has been introduced into Algeria by the French. The East Indian wax insect (*Ceroplastes ceriferus*), which is found on *Celastrus ceriferus* and other trees, is rather rare and has not been used commercially. Its wax is not altogether suitable for candle making, as both the wax itself and its mixtures with olive oil burn with a dim, smoky light, and give out a resinous odor. The wax, which is reputed medicinal, is sweet when fresh and is eaten by children

Two American scale insects, the barnacle scale (*Ceroplastes cirripediformis*) and *Ceroplastes floridensis*, are known as wax scales. No commercial use has been made of their wax. Nearly all of the Coccidæ secrete wax in varying proportions, most of them only in small amounts. Several species of the genus *Icerya*, however, secrete large quantities. In *Icerya ægyptiacum* and *Icerya montserratensis* wax is secreted to form the egg sac and also in long filaments which so readily break off that a jar or a shake of a badly infested tree will bring down the wax in quantity In the genus *Pulvinaria* also white wax is secreted for the protection of eggs.

Certain of the lantern flies (q.v.) of the fam-

ily Fulgoridæ secrete large quantities of a white flocculent wax, and in tropical America the small lantern flies of the genus *Phenax* fly about with large masses of this waxy substance sometimes twice as long as their bodies This fulgorid wax is said to be used in China for candles, etc. The larvæ of an East Indian species (*Phromnia marginella*) are covered with masses of white wax which is secreted by small glands distributed over the abdomen.

Various plant lice or aphids (q.v.), especially the genera *Pemphigus*, *Chermes*, and *Schizoneura*, also secrete white wax from glands which replace the honey tubes One species (*Lachnus longistigma*) infests certain coniferous trees in the United States, and when abundant the insects may be scraped off and sifted to obtain the wax. Some of the Psyllidæ also produce waxen threads. Certain caterpillars secrete wax, as the larvæ of one of the Tortricidæ (*Retinia resinella*) and of a butterfly (*Parnassius apollo*); the bodies of certain sawfly larvæ are covered with a white, powdery, waxen secretion, in one case (genus *Selandria*) nearly concealing the body The wax in all of these insects is secreted by small one-celled skin glands which in the Hemiptera are distributed nearly all over the body, but in the bees are restricted either to the under or upper side of the end of the abdomen See BEE.

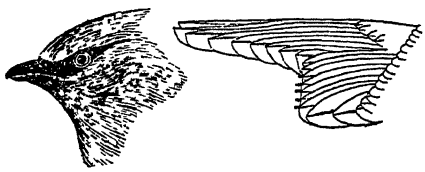
WAX MOTH, or HONEY MOTH. See BEE, *Winter Life and Enemies*.

WAX MYRTLE. See CANDLEBERRY.

WAX SHRUB. See CANDLEBERRY.

WAXWING, or CHATTERER. Any bird of the genus *Ampelis*, more recently called *Bombycilla*, of the passerine family Ampelidæ or Bombycillidæ, characterized by having a short, straight, elevated bill, with a very wide gape, as in the flycatchers, but without bristles; both mandibles notched at the tip; the wings rather long, broad, and pointed; the legs short. The genus *Bombycilla* is peculiar in having many of the shafts of the wing quills tipped with a horny material resembling red sealing wax. The three species are widely diffused over northern regions and are much alike. One, the Bohemian waxwing (*Bombycilla garrula*), inhabits the Arctic regions, breeds to near the limit of timber growth, and makes its nest in a tree long before the winter snows have melted. It migrates southward in winter, and in severe seasons reaches the United States, but always irregularly and at long intervals. It feeds on insects and caterpillars, the cankerworm being especially desired. They also eat seeds, berries, and other fruits. It is a handsome bird, nearly as large as a thrush; is reddish gray, with a black patch on the throat and a black band on the forehead; the tail coverts brownish orange; the primaries, secondaries, and tail feathers tipped with yellow, two white bands on the wings; the lower parts silvery gray. The head is surmounted by an erectile crest of brownish-orange feathers. The song of the waxwing is a weak whistling, bearing a little resemblance to that of the thrush. It is easily tamed.

The more common American waxwing, cherry bird, or cedar bird (*Bombycilla cedrorum*) is a very similar but smaller species, found from Canada to Central America, less migratory, and never visiting Arctic regions. The general color is purplish cinnamon in front and ash color behind; the chin, forehead, and a stripe through the eye black; no white on the wings; the belly yellow, fading into white on the under tail coverts. It is crested. Great flocks of cedar birds collect in the end of summer. They feed on cherries and garden berries, and are particularly fond of those of the red cedar, but



HEAD AND WING OF A WAXWING.

Head of cedar bird (*Bombycilla cedrorum*), wing of same showing the sealing-wax tips of the secondaries

they eat seeds and insects too They breed late in the summer, and build a bulky nest of grass, bark, rootlets, and the like, in which the female deposits 3 to 5 eggs, pale bluish gray, spotted with black.

The third species of waxwing is a native of eastern Asia and Japan Consult E. H. Forbush, *Useful Birds and their Protection*, published by the Massachusetts Board of Agriculture (Boston, 1913).

WAXWORK (so called from the waxy scarlet aril), STAFF TREE, or SHRUBBY BITTERSWEET (*Celastrus scandens*) An American climbing shrub of the family Celastraceæ. It flourishes in most soils from Canada to South Carolina, and west to South Dakota and New Mexico, climbing upon rocks and trees to a height of 20 feet or more When the globular, rich orange pods open they expose beautiful crimson seeds which are especially attractive in autumn. The fibre of the bark has been shown experimentally to be valuable, but little if any use is made of it. *Celastrus articulatus* or *Celastrus orbiculatus*, a native of China and Japan, which is somewhat cultivated, differs mainly in the shape of the leaves.

WAXWORK. The use of wax, generally beeswax, with or without the addition of other material, for the execution of statues, busts, medallions, etc., as well as for modeling a great variety of objects from which metal castings are to be made. Wax is used extensively by sculptors to embody an initial conception later to be worked out in clay or other material. From very early times in imitative art, waxworking was practiced in various parts of the world. The Egyptians made wax figures of their deities for use in funeral rites and put them in the graves of distinguished persons. At one period of Greek art, wax statuettes of the deities, as well as wax dolls, were quite common. Pliny records that Lysistratus, about 300 B.C., made colored portraits in wax from plaster molds; while in Rome, patrician families were in the habit of puttting these wax masks of ancestors as well as of living members of the family in the vestibules of their houses, as the possession of such articles was considered a mark of distinction. During the Middle Ages, especially in Italy, wax was widely used for making portraits, figures of the saints, and ecclesiastical objects such as the Agnus Dei (q.v.). About this period some of the finest examples of metal candelabra, Chandeliers, etc., were made from wax originals. Spanish art shows many beautiful specimens of waxwork in the shape of images of the saints, notable for excellence of form and

beauty of coloring In the fifteenth century Andrea del Verrocchio (q.v.) and Orsino were the first to make human figures of wax on a wooden framework or skeleton, and having glass eyes and natural hair. In the seventeenth century Gaetano Giulio Zummo invented anatomical and pathological models in wax Waxwork as a medium of artistic expression reached its climax about the close of the eighteenth century, when wax portraits, usually in relief and often of considerable merit, acquired wide vogue. Later, life-size figures of notable persons began to be made for purposes of popular exhibition, and in some cases these figures were capable of movement through suitable mechanism. In London Madame Tussaud's, and in New York the Eden Musée were formerly exhibitions of figures of historic and current interest, the latter establishment passing out of existence in 1915.

Consult E S. Bolton, *Wax Portraits and Silhouettes* (New York, 1910) and *Descriptive Catalogue of the Spitzer Collection* (Paris, 1892).

WAXY (or **AMYLOID**) **DEGENERATION.** A morbid process in which the healthy tissue of various organs is replaced by a nitrogenous substance, resembling in some respects amyloid compounds. Organs affected by this degeneration have a certain resemblance in consistency and physical character to wax. They are abnormally translucent, increased in volume, solidity, and weight. When a solution of iodine is brought in contact with such tissues, a mahogany-brown color is produced; iodine and sulphuric acid yield a blue color. Although amyloid degeneration is common to many tissues and organs, the parts most frequently affected are the spleen, liver, and kidneys. The heart muscles, the suprarenal capsules, the lymphatic glands, and the intestinal mucous membrane may also be involved. The causes of waxy degeneration are chronic suppuration, especially of bone, as well as syphilis, tuberculosis, cancer, and possibly gout

WAY (AS. *weg*, Goth. *wigs*, OHG. *wec*, Ger. *Weg*, way; connected with Lat. *via*, road). In law, an easement consisting in the right to pass over land. This right may inhere in a person, who thus may pass over land owned by some other person; or, as is more usual, it may inhere in another piece of land to be used by whoever happens at a given time to be the owner of the latter parcel. The term is also employed to denote a path or road over which a right of way may be exercised. Where the right of way can be used only by one person, or a limited number of individuals, it is considered private. Where it may be used by all persons in common it is public. Twenty years' open and adverse exercise of a right of way makes it a permanent easement by prescription. Where such a right of way exists in the public generally it may not be lost by mere prescription, because of its public character. A way by necessity arises where a person sells to another a portion of his land, to which there is no road or way leading to a public highway, or which is so located as to cut off access from the remainder of the vendor's land to the highway. The person whose land is thus cut off from access to a public highway may pass over the vendor's or purchaser's land, as the case may be, by the most convenient and direct route to the nearest highway, having due regard for the best interests of the person over whose land he passes A way may consist merely of the right to pass over a narrow path on foot, or on horseback, or may extend to the use of vehicles of any description. A private way may be dedicated to the public, but a mere license to the public to pass over a way will not destroy its private character. See EASEMENT and consult authorities under REAL PROPERTY.

WAY, ARTHUR S (1847–). An English classical scholar and poet, born at Dorking He was educated at Kingswood School, Bath, and at Queen's College, Melbourne (Australia), where he was afterward fellow. In 1870–76 he was a lecturer at Queen's College, Taunton, in 1876–81 vice master of Kingswood School, Bath, and from 1882 to 1892 head master of Wesley College, Melbourne, Australia. He published verse translations of the *Odyssey*, the *Iliad*, Euripides, the *Epodes* of Horace, Æschylus, Sophocles, Vergil's *Georgics*, the *Nibelungenlied*, the *Chanson de Roland*, Theocritus, Bion, and Moschus. These are all notable examples of translation.

WAY BILL. See RAILWAYS.

WAY'CROSS. A city and the county seat of Ware Co, Ga., 96 miles southwest of Savannah, on the Atlantic Coast Line, the Waycross and Southern, the Waycross and Western, and the Atlanta, Birmingham, and Atlantic railroads (Map: Georgia, D 4). Its business interests are centred chiefly in lumber and naval stores There are large car and repair shops, a turpentine plant, a cotton gin, abattoir, cold-storage plant, and a saw and planing mill. The Atlantic Coast Line maintains shops here Noteworthy structures are Piedmont Academy, King's Daughters Hospital, the post office, and the two Y. M. C. A buildings. Pop., 1900, 5919; 1910, 14,485; 1915 (U. S. est.), 19,001; 1920, 18,068.

WAYLAND, FRANCIS (1796–1865) An American educator, born in New York City. He graduated at Union College in 1813, studied medicine for three years, and in 1816 entered Andover Theological Seminary. Before graduating he left to become a tutor at Union College, where he remained four years. In 1821 he accepted a call to the pulpit of the First Baptist Church in Boston, where he became known as a preacher of great ability and energy. After a year's professorship at Union College in 1826–27 he left in February of the latter year to accept the presidency of Brown University at Providence. The 28 years (1827–55) during which he remained at the head of this institution saw its rapid development and change from a narrow sectarian college to a modern college on more liberal lines. These reforms marked Dr. Wayland, although a conservative in most matters, as a leader in educational reform. He himself delivered lectures in psychology, political economy, and ethics. Retiring from the presidency of the university in 1855, he served for some time as pastor of the First Baptist Church, Providence, and devoted himself to prison reform and other movements of a similar nature. His works include, in addition to numerous individual sermons and addresses: *Occasional Discourses* (1833); *Elements of Moral Science* (1835), which has run through a number of editions and revisions and has been translated into several foreign languages; *Elements of Political Economy* (1837); *Moral Laws of Accumulation* (1837); *The Limitations of Human Responsibility* (1838); *The Present Collegiate System in the United States* (1842); *Domestic Slavery Considered as a Scriptural Institution* (1845); *Sermons Delivered in the*

Chapel of Brown University (1849); *Memoirs of Adoniram Judson* (2 vols, 1853), *Elements of Intellectual Philosophy* (1854), *Notes on the Principles and Practices of the Baptist Churches* (1857). Consult Francis and Henry L. Wayland, his sons, *Life and Labors of Francis Wayland* (New York, 1867); J. O Murray, *Francis Wayland* (Boston, 1891). See BROWN UNIVERSITY.

WAYLAND, FRANCIS (1826–1904). An American lawyer and educator, son of Francis Wayland (1796–1865) He was born in Boston, graduated at Brown University in 1846, studied law at Harvard, and began practice at Worcester, Mass, in 1850 Eight years later he removed to New Haven, Conn, where he was judge of probate in 1864–65. In 1869 he was Lieutenant Governor of Connecticut, and in 1872 became professor of jurisprudence in Yale University, of whose law school he served as dean from 1873 until 1903. He was president of the American Social Science Association in 1880, and, after 1872, of the Prison Aid Association Besides papers and addresses on social science, he, with his brother, Henry L. Wayland, published a book on their father, *Life and Labors of Francis Wayland* (2 vols., 1867).

WAYLAND THE SMITH (AS. *Wēland*, OIcel. *Volundr*, Ger. *Wieland*) A famous Germanic hero, originally a semidivine goldsmith. According to the usual account, he was a son of the sea giant Wade, who apprenticed him to Mimir, a skilled smith. He was then taken across the sea to the dwarf's, whom he soon surpassed at the forge. He afterward long dwelt in Ulfdaler (the Wolf's valley) along with his two brothers, Slagfidr and Eigil. Here the brothers met three swan nymphs, with whom they lived for seven years. Afterward Wayland came to King Nidung, who cut the sinews of his feet, thus laming him forever, and then imprisoned him. For this cruel treatment Wayland put the King's two sons to death and violated his daughter Beadohild, who became the mother of Wittich, a mighty champion. Wayland then made a feather robe in which he flew away. The legend, with many variations and episodes, was long a favorite among the Germanic peoples. Wayland also appears as Galant in the French *Chansons de Geste*. But the fullest single account is to be found in the *Elder Edda* and in the *Wilkina Saga*. A still older version of the story is contained in *Déor*, an old English lyric. By piecing together the old legends and filling in here and there, Karl Simrock reproduced the saga in his poem *Wieland der Schmied* (Bonn, 1835), and again in the fourth part of his *Heldenbuch* (Stuttgart, 1843). The Germanic origin of the Wayland legend has been questioned. It is clear that it is related to the Greek myths of Hephæstus and Dædalus. Consult the *Corpus Poeticum Boreale*, ed. with *translations by Vigfusson and Powell* (2 vols., Oxford, 1883); J. Grimm, *Deutsche Mythologie* (4th ed., Berlin, 1875–78); Golther, "Die Wielandsage," in *Germania*, vol. xxxiii (Vienna, 1888); Maurus, *Die Wielandsage in der Litteratur* (Leipzig, 1902; English translation by Stallybrass, 4 vols., London, 1882–88).

WAYNE. A city and the county seat of Wayne Co., Neb., 46 miles southwest of Sioux City, Iowa, on the Chicago and Northwestern Railroad (Map: Nebraska, H 2). The Nebraska Normal College is situated here, and there are also a Carnegie library, and fine courthouse, city hall, and school buildings. Pop., 1900, 2119; 1910, 2410.

WAYNE, ANTHONY (1745–96). An American soldier, prominent in the Revolutionary War. He was born at Easttown, Pa., Jan. 1, 1745, and was educated at Philadelphia. At the age of 18 he was employed as a land surveyor, and in 1765 was selected by Benjamin Franklin and his associates to act as agent and surveyor of a projected settlement in Nova Scotia. He was for two years (1774–75) a member of the Pennsylvania Legislature, and in 1775 he also became a member of the Committee of Safety. At the outbreak of hostilities with England he raised a regiment of volunteers, of which, in January, 1776, he was appointed colonel, and was sent to Canada, where he covered the retreat of the American forces at Three Rivers. He commanded at Ticonderoga until 1777, when he was made brigadier general and joined Washington in New Jersey. He commanded the rear guard in the retreat at Brandywine, led the attack at Germantown; captured supplies for the distressed army at Valley Forge, distinguished himself at Monmouth; was defeated at Paoli, and finally achieved a brilliant victory in the storming of Stony Point (q.v.), July 16, 1779. His courage and skill greatly aided Lafayette in Virginia in 1780, where he also took part in the siege of Yorktown Later he served in Georgia, and finally occupied Charleston, S. C, on its surrender by the British, Dec. 14, 1782. On Oct. 10, 1783, he was made brevet major general, and in the following year, having retired from the army, he entered the Pennsylvania Legislature, and in 1787 was a member of the Pennsylvania convention which ratified the Federal constitution. Having removed to Georgia and settled on a plantation given him by the State in recognition of his services, he entered Congress from that State in 1791, but in 1792 upon a contest his seat was declared vacant, and in April of that year he became commander in chief of the national army with the rank of major general. His reputation as the "Mad Anthony" of the Revolution survived and he was now called upon to end the Indian troubles on the frontier, where Harmar and St. Clair had failed. He began his campaigns in Ohio in the fall of 1793; in 1794 he was active on the Maumee, and on August 20 defeated the Indians decisively at Fallen Timbers, and in August, 1795, he, with 12 of the Northwestern tribes, signed the Treaty of Greenville by which the United States acquired a large tract of territory. While still engaged on this service his death occurred at Erie, Pa. Consult *Wayne's Orderly Book of the Northern Army at Fort Ticonderoga and Mount Independence*, edited by J. Munsell (Albany, 1859); C. J. Stillé, *Major General Anthony Wayne and the Pennsylvania Line* (Philadelphia, 1893); J. R. Spears, *Anthony Wayne* (New York, 1903).

WAYNE, JAMES MOORE (1790–1867). An American jurist, born in Savannah, Ga., and educated at Princeton College, where he graduated in 1808. He then studied law, was admitted to the bar, and practiced at Savannah. In 1829–35 he was a member of Congress. He was appointed associate justice of the United States Supreme Court in 1835. Wayne was an able orator and logician, and an authority upon admiralty jurisprudence. He favored free trade, but opposed internal improvements by Congress,

except of rivers and harbors, and opposed the rechartering of the United States Bank.

WAYNES'BORO. A borough in Franklin Co., Pa., 78 miles by rail northwest of Baltimore, Md., on the Western Maryland and the Cumberland Valley railroads (Map: Pennsylvania, F 8). It is chiefly an industrial town, being especially known for the manufacture of engines, boilers, grinders, threshers, boring machines, bolt cutters, wood and iron workers' vises, nut facers, etc. There are also foundries and machine shops, and manufactories of lumber products. Pop., 1900, 5396; 1910, 7199.

WAYNES'BURG. A borough and the county seat of Greene Co., Pa., 60 miles by rail south by west of Pittsburgh, on the Waynesburg and Washington Railroad (Map: Pennsylvania, A 8). It is the seat of Waynesburg College. The region is underlaid with a stratum of coking coal, and there is an abundance of oil and natural gas. There are four large gas compressing stations near here, and a shovel factory. Pop., 1900, 2544; 1910, 3545.

WAYN'FLETE, or **WAINFLEET,** WILLIAM OF (?1395–1486). An English bishop and statesman. He was born at Wainfleet and probably educated at Winchester and New College, Oxford. He was ordained priest in 1426, and on the foundation of Eton College, became in 1440 a fellow, becoming the second provost in 1443. He succeeded Cardinal Beaufort as Bishop of Winchester in 1447, and a year later obtained letters patent for the foundation of a hall at Oxford to promote the study of theology and philosophy, which 10 years later he merged into his foundation of Magdalen College. As a member of the Royal Council, he was called upon to treat with the rebel Jack Cade, and incurred the hatred of the Yorkist party by his intervention. He was appointed Lord Chancellor by Henry VI in 1456, and took a decided part against the Yorkists when the crisis became acute. He lost his office on their triumph in 1460, acquiesced for the time in the rule of Edward IV, but released Henry VI from the Tower in 1470, and was obliged to purchase a pardon in 1471. After this he was much at court, and occupied with the completion of Eton and Magdalen colleges. In 1484 he founded a free school at Wainfleet. The last months of his life were spent at South Waltham, Hampshire.

WAY OF THE WORLD, THE. The last play of William Congreve, produced in 1700 at Lincoln's Inn Fields.

WAYS AND MEANS, COMMITTEE OF. In the United States, the most important committee both in the State and national legislatures, having been borrowed from the usage of Great Britain. In the House of Representatives the chairmanship of the committee usually goes to one of the acknowledged leaders of the majority party and is regarded as second only in rank to the Speakership. The Committee of Ways and Means was employed in the first Congress of 1789 and became a standing committee in 1795. It is charged with the preparation of all legislation as to raising of revenue or the payment of the national bonded debt. The committee is appointed by the Speaker; the number of members was originally seven, but is now 17; the minority party is usually given from one-fourth to one-third of the places on the committee. For dispatch of business the committee usually appoints several subcommittees. In 1850 it was given a temporary right of way over other committees of the House, and at the outbreak of the Civil War the privilege became permanent. Until 1865 the Ways and Means Committee also considered appropriation measures, but later that duty devolved upon a Committee of Appropriations, which ranks second in importance among House committees. Consult L. G. McConachie, *Congressional Committees* (New York, 1898), and Woodrow Wilson, *Congressional Government* (15th ed., Boston, 1900).

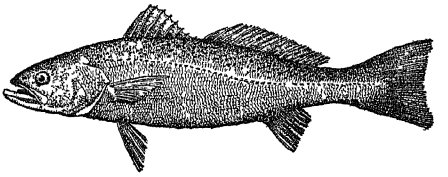
WAYZ-GOOSE. See BEAN FEAST.

WAZAN, wä-zän'. A holy city of Morocco, situated about 53 miles north of Fez. It has a number of fine mosques and a fine palace. The shereef, to whose residence Wazan owes its importance, is regarded as the spiritual ruler of Morocco, and as such is superior even to the Sultan himself. The town is outside of the jurisdiction of the Sultan and is regarded as an asylum by fugitives from justice, whence it is known as Dar D'manah or House of Safety. The inhabitants of Wazan, estimated at 10,000, are mostly descendants of the shereefs and are engaged in the manufacture of the white woolen cloth from which *jurbahs* or hooded Moorish cloaks are made.

WAZIRISTAN, wä-zē'rē-stän'. A mountainous region in northwest India bordering upon Afghanistan and included in the territory between the Gomul and Tochi rivers. It is well watered and the higher altitudes abound in picturesque scenery and have a healthful climate. Iron mining and the breeding of horses and donkeys are the principal industries. Its isolated situation renders Waziristan practically independent, although in 1897, as a result of depredations committed by the inhabitants, a British force took possession of the Tochi valley. It consists of two political agencies, northern and southern Waziristan, but the British exercise a minimum of interference with tribal chiefs. The chief town is Kanigoram.

WEA, wē'ä (abbreviated from *Wawiatenong*, referring to a settlement near an eddy in a stream). A subtribe of the Miami (q.v.). At the beginning of the nineteenth century they were resident upon the Upper Wabash River, with their principal village, known to the French as Quiatenon, just below the mouth of Wea Creek, below the present site of Lafayette, Indiana. In 1820 the Wea sold their reserved lands in Indiana and removed with the Piankishaw to Illinois and Missouri, whence they afterward removed to Kansas. In 1854 the two tribes, reduced to a mere remnant, united with the remnants of the Peoria (q.v.) and Kaskaskia (q.v.), all that were left of the ancient Illinois (q.v.).

WEAKFISH (so called on account of its tender mouth), or SQUETEAGUE. A common



WEAKFISH.

fish of the family Sciænidæ (*Cynoscion regalis*), found on sandy shores along the Atlantic coast of the United States. It is pale brownish above

with a greenish tinge, grading into silvery along the sides and belly, variegated with brown vermicular blotches, some of which form undulating lines running downward and forward. Its average weight is about five pounds, but it may attain a weight of 30 pounds From its shape and habit of taking the hook it is sometimes called sea trout and is sold in the markets under this name. It is an important food fish along the eastern coast. It spawns in May and June. The eggs after being laid, are buoyed up by tiny oil drops and hatch in about 48 hours.

WEAK SIGHT. See ASTHENOPIA.

WEALDEN (wēl'den) **FORMATION.** An important series of fresh-water strata belonging to the Lower Cretaceous series as developed in England. Having been originally studied in the parts of Kent, Surrey, and Sussex called the Weald, this local name was given to the formation. It has been divided into two series, which do not differ very materially from each other, viz, Weald clay, 560 feet, Hastings sand, 740; total, 1300. The formation was deposited in an inland sea which covered much of southern England and extended into Germany.

WEALTH (ME. *welthe, weolthe,* OHG. *welida, welitha,* wealth, from AS. *wel, well,* Goth. *waila,* OHG. *wela, wola,* Ger. *wohl,* well; connected with Gk. *βέλτερος, belteros,* better, Skt. *vara,* better, wish, from *var,* to choose). The term "wealth" in political economy is applied to all objects possessing value (q.v.). As a rule, objects which fall under the category of wealth are useful, limited in supply, and transferable. Some authors would exclude, others include, under wealth personal services; a few would include health, strength, intelligence, and other personal attributes. The best usage confines the term to objects that are external to man. See POLITICAL ECONOMY; VALUE.

WEALTH OF NATIONS, THE. See SMITH, ADAM

WEANING (from *wean,* AS *wenian,* Ger. *gewohnen,* to accustom). The substituting of artificial food for breast milk, in the case of an infant. This process should be gradual. If sudden, the mother suffers from painful breasts, and the child from indigestion. Weaning should not be accomplished in hot weather, because food, and particularly milk, is apt to be contaminated at this time. Nursing should be continued in normal cases for nine months after birth If it be protracted beyond this the vitality of the mother may suffer, and the child may lose weight from insufficiently nourishing food. A stationary weight or a loss of weight in the child is a signal that nutrition needs supplementing, and weaning must be accomplished, even though the child seems well and is natural. Pregnancy in the mother is an imperative reason for weaning. It is wise to accustom every child to take water from a bottle after it is a few months old, before the time for weaning approaches Sudden weaning may become imperative because the mother has no milk, or becomes the victim of an acute disease, such as pneumonia, typhoid fever, Bright's disease, or tuberculosis Inflammatory disease of the breast is also a contraindication for nursing. During a short acute illness, the breasts may be emptied at regular intervals with a pump, while the child is fed from a bottle, and breast feeding may be resumed upon the mother's recovery. If the mother has no milk, the child must be weaned as soon as the breasts have been emptied of colostrum. It is safe to wait for two days for the milk to appear in the breasts. When weaning is sudden, reason must be employed in the use of artificial food That is, a five-month-old child must not be put at once on a diet for that age, but gradually brought up to it after beginning with food which is proper for a child of a month old See INFANTS, FEEDING OF

WEARE, wār, MESHECH (1713–86). An American political leader, born at Hampton Falls, N. H He graduated at Harvard in 1735, studied for the ministry, and preached for a short time. He later studied law; represented his town for many years in the New Hampshire General Court; was Speaker in 1752; and served as a justice, and then Chief Justice, of the Superior Court of Judicature. He was also colonel of a regiment of militia, and was a commissioner to the famous Albany Congress of 1754. At the beginning of the Revolutionary War he was made chairman of the Committee of Public Safety; when the new courts were organized, was placed at their head; and was active in raising troops to oppose the British under Burgoyne. Under the temporary constitution of 1776 he was annually elected President of the State until 1784, when he was almost unanimously chosen under the new constitution, but resigned before the end of his term.

WEARING. See TACKING AND WEARING.

WEARING OF THE GREEN, THE. An Irish ballad by an unknown writer. It first appeared during the activities of the United Irishmen (q.v.) in 1797. Later, at the time of the Fenian troubles, a revised version was introduced by Dion Boucicault (q.v.) in his play *Arrah na Pogue,* the hero being Napper Tandy (see TANDY, JAMES NAPPER).

WEASEL, wē'z'l (AS. *wesle,* Ger. *Wiesel,* weasel, of uncertain etymology, perhaps akin to Gk. *αἴλουρος, ailouros,* cat, weasel; possibly connected, from its habitat, with OHG. *wisa,* Ger. *Wiese,* meadow). One of the small, slender carnivores of the family Mustelidæ, typical of the genus *Putorius.* The name was first applied to the small European *Putorius vulgaris,* noted for its constant pursuit of moles and field mice (voles), other European species being known as polecats (q.v.) and stoats. The latter animal (*Putorius erminea*) turns white in winter in northern localities, and its fur is ermine (q.v.). In North America are several species or varieties of weasels, all similar to one another and to the European ones. The one most familiar is the long-tailed or New York weasel (*Putorius noveboracensis*) of the Eastern States; the male is 16 inches long, the female only 13 inches, more than one-third of which belongs to the tail. It is dark chocolate-brown above and white beneath, with the end of the tail black. This stoat-like weasel turns pure white in winter wherever the climate is cold, except (as in all other species) for the black tip of the tail. A smaller species, more widely distributed through the northern United States and Canada, is the short-tailed, or Bonaparte's, weasel (*Putorius cicognani*), the male and female measuring 11 and 9 inches respectively, of which the tail takes less than a quarter; its brown is darker and its white rather yellowish. This is the one which supplies most of the ermine procured in British America in winter, although the Arctic least weasel (*Putorius rixosus*) supplies some. This last species is

only 6 inches long Another least weasel (*Putorius alleghamensis*) dwells in the western Alleghanies; while Florida and Texas have large species that never turn white

Weasels are alike in disposition and habits—slim, lithe, swift, muscular, ferocious little beasts, persevering in pursuit of prey, and alert in escaping its enemies, chiefly hawks and owls. It is an admirable hunter, its scent as keen as its sight. It wearies out animals larger and apparently much stronger than itself, preying on mice, rats, birds, and other small animals, sometimes even on hares and rabbits, robbing birds' nests, devouring the young or sucking the eggs, and is often troublesome in poultry yards. It also does great good by devouring field mice, etc., about barns and granaries It climbs walls and trees with agility, and does not hesitate to plunge into water after the water rat. It abstracts the blood of the animal which it has killed, and generally devours the brain; but when food is abundant it carries the body to its retreat, where a considerable quantity of prey is often found, the weasel continuing to eat it in a half-putrefied state. It apparently kills for the love of killing, or at least this is suggested by the slaughter sometimes worked in a poultry yard, and the fact that many of the chickens killed are left untouched, and seemingly without even having had their blood sucked. The weasel generally sleeps during the day, and is most active at night. It has a disagreeable smell, which is strongest in hot weather, or when it has been pursued or irritated. It is capable of being tamed when taken young, and becomes docile and gentle. The female weasel makes a nest of straw, leaves, and moss for her young, which are produced in spring, four or five in a litter, often in a crevice of a bank or in a hollow tree. See FUR-BEARING ANIMALS, and the bibliography and references there given. Consult C. H. Merriam, "Synopsis of the Weasels of North America," in *North American Fauna*, No 11, published by the United States Biological Survey (Washington, 1896).

WEATHER, wĕTH'ẽr (AS. *weder*, Ger. *Wetter*). The condition of the atmosphere at any time in respect of temperature, moisture, precipitation, sunshine, wind, electricity, dust, or any other meteorological element. The study of weather is of importance to mankind, and has always received great attention, especially because of the desire to anticipate or predict approaching important changes in the weather. The weather bureau (q.v.), or meteorological office, as now established in nearly every civilized nation of the globe, represents the latest practical application of physical science to the needs of mankind; its primary duty is to preserve and study the records of local weather in order to make satisfactory local forecasts.

Modern physical meteorology with its elaborate weather records may be said to have begun in 1653, when Ferdinand II, Grand Duke of Tuscany, distributed thermometers to several cloisters in Italy and organized a system of daily records under the general oversight of Father Luigi Antinori. In 1657 barometers, wind-vanes, and hygrometers were added to the equipment of these stations Continuous automatic records of the individual features of the weather probably began in England between 1666 and 1670, with the Moreland barometer and other apparatus devised by a special committee of the Royal Society, of which Sir Christopher Wren was chairman. A great advance has been made in meteorology since the great exhibition or World's Fair of 1851 at London, when for the first time the items appropriate to the weather map were telegraphed for display upon charts At the present time similar daily weather maps are compiled by all nations, so that the student quickly acquires a comprehensive view of the conditions existing in any part of the world. In 1873 the United States Weather Bureau, then a part of the Signal Service of the army, commenced the formation of a daily weather map of the whole Northern Hemisphere, which was published continuously from 1875 to 1883, inclusive, and was kept up in manuscript for ten years later. This gigantic undertaking included observations from the ocean as well as the land, and only by the use of similar maps can we hope to understand and predict changes of the weather in distant parts of the globe. In order to make satisfactory predictions of the monsoon rains in India, a daily weather map of the Indian Ocean, or the monsoon area, was compiled at Calcutta during the years 1893–99, and by agreement between the Secretary of War and the Secretary of the Navy daily weather maps of the Atlantic and Pacific oceans have been compiled by the United States Hydrographic Office since 1888. (See Page, *Instructions to Voluntary Observers of the Hydrographic Office*, Washington, 1901.) Similar maps for the North Atlantic for 1881–82 were issued by the London Meteorological Office

Weather Forecasts are based on the general study of types of weather, combined with the study of the series of the daily weather maps for a few days immediately preceding the period for which predictions are to be made. No forecast of weather is made for a period in advance longer than is warranted by the rapidity with which atmospheric changes happen to be going on at that time. The forecast usually covers all questions bearing on destructive winds, excessive heat or cold, rain or snow, river floods, etc. Special forecasts of the weather for any given locality or time are usually made when requested. Consult: W. L. Moore, *Descriptive Meteorology* (New York, 1910); W N. Shaw, *Forecasting Weather* (London, 1911); W. I. Milham, *Meteorology* (New York, 1912), containing a bibliography; and publications of the United States Weather Bureau (Washington). See CLIMATE; METEOROLOGY; WEATHER BUREAU; ETC

WEATHERBEE, wĕTH'ẽr-bê, SIR RICHARD LINTON (1836–). A Canadian lawyer and jurist. He was born at Bedeque, Prince Edward Island, and in 1858 graduated at Acadia University, Wolfville, N. S. After a few years' newspaper work, during which he contributed chiefly to the *Acadian Recorder*, he was called to the bar in 1863, and practiced his profession in Halifax, where he became one of the leaders of the provincial bar. In 1877 he was counsel for the Dominion before the Halifax Fisheries Commission (see FISHING LAWS). He was a puisne judge of the Supreme Court of Nova Scotia in 1878–1905, and then Chief Justice until his retirement in 1907.

WEATHER BUREAU. The specific meaning of this term is derived from the Act of Congress of Oct. 1, 1890, portions of which read as follows:

"That the civilian duties now performed by the Signal Corps of the army shall hereafter devolve upon a bureau to be known as the

Weather Bureau, which, on and after July 1, 1891, shall be established in and attached to the Department of Agriculture."

The duties devolving upon the Weather Bureau are defined by sec. 3 of said Act, as follows:

"That the Chief of the Weather Bureau, under the direction of the Secretary of Agriculture, on and after July 1, 1891, shall have charge of the forecasting of weather, the issue of storm warnings, the display of weather and flood signals for the benefit of agriculture, commerce, and navigation, the gauging and reporting of rivers, the maintenance and operation of seacoast telegraph lines, and the collection and transmission of marine intelligence for the benefit of commerce and navigation, the reporting of temperature and rainfall conditions for the cotton interests, the display of frost and cold-wave signals, the distribution of meteorological information in the interests of agriculture and commerce, and the taking of such meteorological observations as may be necessary to establish and record the climatic conditions of the United States, or as are essential for the proper execution of the foregoing duties."

Among early meteorological services of importance were those of the Surgeon-General of the United States army (1818); Russia (1837); Austria (1848); Prussia (1848); Smithsonian Institution (1849); Netherlands (1849); England (1860); and France (1863). At present nearly every civilized nation has its weather bureau or meteorological office, and many have also marine or hydrographic offices. The United States Weather Bureau was originally organized under the Chief Signal Officer of the army, and its history goes back to Feb. 9, 1870. But in fact the system of observation by voluntary and unpaid observers, which forms so large a part of the old records of the bureau, goes back to the year 1849, when the Secretary of the Smithsonian Institution began to organize this corps of observers; indeed, one may go back to the year 1817, when Josiah Meigs issued his meteorological instructions to the registrars of the United States Land Office, and 1818, when Dr. Lovell, Surgeon-General United States army, issued similar instructions to his officials. In 1838 Prof. James P. Espy secured the appointment of a joint committee on meteorology, representing various scientific interests in Philadelphia. This committee began the collection of daily observations and the preparation of daily weather maps. In 1842 Espy was appointed meteorologist to the government, and assigned to duty in the War Department, where he continued to compile and study daily weather maps. In 1851 he was ordered to continue his work under Professor Henry as Secretary of the Smithsonian Institution; in 1854 the latter began the preparation for the daily display of weather maps based on telegrams from all parts of the country, and from 1856 to 1861 such a map was daily exhibited and studied, and frequently made the basis of weather prediction. This work was discontinued on account of the irregularities in the telegraph service incident to the Civil War, and was taken up again jointly by the observatory of the Astronomical Society and the Chamber of Commerce in Cincinnati in 1868. In February, 1870, an Act of Congress ordered the Secretary of War to provide for the observation and prediction of storms, to which subsequently were added floods and weather. The work that was then being carried on at Cincinnati was therefore transferred to Washington. In 1891 these duties were transferred to the Weather Bureau, which was reorganized under the Department of Agriculture.

As at present organized, the Weather Bureau comes under the rules governing the civil service of the country. Its first chief was Prof. Mark W. Harrington (q.v.), to whom Prof. Willis L. Moore (q.v.) succeeded July 4, 1895, who in turn was succeeded by Prof. Charles F. Marvin (q.v.) Aug. 4, 1913. The Weather Bureau employs the whole time of about 800 paid employees, located at about 200 stations, distributed throughout the United States and the West Indies. It also receives reports of temperature or rain or rivers from several hundred special observers and from over 4000 cooperative observers of local climatological matters; also about 20,000 special reports on the condition of the growing crops from a meteorological point of view.

The bureau receives daily two regular sets of weather telegrams at 8 A.M. and 8 P.M., on which are based the morning and evening weather charts and the forecasts for the next 36 hours. These forecasts are immediately telegraphed to all concerned throughout the country and to vessels about to sail in any direction over the adjacent oceans; they are published in local newspapers, on special telegraph forms, on special postal cards, by flag signals, and by other methods of communication, so that within an hour's time after the forecasts leave Washington they can be obtained by any one who lives within access of a telegraph or telephone office. Those who can be reached only by mail receive the forecasts a few hours later. The forecasts of heavy storms, cold waves, and injurious frosts and specially hot weather are verified almost without exception; the forecasts of rain are the least successful of all. (See STORM AND WEATHER SIGNALS.) A system of so-called wireless agencies of communication is now extensively employed both for collecting weather reports and disseminating forecasts and warnings. The condition of the rivers, especially in times of flood, is telegraphed to all those interested; predictions of the rise and fall of the water are made oftentimes with remarkable success, and are of the greatest value to life and property interests located in river valleys subject to floods and overflows. *The National Weather and Crop Bulletin* is published weekly during the summer season, and monthly from October to April, giving full details of the temperature and rainfall as compared with normal conditions, and showing the influence of the weather on the development of the future crop. In the winter a *Snow and Ice Bulletin* is published weekly, showing the quantity of snowfall, the ice in the rivers, the opening and closing of navigation, the condition of winter wheat, and the injury done to crops by cold waves, frosts, or floods.

In addition to the central forecast district at Washington, five others are maintained, having their centres at Chicago, New Orleans, San Francisco, Portland (Oregon), and Denver, each of which issues independent forecasts. In the interests of local climatology, the larger States, or groups of smaller States, are organized as sections, and publish monthly a section report, which gives every observation of rainfall and temperature made during the month, as also charts of isotherms and rainfall. There are at

present 45 such sections, including those of Cuba and Porto Rico. The analogous publications for the Hawaiian Islands and for the Philippines are specially provided for by those territories. The general climatology of the United States is provided for by the publication of the *Annual Report of the Chief of the Weather Bureau*, which contains several hundred quarto pages of tabular matter and additional special reports or memoirs. In order to secure prompt publication of general climatological data, the bureau publishes a *Monthly Weather Review*, which contains not only a summary relative to storms, forecasts, and warnings, and the general climate and crop conditions, but also 10 or 20 pages of special contributions and notes bearing on questions of meteorology, seismology, aërology, etc.

All apparatus used by the bureau is carefully tested, and all stations are frequently inspected, so as to secure the greatest possible exactness and uniformity. The Instrument Division is in charge of apparatus and methods of observation. New instruments and improvements on old apparatus emanate from this division. When ordinary telegraph and telephone lines and cables are not otherwise available, the bureau builds and controls its own lines. Special researches of any magnitude are generally published as bulletins, of which there are an octavo and a quarto series. Among these are those relating to international weather charts and storm tracks for the Northern Hemisphere; the results of observations with kites; and the study of the radiation of heat by the air The headquarters of the Weather Bureau are located in a special building in Washington, D. C. The early history of this and other national weather bureaus is given in *Bulletin No 11;* many additional details will be found in Moore, *Metcorology, Practical and Applied* (London, 1894). Consult also Abbe, *Aims and Methods of State Weather Services* (Baltimore, 1900); Bayard, *Annual Presidential Address*, before Royal Meteorological Society (London, January, 1899); Bartholomew, *Physical Atlas*, vol. iii, "Meteorology" (ib, 1900). See METEOROLOGY; SIGNALING AND TELEGRAPHING, MILITARY; STORM AND WEATHER SIGNALS; WEATHER; ETC.

WEATHERFORD, wĕTH'ĕr-fĕrd. A city and the county seat of Parker Co., Texas, 31 miles by rail west of Fort Worth, on the Texas and Pacific, the Gulf, Colorado, and Santa Fe, the Gulf, Texas, and Western, and the Weatherford, Mineral Wells, and Northwestern railroads (Map: Texas, D 3). It is the seat of Weatherford College (Methodist Episcopal, South) and the Texas Fairmont College and Conservatory of Music. There are also a Pythian home for orphans, a sanitarium, and a courthouse. Weatherford has among its industries a cotton mill, cotton gins and a compress, bottling works, a peanut factory, foundry and machine shops, railroad shops, a creamery, and manufactories of flour, pottery, and lumber products. Pop., 1900, 4786; 1910, 5074

WEATHERFORD, wĕTH'ĕr-fĕrd. WILLIAM (c.1780–1826). A mixed-blood chief of the Creek Indians, the leader of the hostiles in the Creek War of 1813–14. He was the son of a white father by a half-breed woman whose father was a Scotchman. He first came into prominence by leading the attack upon Fort Mims (q.v.), Aug. 30, 1813. It is maintained, with apparent truth, that he did his best to prevent the excesses following the victory, and left the scene rather than witness the atrocities. At the battle of the Holy Ground in December, 1813, he was defeated and narrowly escaped capture by Claiborne's troops. When the last hope of the Creeks had been destroyed by the bloody battle of the Horseshoe Bend, March 27, 1814, in which nearly 1000 Creek warriors perished, Weatherford voluntarily surrendered to Jackson, creating such an impression by his straightforward manner that the general allowed him to go back alone to collect his people preliminary to arranging terms of peace After the treaty he retired to a plantation at Little River, Ala, where he passed the remainder of his life.

WEATHERLY, wĕTH'ĕr-lē. A borough in Carbon Co., Pa., 12 miles northwest of Mauch Chunk, on the Lehigh Valley Railroad (Map: Pennsylvania, K 5). There are silk mills, foundries, a candy factory, a fabricating plant, and a cigar factory. Pop., 1900 2471; 1910, 2501.

WEATHERLY, wĕTH'ĕr-lē, FREDERIC EDWARD (1848–). An English song writer, born at Portishead, Somersetshire He graduated at Brasenose College, Oxford, in 1871, and was called to the bar at the Inner Temple in 1887. Beginning with *Muriel and Other Poems* (1870), he wrote many popular songs, especially for children, among them. "London Bridge," "The Three Old Maids of Lee," "Darby and Joan," and "The Holy City." Among the best known of his writings are *Lays for Little Ones* (1898), and many delightful stories and sketches, such as *Walton School* (1872), *Oxford Days* (1879), and *Two Children* (1884). He also wrote *The Rudiments of Logic* (1879) and *Questions in Logic* (1883).

WEATHER SIGNALS. See STORM AND WEATHER SIGNALS.

WEATHER VANE. See ANEMOGRAPH; ANEMOSCOPE

WEA'VER, EMILY POYNTON (1865–). A Canadian author. She was born near Manchester, England, went to Canada with her parents in 1880, and lived in Oxford County, Ontario, Toronto, Halifax, and again in Toronto. She contributed short stories and historical essays to the leading British and American periodicals and published· *My Lady Nell* (1890); *The Rabbi's Sons* (1892), *Prince Rupert's Namesake* (1893); *The Rainproof Invention* (1896); *A Canadian History for Boys and Girls* (1905); *Builders of the Dominion: Men of the East* (1907); *Old Quebec: The City of Champlain* (1908); *The Trouble Man* (1910); *The Story of the Counties of Ontario* (1913); *Canada and the British Immigrant* (1914)

WEAVER, HENRY A. (1832–1903). An American actor. He was born in London, England, but was brought to the United States when a child. His début on the professional stage was made in Brooklyn in 1853. During his long career he supported "Lotta" (playing Quilp in her *Little Nell and the Marchioness*, Boston, 1866), Mme. Janauschek, J. B. Booth, Tommaso Salvini (with whom he played Iago), Mrs. Langtry, Julia Marlowe, Stuart Robson (with whom he played Doctor Johnson in *Olwer Goldsmith*), and Mrs Leslie Carter.

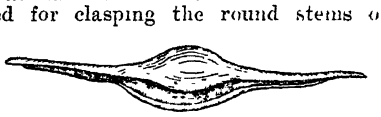
WEAVER, JAMES BAIRD (1833–1912). An American political leader, born at Dayton, Ohio. He graduated at the Cincinnati Law School in 1854, practiced law in Iowa, and served in the Civil War, being brevetted brigadier general of

volunteers in 1865. In 1866–70 he was district attorney for the Second Judicial District of Iowa, and in 1867–73 also an assessor of the United States internal revenue For a time he edited the Iowa *Tribune* at Des Moines. He was active in the organization of the National Greenback party, was elected to represent that party in Congress in 1878, and in 1880 was its candidate for the presidency, receiving a popular vote of 308,578. In 1884 and 1886 he was again elected to Congress by a fusion of Democrat and Greenback votes, but was defeated in 1888. In 1892 he was the candidate of the People's party for the presidency, receiving 22 electoral votes, and a popular vote of 1,041,028. He was mayor of Colfax, Iowa, in 1904–06 He published *A Call to Action* (1892), and *Past and Present of Jasper County, Iowa* (1912).

WEAVER, JONATHAN (1824–1901). A bishop of the United Brethren in Christ. He was born in Carroll Co., Ohio; entered the ministry in 1847 and became Bishop in 1865; in 1893 he was made emeritus. He published *Universal Restoration Not Sustained by the Word of God* (1878), *Practical Comment on the Confession of Faith of the United Brethren* (1892), and *Christian Theology* (1900). Consult H. A. Thompson, *Biography of Jonathan Weaver* (Dayton, 1901), and Daniel Berger, *History of the United Brethren in Christ* (ib., 1897).

WEAVER BIRD. The popular name for a group of birds, forming the family Ploceidæ, similar to the finches. The name refers to the structure of the nests of these birds, which are woven in a wonderful manner of various vegetable substances. About 275 species of Ploceidæ are known, of which over 200 are found in Africa, and the remainder in tropical Asia, the Philippines and other East Indian islands, and Australia. They are small birds, with a strong conical bill, sometimes coral red The claws are large and very long. The wings are pointed, the first quill remarkably short. There is great diversity in the form and appearance of the nests constructed by different species. One of the best-known species is the yellow weaver (*Ploceus philippinus*), the baya (q.v.) of India. Many other weaver birds construct nests much on the same plan—pouches elongated into tubes, entered from below; some are kidney-shaped, with entrance at the side. They often suspend their nests in the same way from the extremities of branches, and prefer branches which hang over water, probably as affording security against enemies. Social habits are prevalent among them, and many nests of the same species are often found close together. Some of them attach one year's nest to that of the year preceding, as certain Madagascan species, which sometimes thus make five nests in succession, one hanging to another. Some of the African species build their nests in company, the whole forming one structure. The social weaver birds (*Philetærus socius*) of South Africa construct in communities an umbrella-shaped roof in a tree, beneath which may be 300 bird homes. An acacia with straight, smooth stem, such as predaceous animals cannot climb, is often selected. The birds begin by constructing the roof (of coarse grass), each pair afterward building their own nest, formed in an excavation on the under side of the roof. As new nests are built every year, the weight of the structure often becomes so great as to break down its support. The waxbills, Java sparrows, nutmeg birds, African oxpeckers, and other species elsewhere described belong to this large family, and make remarkable community nests. The widow birds (q.v.) are closely related to them See Plate of NESTS OF WEAVER BIRDS

WEAVER'S-SHUTTLE SHELL. A smooth, usually white gastropod, related to the cowry (q.v.), whose aperture is drawn out into a long canal at each end The foot is narrow and adapted for clasping the round stems of the



WEAVER'S-SHUTTLE SHELL.

alcyonarian coral Gorgonia, on which the mollusk feeds The best-known species is *Ovulum volt* The genus contains many species inhabiting all warm seas, and the group is sometimes called China shells

WEAVING (from *weave*, AS. *wefan*, Ger *weben*, to weave). The art of making cloth on a loom (q.v.) which in its simplest form is merely a frame to hold the warp threads parallel and regular, and enable sheds to be formed through which the wefts can move freely in a straight line without the necessity of passing over and under, as in plaiting, or in making lace (q.v.) on the pillow

The three fundamental steps in weaving after the loom has been warped are: (1) pulling the lisses or healds to form the new shed, (2) passing the weft (usually called filling in machine weaving) through the shed; (3) pressing home the weft.

The three fundamental weaves are plain, twill, and satin. All others are merely variations and complications of these.

In plain weave the warp is divided into only two systems, the odd threads being attached to one set of lisses, the even threads to another. The passes of the weft to the left are through a shed that has the odd warps next to the weaver; the passes of the weft back to the right are through a shed that has the even warps next the weaver.

In twill weave the warp is divided into at least three systems, and there is not complete alternation of warp and weft as there is in plain weave. In a two-one twill the first weft passes over warp one, under warps two and three, over warp four, under warps five and six, etc.; the second weft over warps two, five, eight, etc., and under the others; the third weft passes over warps three, six, nine, etc., and under the others. This of course leaves only half as much weft as warp on the surface, and forms the diagonal ribs or ridges that are characteristic of twills.

In satin weave, which demands small silky threads, and which is primarily a silk weave, the warp is divided into at least five systems, and the weft is so passed that not more than one-fourth as much weft as warp remains on the surface, also the points where the weft comes to the surface are placed irregularly to avoid twill or diagonal effects. The result is that the wefts are practically negligible, and the surface appears to consist entirely of short lengths of parallel warps, thus giving the glossy effect characteristic of satin.

Figs. 1, 2, and 3 illustrate plain, twill, and satin weaves as plotted for a machine loom. In *A* the horizontal lines represent the healds or

loom harness with the disposition of the warp threads; the weave is shown at *B* written out on squared design or cross-section paper, each section representing the crossing of a warp and filling thread and the X marks showing that the warp is above the filling at the point they appear, the blank sections show that the filling is above the warp; the threads as interlaced are shown at *C*, and a section of the fabric cut through the warp is shown at *D*.

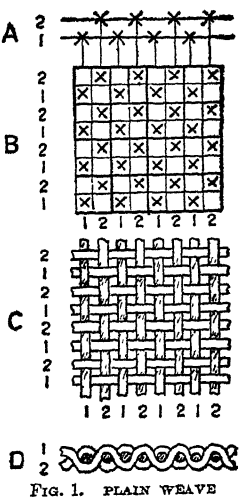


FIG. 1. PLAIN WEAVE

The plain weave (Fig 1) is the simplest form of weaving, requiring but two different movements of the warp threads. Four repeats of the weave in warp and filling are shown. From an examination of the several diagrams it will be seen that the movements of threads marked 1 are identical and of threads marked 2, while all alike, are exactly opposite to the movement of the former; this makes it possible to arrange the warp for the loom on the harness frames, as at *A*, and by raising No. 1 and depressing No. 2 the shed is formed while the first pick, or shot, of the filling is passed through, then harness No. 1 is depressed and No. 2 raised and the second filling thread is passed through the new shed; the third shed is like the first, the fourth like the second, and the weave repeated forms the fabric with the plain weave. Patterns in this weave can only be produced by the use of threads of different colors or material. It is not only the simplest but the firmest and strongest of weaves.

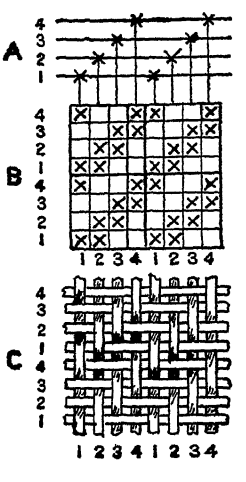


FIG. 2 TWILL WEAVE.

The twill weave, as illustrated in Fig. 2 by one of the simplest forms, is a weave in which the filling threads pass over or under two or more adjacent warp threads at a time, at least once in a repeat, each of the picks being alike except that each is stepped one thread to the right or the left of the one preceding it. The simplest twills may be woven on three harness and are technically "one up and two down," $\frac{1}{2}$, or "two up and one down," $\frac{2}{1}$, twills, the former being a filling-face and the latter a warp-face weave as the warp or filling predominates on the face. The next twills are the four harness twills, $\frac{2}{2}$, $\frac{1}{3}$, which are warp-face and filling-face weaves respectively, and $\frac{2}{2}$, which is even-sided; the twill used in the diagrams under Fig. 2 is a $\frac{2}{2}$ twill. The twill weave is distinguished by having a distinct wale or diagonal pattern, and by changing the number of threads taken up a great variety of twill weaves may be produced. Twill weaves are designated as right twills and left twills, as the diagonal, when traced from the bottom of a piece of cloth held lengthwise, leads to the right or left respectively. The twill shown in Fig 2 is a right twill. By various arrangements of the twill weaves, curved twills or weaves may be formed instead of plain diagonals. By drawing the warp threads in different ways on the loom harness fancy weave effects are produced, such as the herringbone, where a section of right twill and a section of left twill alternate.

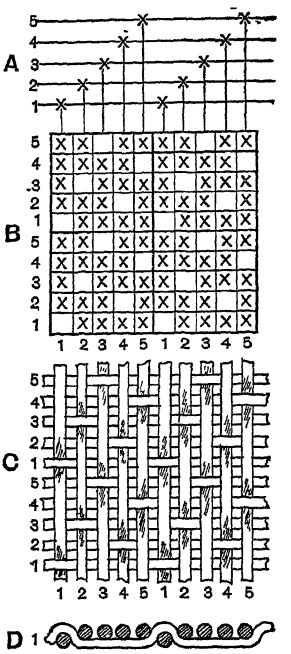


FIG. 3. SATIN WEAVE.

The simplest satin weave is produced with five harness and is illustrated in Fig. 3. An examination of the diagram shows that the stitching of the warp threads to the filling is so distributed that no two intersections are adjacent; and in order to make a smooth surface the warp threads stitch down to but one filling thread in a repeat of the weave. The weave as shown produces a fabric with warp satin face and filling satin back.

Rep and Taffeta Weaves. The simplest forms of plain weave have warp and weft threads of equal size and equal number to the inch, and showing equally on the surface, as in hard-spun etamines or rough-spun burlaps. Increasing the size and hardness of the warps, and decreasing the size while increasing the number and softness of the wefts, and pressing the wefts home hard, buries the warps entirely and produces a ribbed surface consisting entirely of wefts, the ribs marking the position of the hidden warps. This is the so-called rep weave, except that usually on the shuttle loom the warps are fine and the wefts are coarse, and the result is a warp rep instead of a weft rep. When the weft rep on a bobbin loom is figured by blocking in the colors with short passes, instead of sending the weft the full width of the warp as on the shuttle loom, the result is real tapestry. (See TAPESTRY.) On the other hand, if on a shuttle loom we have coarse wefts with fine warps, but the warps are so few that instead of covering the wefts they serve merely as binders, the result is taffeta. If the warps are numerous, but the wefts are inserted in satin weave, then the result will be warp satin on one side and will look like taffeta on the other.

Damasks and Brocades. These, like satins, are primarily silk weaves developed on the shuttle loom in China, the home of silk, just as twills and tapestries were developed in wool on

the bobbin loom in Flanders Damask is a weave with warp satin ground and weft satin, twill, or taffeta figures, or vice versa Brocade, derived from the Spanish for brocaded, and ultimately from the broche, i.e., the pointed bobbin of the high-warp loom, originally meant the combination of bobbin and shuttle effects; in other words, figures inserted with bobbins during the process of weaving a shuttle fabric. Ancient shuttle silks containing gold are usually called brocades, because the gold thread was inserted from bobbins, even in what would otherwise be damasks. Nowadays the brocaded effects, even on many hand looms, are usually inserted with extra shuttles. Of brocaded figures in general it may be said that they are weft effects, apt to be small and detached and in relief and in color, as contrasted with most damask figures that are large and flat and usually in the same color as the ground, but with contrasting tone produced by the contrast of weaves. The technical term for damask with ground of different color from the figures is "lampas." Brocatelle is a damask with large satin figures that are forced out into bold relief by the coarseness of the linen or cotton weft. Light-weight brocaded silks are usually called *soies brochées*, by way of distinction from the rich and heavy brocades based upon ancient cloths

Velvet. Velvets are also primarily a silk weave, corresponding in wool to the hand-knotted Oriental rugs. (See RUGS, ORIENTAL) Brussels and Wilton carpets (see CARPETS AND RUGS), and their printed imitations called tapestry carpets and velvet carpets, are merely the velvet weave applied to floor coverings of wool. Corduroys and velveteens are fabrics with pile surface, formed by bringing weft threads in loops to the surface and then cutting the loops. The primitive form of these can be seen in the Coptic velvets with uncut woolen weft pile, of which there are several important examples in the New York Metropolitan Museum of Art. The pile of modern velvets is produced not by extra wefts, but by extra warps that loop over wires which are withdrawn after the passage of the binding weft. When the velvet is to be cut velvet, the wires often have knives on the end that do the cutting automatically as the wires are withdrawn. Plain velvets are often woven double, with a common pile the cutting of which produces two complete velvets, one facing up and the other down. Velvets are figured by using several systems of warps of different colors, as in Brussels and Wilton carpets; by leaving part of the surface without pile and in satin or twill or taffeta; by contrasting surfaces of cut pile with surfaces of uncut pile; and by contrasting pile of two different heights. The more elaborate and complicated effects have never been produced in America, and in Europe on hand looms only. Terries and Turkish toweling are woven plain with uncut loops.

In gauze and other crossed weaves the warps twist over each other back and forth producing embroidered effects as in lappets, or openwork effects as in lenos and woven laces. In plain gauzes the warps twist in pairs around the filling threads, and produce a structure that, though light and open, is comparatively firm. A fair comparison is that between madras and crete, the former having a gauze and the latter an etamine ground. Leno is muslin with gauze effects introduced at regular intervals. The introduction of crossing threads that differ in color or count from the rest, as well as variation in the number of threads that cross and in the weft threads that are crossed, and the combination of gauze with twill, satin, brocade, or velvet weaves, produces some of the most delightful and unconventional stuffs that are known. In lappets the surface of a plain or gauze fabric is diapered with simple embroidery effects, by drawing with the lappet needle extra warp threads back and forth from point to point, binding them with the weft only at the outlines of the figures, and floating them loosely between.

Swivel weaving is accomplished by a special attachment described in the article LOOM. The swivel introduces a special filling to form figures on the face of the fabric—usually at a distance one from another—and while the result is similar to that secured by lappet weaving, much more elaborate effects can be produced, as the warp threads may be manipulated to bind the filling in a weave which, while causing it to predominate on the face of the fabric, does not make it float as in the lappet weave, where the figuring thread is bound down only at the right and left sides of the figure to be produced, with no intermediate stitches. By the use of a tier of shuttles in the swivel attachment several colors may be introduced in the figure, as when weaving a fabric where the ground may be figured in an all-over pattern of leaves or vines produced by the regular warp and filling, and the flowers are scattered over the surface and blended of two or three different colored threads by the swivel attachment. The great advantage of producing figured effects by lappet or swivel weaving over the use of a regular warp or filling is that in the latter the warp or filling floats from figure to figure on the back of the fabric, there being as many floating threads as there are threads in the figure; and these threads must be trimmed off after weaving, causing a great waste of material, while in the former mode of weaving the special warp or filling floats from figure to figure in but a single thread.

As the space in the power loom usually limits the number of harness frames to 24, great ingenuity is displayed by designers in the effort to produce complicated warp movements simply. A simple illustration of this feature of weaving

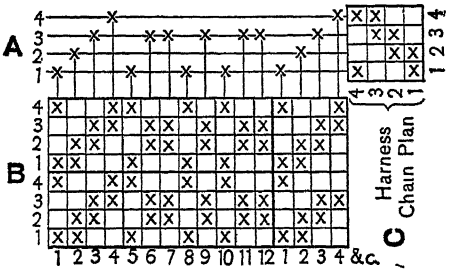


FIG. 4. DRAWING-IN DRAFT AND HARNESS—CHAIN PLAN.

is shown in Fig. 4. The weave *B* repeats itself on 12 threads and could be woven on 12 harness, but the number of harness may be reduced to four by drawing all threads which have like movements on the same harness as designated at *A*. The same principle is applied to more elaborate patterns where the weave may repeat on 100 or more warp threads and could be reduced, by the special drawing-in, to a number of harness which can be handled in the loom. In the harness looms the movements of the various harness

are governed either by cams or a pattern chain which is so arranged that as it passes over a small intermittently revolving cylinder the bars of the chain, which are supplied with a roll or small cam for each harness that is to be raised, act on certain levers which control the harness and raise or lower them according to the arrangement of the harness chain Diagram *C* in Fig. 4 is the plan for the harness chain to produce the weave *B* when the warp is drawn in the harness as at *A*

For patterns where the warp threads interlace with so many different movements that the weave may not be reduced as above, the patterns must be produced in a loom supplied with the Jacquard machine, which is a special head motion or harness motion, described in the article LOOM.

Bibliography. Ernest Pariset, *Histoire de la Soie* (Paris, 1862), T. R. Ashenhurst, *Weaving and Designing of Textile Fabrics* (London, 1887), id., *Practical Treatise on Weaving* (5th ed., ib., 1893); E. A. Posselt, *Jacquard Machine Analyzed and Explained* (3d ed., Philadelphia, 1893), A. S. Cole, *Ornament in European Silks* (London, 1899); E. A. Posselt, *Textile Machinery Relating to Weaving* (Philadelphia, 1901); Moritz Dreger, *Kunstlerische Entwicklung der Weberei und Stickerei* (Vienna, 1904), Harry Nisbet, *Grammar of Textile Design* (New York, 1906); Luther Hooper, *Handloom Weaving: Plain and Ornamental* (ib., 1910); Otto von Falke, *Kunstgeschichte der Seidenweberei* (Berlin, 1913 et seq.), G. H. Oelsner, *A Handbook of Weaves*, English translation by S. S Dale (New York, 1915).

WEBB, ALEXANDER STEWART (1835–1911). An American soldier and educator, born in New York City. He graduated at West Point in 1855, was assistant professor of mathematics there in 1857–61; and during the Civil War served in the defense of Fort Pickens, at the first battle of Bull Run, and in the Peninsular and Maryland campaigns, and was made a brigadier general of volunteers in June, 1863 At Gettysburg his brigade played a conspicuous part in repelling Pickett's famous charge. He commanded a division in the Rapidan campaign, and a brigade in the campaign of the Wilderness; was severely wounded at Spottsylvania; and acted as chief of staff to General Meade after his return to active service. In August, 1864, he was brevetted major general of volunteers for his services at Gettysburg and in the Wilderness campaign, and in March, 1865, was brevetted brigadier general in the regular army for his services in the last campaign against General Lee, and major general for his services during the war. In December, 1870, at his own request, he was honorably discharged. From 1869 until 1903 he was president of the College of the City of New York. He published *The Peninsula · McClellan's Campaign of 1862* (1882).

WEBB, SIR ASTON (1849–). An English architect, born in London. He served as president of the Architectural Association (1884) and of the Royal Institute of British Architects (1902–04); in 1903 was elected to the Royal Academy; received in 1905 the gold medal of the Royal Institute of British Architects and in 1907 that of the American Institute of Architects. Webb was knighted in 1904 and received the K.C.V.O. in 1914. His works include: the Birmingham Assize Courts; the Admiralty Arch at the east end of the Mall, London; the Britannia Royal Naval College and Sick Quarters at Dartmouth, the new buildings of the Victoria and Albert Museum, the Royal College of Science, and the Imperial College of Science and Technology, all at South Kensington, the French Protestant Church, Soho; London offices for the Grand Trunk Railway of Canada, architectural surroundings for the Victoria Memorial at Buckingham Palace, and the new façade of the palace itself.

WEBB, BEATRICE, *née* POTTER (1858–). An English economist. After receiving a private education she engaged in the investigation of social and industrial conditions. She was married to Sidney Webb (q.v.) in 1892. In 1905–09 she served on the Royal Commission on Poor Law and Unemployment, of whose minority report she was joint author, and after 1909 was honorary secretary of the National Committee for the Prevention of Destitution She edited *The Case for the Factory Acts* (1901) and *The Case for the National Minimum* (1913), wrote *The Cooperative Movement in Great Britain* (1891, new ed, 1904); and was joint author of several important works noted in the article on her husband. She became one of the leading members of the Fabian Society. Manchester University honored her with the degree of D Litt.

WEBB, CHARLES HENRY (1834–1905). An American author, born at Rouse Point, N Y He ran away to sea in his youth, was on the staff of the New York *Times* in 1860–63, and, having in the latter year gone to California, there founded *The Californian,* which he edited until 1866. He subsequently contributed to the New York *Tribune* humorous articles over the signature John Paul. His publications include *Liffith Lank* (1866), *John Paul's Book* (1874), *Parodies, Prose, and Verse* (1876), *Vagrom Verse* (1889), and *With Lead and Line Along Varying Shores* (1901).

WEBB, JAMES WATSON (1802–84). An American journalist. He was born in Claverack, N Y In 1819 he entered the United States army as second lieutenant of artillery, was stationed in the West, and in 1827 resigned his commission. The same year he became editor of the New York *Morning Courier,* and having united with this the *Enquirer,* edited the *Morning Courier and New York Enquirer* until 1861. It was the leading Whig journal until that party was dissolved. He was in 1843 appointed engineer in chief of the State of New York, with rank of major general, and in 1861 Minister and Envoy Extraordinary to Brazil. In 1865 he negotiated the secret treaty with the French Emperor for the removal of French troops from Mexico, and in 1869 resigned. After his return from Brazil he lived in New York till his death. He published: *Altowan, or Incidents of Life and Adventure in the Rocky Mountains* (1846); *Slavery and its Tendencies* (1856); and *National Currency,* a pamphlet (1875).

WEBB, JOHN RICHMOND (c.1667–1724). An English general, born probably at Rodbourne Cheney, Wiltshire, an old possession of the family. He distinguished himself under Marlborough at Blenheim and at Oudenarde, where he commanded the left. He became brigadier general in 1704 and major general in 1706. His clever victory at Wynendaele, Belgium, in 1708 over a French force three times as large as his own was credited by the Whigs at home, notably Addison, to Cadogan, a junior officer, an injustice which heightened rather than lowered

the popularity of Webb, who readily took the cue from his Tory friends and played the part of one persecuted for politics' sake. In 1709 he became lieutenant general and was severely wounded at Malplaquet. From 1712 to 1715 he was general and commander of the land forces in Great Britain, but the Whigs turned him out, and in 1722 by charging him with membership in a Jacobite society forced his retirement from public life His character as the big, handsome soldier and simple politician is excellently portrayed in *Henry Esmond* by Thackeray, who through his paternal grandmother was descended from Richmond Webb, the general's second cousin.

WEBB, SAMUEL BLATCHLEY (1753–1807). An American soldier, born at Wethersfield, Conn. He early joined the Patriot party, and as lieutenant in the Second Connecticut Company, joined the Continental army at Cambridge. He served with great gallantry and was wounded at Bunker Hill, and in 1775, became aid-de-camp to General Putnam, with the rank of major. In 1776 he was chosen by Washington as his private secretary and aid, with the rank of lieutenant colonel, and as such wrote the order for promulgating the Declaration of Independence in New York City. He participated in the battles of Long Island, White Plains, Trenton, and Brandywine, being wounded at White Plains and Trenton, and on Dec. 10, 1777, during an expedition to Long Island, was taken prisoner. Exchanged in December, 1780, he was transferred to the Third Connecticut Regiment in January, 1781, and in September, 1783, was brevetted brigadier general He was one of the 16 officers who on June 19, 1783, founded the Society of the Cincinnati.

WEBB, SIDNEY (1859–). An English economist and Socialist, born in London. He was educated in Switzerland, Germany, and at the City of London College In 1878 he entered the English civil service, where he was employed in many capacities until 1891. He was called to the bar in 1885; and served in the London County Council from 1892 to 1910 and on various royal commissions. He was a founder of the London School of Economics and Political Science and became honorary professor of public administration in the University of London. One of the first members of the Fabian Society (q.v.), he contributed to *Fabian Essays* and wrote *Socialism in England* (1890). His most important books, written in collaboration with his wife, Beatrice Potter Webb (q.v.), include: *The History of Trade Unionism* (1894; new ed., 1902); *Industrial Democracy* (1897; new ed., 1902); *English Local Government* (1906–13); *Minority Report of the Poor Law Commission* (1909); *English Poor Law Policy* (1910); *The State and the Doctor* (1910); *The Prevention of Destitution* (1911). As editor of the *New Statesman* and through his speeches and writings Webb exerted a powerful influence on the development of English public opinion on political, economic, and especially social questions. Consult A. G. Gardiner, *Pillars of Society* (London, 1913).

WEBB, THOMAS (1724–96). A British soldier and Methodist lay preacher. He was a man of wealth and education, and for several years was lieutenant of the Forty-eighth Regiment of Foot. He lost an eye in the storming of Louisburg, Nova Scotia (1758), was one of the few officers surviving with Washington from Braddock's defeat (1755), and scaled the Heights of Abraham with Wolfe (1759). Converted under the preaching of John Wesley in 1765 he united with the Methodists and began preaching Soon after, when the John Street Church was erected in New York City, in 1768, he was one of the chief contributors. In 1772–73 he visited England to secure aid for the struggling churches, and preached in England and Ireland. Returning to England at the breaking out of the Revolution, he settled at Portland, near Bristol, but preached wherever opportunity offered. He labored among the French prisoners at Winchester in 1776–82, and also among the sailors of Portsmouth. He is buried in Portland Chapel, which he helped to build.

WEBB, THOMAS EBENEZER (1821–1903) A British philosophical scholar, born at Pontscatho, Cornwall, and educated at Kingswood College, Sheffield, and at Trinity College, Dublin. He became professor of moral philosophy in the University of Dublin in 1857, regius professor of laws in 1867, and public orator in 1879. He withdrew from academic life in 1887, and thenceforth until his death was county court judge for Donegal. He published *The Intellectualism of Locke* (1857); *The Veil of Isis* (1885); *The Irish Land Question* (1886); *The Mystery of William Shakespeare: a Summary of Evidence* (1902).

WEBB CITY. A city in Jasper Co., Mo., 5 miles northeast of Joplin, on the Missouri Pacific and the St. Louis and San Francisco railroads (Map: Missouri, B 4). It is chiefly important as a mining centre, being situated in the lead and zinc district of southwest Missouri. There are more than 200 mining plants in operation in the city and vicinity. Other establishments include a large foundry, machine shops, ironworks, a flour mill, etc. Pop., 1900, 9201; 1910, 11,817; 1915 (U. S. est.), 13,560

WEBBE, wĕb, WILLIAM. An English author, who seems to have been active between 1568 and 1591. He was educated at St. John's College, Cambridge, where he made the acquaintance of Gabriel Harvey and Edmund Spenser, and graduated B.A. in 1573. About 10 years later he became a private tutor in the household of Edward Sulyard of Flemyngs in Essex. There he composed *A Discourse of English Poetrie* (1586; reissued in E. A. Arber's *English Reprints*, London, 1870). The work is of interest for the light it throws upon the poets of the author's day, and upon contemporary literature and canons of criticism. To it are appended the first two eclogues of Vergil in hexameter verse. Webbe was of the school which wished to abolish rhyme and import classical metres into English verse.

WEBBER, CHARLES WILKINS (1819–56). An American journalist and explorer, born in Russellville, Ky. He was one of the Texan Rangers and saw much of the wild frontier life. Afterward he studied medicine and then theology, but abandoned both professions and became connected with the *New World*, the *Democratic Review*, and the *Sunday Despatch* in New York City. He organized an expedition to the Colorado and Gila rivers in 1849. In 1855 he went to Central America. He was killed in Nicaragua, while a member of the filibustering party commanded by William Walker (q.v.). He wrote *Old Hicks, the Guide, or Adventures in the Comanche Country in Search of a Gold*

Mine (1848), *The Gold Mines of the Gila* (1849), *Tales of the Southern Border* (1852), and *Shot in the Eye* and *Adventures with the Texan Rifle Rangers* (1853).

WEBBER, HERBERT JOHN (1865–). An American plant physiologist, born at Lawton, Mich. In 1889 he graduated from the University of Nebraska. For the United States Department of Agriculture he investigated orange diseases in Florida (1893–97) and from 1889 to 1907 had charge of the department's plant-breeding investigations. He served as professor of experimental plant biology at Cornell (1907–08), where subsequently he was acting director (1909–10) and professor of plant breeding (1910–12) in the New York State College of Agriculture. In 1912 he went to the University of California to be director of the Citrus Experiment Station, dean of the Graduate School of Tropical Agriculture, and professor of plant breeding.

WEBER, vā'bĕr, ALBRECHT (1825–1901). A German Orientalist, born at Breslau. He studied at the universities of Breslau, Bonn, and Berlin, 1842–45, visited England and France where he studied under Burnouf in 1846, returned to Germany and was privatdocent at the University of Berlin, 1848–56. In 1856 he became assistant professor and in 1867 professor of Indian languages and literature, holding this position until his death. Among his works the most important are his edition of the *White Yajur Veda* (1849–59); *Indische Studien* (18 vols., 1850–98), *Indische Litteraturgeschichte* (1852, 2d ed., 1876); *Indische Skizzen* (1857); *Verzeichnis der Berliner Sanskrithandschriften* (2 vols., 1853–92); a translation of Kalidasa's drama *Mālavikā und Agnimitra* (1856); an edition of Hala's *Saptaśataka* (1881); *Indische Streifen* (3 vols., 1868–79); contributions, especially from Vedic literature, to the *Sanskrit-Worterbuch* of Böhtlingk (q.v.) and Roth (q.v.); and numerous briefer articles in Oriental periodicals. Consult R. Pischel's memorial address in the *Proceedings of the Royal Prussian Academy of Sciences* (Berlin, 1903).

WEBER, E(MIL) ALFRED (1835–1914). A German philosopher, born at Strassburg. He studied at Berlin, Halle, Jena, and Tübingen, was assistant professor of philosophy at the Protestant Seminary at Strassburg (1863–72), and from 1872 professor in the Kaiser Wilhelm University of the same city. Weber published: *Examen critique de la philosophie religieuse de Schilling* (1860); *Introduction historique à la philosophie hégélienne* (1866); *Histoire de la philosophie européenne* (1872; 7th ed., 1905; Eng. trans. by Frank Thilly, 1896); *Wille zum Leben oder Wille zum Guten?* (1882); *Die Religion als Wille zum ewigen Leben* (1888); *Von der Schulbank zum Lehrstuhl* (1894); *Aegri Somnia* (1900).

WEBER, ERNST HEINRICH (1795–1878). A German physiologist and anatomist, born at Wittenberg. He studied medicine at Wittenberg and Leipzig, and was appointed professor of comparative anatomy at Leipzig in 1818, professor of human anatomy in 1821, and, in addition, professor of physiology in 1840. His principal works are *Anatomia Comparata Nervi Sympathici* (1817); *De Aure et Auditu Hominis et Animalium* (1820); *Wellenlehre* (with his brother Wilhelm, 1825); *Zusatze zur Lehre vom Bau und von der Verrichtung der Geschlechtsorgane* (1846); "Der Tastsinn und das Gemeingefuhl," in Wagner's *Handworterbuch der Physiologie* (vol. iii, pt ii, 1846; also published separately, 1851); and an important collection of shorter essays and monographs, entitled *Annotationes Anatomicæ et Physiologicæ* (1851). Weber is well known for his discoveries in anatomy, notably that of the existence of a rudimentary uterus in male mammals, but his greater fame rests upon his pioneer work in the exploration of the sense organs. His work upon the ear and upon the cutaneous senses—pressure, temperature, and what was then called the space sense—gave the deciding impulse to the introduction of the experimental movement into psychology The important generalization which bears his name (see WEBER'S LAW) was the first valid generalization in psychophysics.

WEBER, GEORG (1808–88). A German historian, born at Bergzabern, in the Rhenish Palatinate. He studied at Erlangen, in 1839 became a teacher in one of the higher public schools of Heidelberg, and from 1848 to 1872 was its director. Among Weber's historical publications may be mentioned *Geschichte der englischen Reformation* (1845–53); *Weltgeschichte in übersichtlicher Darstellung* (1866; 21st ed., 1903); *Geschichte des Volkes Israel* (with Holtzmann, 1867); and *Allgemeine Weltgeschichte fur die gebildeten Stande* (1857–80).

WEBER, wĕb'ĕr, JOSEPH M (1867–). An American comedian, born in New York City. He began his stage career in 1877 in company with Lewis M. Fields (Lew Fields), with whom he formed the theatrical firm of Weber and Fields in 1885. Besides several other enterprises this firm managed the Broadway Music Hall from 1895 to 1904. Thereafter Weber was proprietor and manager of Weber's Theatre, New York. He was one of the best-known comedians of his day, especially clever in burlesques of current plays.

WEBER, vā'bĕr, KARL JULIUS (1767–1832). A German writer, born in Langenburg in Wurttemberg. He received his education at Erlangen and Gottingen, and after some time passed in Switzerland became, in 1792, private secretary to the Count of Erbach-Schönberg, whom he left in 1799 to accept the post of government councilor at König in Odenwald. Until 1804 he filled various administrative offices, retired then to private life, but from 1820 to 1824 was a member of the popular chamber of the Wurttemberg Estates. Weber is best known for his writings, in which he displays a fresh, original spirit, fine powers of observation, and a talent for witty satire. He was largely influenced by the humanistic teachings of the French literature and philosophy, but his reading was wider than France and his sympathies were cosmopolitan. The most celebrated of his works is *Demokritos, oder hinterlassene Papiere eines lachenden Philosophen* (1832–40), which is still very popular in Germany. He also wrote *Möncherei* (1818–20), more clever than reliable; *Das Ritterwesen* (1822–24); and *Deutschland, oder Briefe eines in Deutschland reisenden Deutschen* (1826–28). His collected works in 30 vols. were published in 1834–45.

WEBER, KARL MARIA VON (1786–1826). A famous German composer, born at Eutin, Oldenburg, Dec. 18, 1786 His musical training began at a very early age. His father, a shiftless musician, was anxious to make him a musical prodigy like Mozart and exhibit him for profit. Up to 1800 he received lessons from

his step-brother Fritz; J. P. Heuschkel at Hildburghausen, who grounded him thoroughly in piano playing, Michael Haydn at Salzburg; and at Munich, from Valesi in singing, and Kalcher, under whose direction he composed his first opera, *Die Macht der Liebe und des Weines*, the score of which, with other youthful compositions, was accidentally burned. At Freiberg in Saxony Weber produced in November, 1800, an opera, *Das Waldmadchen*, which failed, however, of lasting success there or elsewhere. The impulse to the composing of operas so early in his career came from his association with stage life through his father's wandering troupe. At Salzburg, where the family was again in 1801, his third opera, *Peter Schmoll und seine Freunde*, was privately heard at the house of his teacher, Michael Haydn; subsequently it was given at Augsburg. Important for Weber was his association as pupil and friend with Abbé Vogler at Vienna in 1803. In 1804, through Vogler's influence, he was appointed kapellmeister at Breslau. In 1806 he accepted the post of private secretary to Duke Louis of Württemberg. At Stuttgart, in 1810, preparations for the production of his opera *Silvana* were interrupted by his arrest at rehearsal. His father was charged with having misappropriated money. To shield him, Karl Maria took the disgrace upon himself, and both were banished. He went to Mannheim and Darmstadt and completed his comic opera *Abu Hassan* (1810) Weber had no important appointment until 1813, when he was called to Prague as conductor of the Landstandisches Theatre. Among the singers he engaged was Caroline Brandt, whom he had heard at a performance of his *Silvana* in Frankfort and with whom he now fell in love. Upon their marriage (1817) Caroline, though in her prime, left the stage and devoted her life to him. Her influence on Weber was beneficial in the highest degree. In 1816 Weber, owing to the mark he had made in Prague, was called to Dresden as conductor of the opera. His work here as conductor was of the highest importance to the cause of German opera, notwithstanding that he often was obliged to overcome the prejudices of the King and the intrigues of the Italian party, headed by Morlacchi, the conductor at the Italian opera.

A chance discovery of Apel's *Gespensterbuch* in Dresden led him to take up the subject of the *Freischutz*, and Friedrich Kind wrote a libretto for him. The composer worked three years on the score, though not uninterruptedly, since his *Invitation à la valse* (dedicated to his wife) and other minor works, besides his *Jubilee Mass* and *Preciosa*, were written during this period. *Der Freischütz* was the first musical work brought out at the new Schauspielhaus, Berlin, where it was produced under Weber's direction, June 18, 1821, and achieved such a triumph as rarely has fallen to any stage work. Throughout Germany its success was equally great, and in London it was performed at three theatres simultaneously. His *Euryanthe*, produced in Vienna in 1823, was less successful there, but was received with acclamation in Dresden and Leipzig and especially in Berlin. But consumption began to make inroads upon his strength, and it was with a desperate desire to provide for his family that he accepted Charles Kemble's offer of £1000 to compose *Oberon* and direct its production in London. *Oberon* was produced at Covent Garden, April 12, 1826, and was received with unbounded enthusiasm Weber survived only a few weeks, dying June 5, 1826. In 1844 his body was removed from Moorfield's Chapel to Dresden, where Wagner, who had arranged for the occasion a dirge on themes from *Euryanthe*, also pronounced a funeral oration.

Weber's *Freischutz* struck a national note, and through it he became the founder of the Romantic school of German opera. His influence on Wagner was very marked. The finale of the first act and the march in the second act of *Tannhauser*, and the first finale in *Lohengrin*, besides minor passages in both these works, show unmistakably the influence of Weber in structure. Wagner's admiration for Weber was unbounded Weber's *Leyer und Schwert* are among the most spirited German patriotic songs, and several of his piano works, notably the *Invitation à la valse*, the E flat major *Polonaise*, and the *Concertstuck* for piano and orchestra, are brilliantly effective. Weber's complete literary works were edited by Georg Kaiser (Berlin, 1908)

Consult: the standard biography of Weber by his son, Max Maria von Weber, *K. M. von Weber, ein Lebensbild* (3 vols, Leipzig, 1864–66; new ed., 1912); also A. Reissmann, *Karl Maria von Weber* (Berlin, 1882); J. Benedict, *Weber* (London, 1882), H. Gehrmann, *Weber* (Berlin, 1899); G. Servières, *Weber* (Paris, 1906).

WEBER, Max Maria von (1822–81). A German civil engineer, son of Karl Maria von Weber. He was born in Dresden and received his early training in the schools of that city. Part of his experience was gained under Brunel and Stephenson in England. In 1850 he entered the civil service of his native Kingdom. In 1870 he went to Vienna, where he did much towards the extension of Austrian railways. In 1878 he was called in a similar capacity to Berlin. Outside of his official duties Weber found time for considerable writing, in the line of general literature as well as on technical matters. Among his works may be cited: *Schule des Eisenbahnwesens* (1857; 4th ed., by R. Koch, 1885); *Karl Maria von Weber: ein Lebensbild* (3 vols., 1864–66); *Die Praxis des Baues und Betriebs der Sekundärbahnen* (1873); *Nationalitat und Eisenbahnpolitik* (1876); and the posthumous *Vom rollenden Flugelrad* (published by M. Jähns, with biography, 1882).

WEBER, Theodor (1836–1906). A German Old Catholic bishop. He was born at Zülpich, studied at Bonn, Munich, and Breslau, and became a priest in 1860. He was made professor of philosophy at Breslau in 1872. He was active in the Old Catholic movement from its beginning, and in 1890 removed to Bonn and was appointed vicar general by Bishop Reinkens. Five years later he was consecrated assistant bishop, and on Reinkens's death in 1896 he succeeded him as Bishop. He wrote: *Kants Dualismus von Geist und Natur* (1866); *Die Geschichte der neuern Philosophie und die Metaphysik* (3 parts, 1873); *Staat und Kirche nach der Zeichnung und Absicht des Ultramontanismus* (1873; 2d ed., 1875); *Metaphysik—Eine wissenschaftliche Begründung der Ontologie des positiven Christentums* (2 vols., 1888–91).

WEBER, Wilhelm (1804–91). A German physicist. He was born at Wittenberg and was educated at Halle. In 1825, in association with his brother, Ernst Heinrich Weber, he published

Die Wellenlehre. He became assistant professor of physics at Halle in 1827, and professor at Göttingen in 1831. He was one of the seven professors of Gottingen who were removed in 1837 for having protested against the violation of the constitution He held the chair of physics at Leipzig, 1843–49, when he was restored to his former position at Göttingen While living in that city he became acquainted with Gauss, and in 1833 they jointly devised an electromagnetic telegraph. They also founded the Magnetic Union and made many observations on terrestrial magnetism. An important achievement of Weber's is the introduction of the absolute system of electrical units modeled on the work of Gauss, who first devised such a system of units in his experiments in magnetism. Weber determined the value of the practical units in absolute measure and at the International Electrical Congress held at Paris in 1881 his system with certain modifications was adopted and the volt, ampere, coulomb, and farad were defined. Weber's works were published by the Gottingen Academy of Science in 1892, and his more important papers on absolute measurement of current and resistance were republished at Leipzig in 1904 as *Funf Abhandlungen über . . . Strom- und Widerstandsmessung.* A biographical sketch entitled *Wilhelm Weber,* by Heinrich Weber, was published at Berlin in 1893.

WEBER'S (vā'bĕrz) **LAW.** In psychology, the formula expressing the relation of sensation to intensity of stimulus In 1834 E. H. Weber proposed the theorem that the ratio of the increment of stimulus necessary to give a noticeably different sensation to the original stimulus is constant, or, as he expressed it, $\frac{V - U}{U} = C$, where V is the comparison stimulus, U the standard stimulus, and C a constant. The principle may be briefly termed that of the constancy of the relative difference limen (see LIMEN). It can be more explicitly stated in other forms, e.g., (*a*) if sensations increase in intensity by equal amounts, their stimuli increase by relatively equal amounts; (*b*) the difference which is relatively the same for stimulus is absolutely the same for sensation; or (*c*) the intensity of the stimulus increases in geometrical ratio as the intensity of the apperceived sensation increases in arithmetical ratio. The validity of this theorem was confirmed by Fechner by the use of various psychophysical methods (Weber had used that of minimal changes; see PSYCHOPHYSICS); he also extended its range to other sense departments than those investigated by Weber, and gave it the name Weber's law. Since Fechner's time the investigation of the applicability of the law has been carried on by many experimenters, and its significance is attested by its prominence in the literature of psychophysics. Wundt gives a résumé of its applicability as follows: The law has its most satisfactory application and its widest range in noise intensities; it has a less extended application in the modalities of vision, pressure, movement, taste, and smell; its validity in temperature and organic sensation is yet uncertain. Under certain theoretical conditions the law holds also for intensity of feeling (affection); in practice, however, other laws of feeling cut across it. It will be noticed that the range of applicability of the law is restricted to intensities. In the early days of psychophysics the law was supposed to hold not only for intensity but also for relations and qualities; it has now become a generalized law for intensity of sensation just as, e.g., the law of adaptation is a law of visual quality. In all modalities of sensation there are variations from the law at small and at great intensities For quantitative results, see INTENSITY OF SENSATION.

When a stimulus acts upon the organism and its intensity is consciously noted, four factors may be distinguished, viz., stimulus, excitation, sensation, and apprehension or apperception of the sensation. The facts of Weber's law show that somewhere in this series of steps there is an inertia or lag. Accordingly, in the formulation of a theory of intensity, it is possible to assign the position of the discrepancy to any one of three places—between stimulus and excitation, between excitation and sensation, or between sensation and apperception; these interpretations furnish respectively the physiological, psychophysical, and psychological interpretations of Weber's law.

(1) The psychophysical view was historically first. Fechner held that the logarithmic relation which characterizes the law prevails not between physical processes themselves, but between physical and psychical processes. We have no access to the final term of the physical series, the cortex, and hence we are compelled to state the logarithmic relation in terms of stimulus and sensation, i.e., s (sensation) $= C$ log. r (stimulus); but we have reason to suppose that, except at the upper and lower limits of intensity, the cortical excitation is directly proportional to the intensity of the stimulus, and hence we can pass from external to internal psychophysics, and state the relation as $s = C$ log. E (excitation).

(2) The physiological formulation is that of G E. Muller, who considers the sensation to be directly proportional to its cortical excitation, while the inertia is traceable to the behavior of nerves under excitation, to loss of energy in transmission, etc. The formula is thus $s = E = C$ log. r.

(3) The psychological interpretation has taken three forms. (*a*) Wundt says that there are instances (method of mean gradations) in which sensation is directly proportional to its stimulus, and a single instance of this sort is enough to controvert the physiological interpretation. For Wundt, Weber's law is only a special case of the more general psychological principle of relativity. Intensities are always judged relatively; we estimate the intensity of a sensation always with reference to some other intensity. This comparison of intensities is a matter of apperception. (*b*) Ziehen replaces apperception by association. A certain number of increments of intensity are added together till finally the verbal judgment, "greater," results by a process of association. If the original stimulus be large, it takes a relatively greater increment to call forth the judgment. (*c*) Meinong contends that too much emphasis has been put upon "just noticeable differences"; such differences may not be equally great or noticeable. We must distinguish between difference and differentness or diversity. In an arithmetical series one obtains an expression of the former category, in a geometrical series an expression of the latter. The mind takes note of diversity, not of difference; it notes not that an intensity difference of 2 less 1 equals one of 101 less 100, but rather that the relation of 2 to 1 is like that of 200 to 100.

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WEB'STER. A town, including several villages, in Worcester Co, Mass, 16 miles south by west of Worcester, on the French River, and on the New York, New Haven, and Hartford and the Boston and Albany railroads (Map: Massachusetts, D 4) It has a public library and a beautiful 1200-acre lake. Woolen goods are extensively manufactured and there are other important industrial establishments, including print works, shoe factories, yarn mills, cotton mills, etc. Pop., 1900, 6804; 1910, 11,509; 1915 (State census), 12,565; 1920, 13,258.

WEBSTER, ARTHUR GORDON (1863–1923). An American physicist, born at Brookline, Mass., and educated at Harvard and at Berlin, Paris, and Stockholm In 1895 he was awarded the Thomson prize (Paris) of 5000 francs for experimental research on the period of electrical oscillations. He became professor of physics in 1900 at Clark University, where he had taught since 1890. In 1903–04 he was president of the American Physical Society, and in 1915 was appointed to the Naval Consulting Board. He came to be recognized as a leading authority on sound in the United States, inventing several instruments in this field. Besides numerous papers on physics, he wrote: *A Mathematical Treatise on the Theory of Electricity and Magnetism* (1897); *Dynamics of Particles of Rigid, Elastic, and Fluid Bodies* (1903); *Harrison Lectures on Sound, University of Pennsylvania* (1911).

WEBSTER, BENJAMIN NOTTINGHAM (1797–1882). An English actor, manager, and playwright. He was born at Bath; made his début at Warwick, and after playing in the provinces for a time appeared in London in 1819. In 1820 he became a member of the company at Drury Lane; in 1829 of that at the Haymarket, which he managed from 1837 till 1853. He became lessee of the Adelphi Theatre in 1844 and controlled it till his retirement in 1874. As an actor he created many rôles, his best being Triplet in *Masks and Faces* (Haymarket, 1852), Penn Holder in *One Touch of Nature*, written by himself (Adelphi, August, 1859), and Robert Landry in *The Dead Heart* (Adelphi, November, 1859). Among his plays were adaptations of the *Cricket on the Hearth* and the *Bird of Passage*. Consult: Scott, *The Drama of Yesterday and To-Day* (London, 1899); Matthews and Hutton, *Actors and Actresses of Great Britain and the United States* (New York, 1886).

WEBSTER, DANIEL (1782–1852). An American statesman, orator, and constitutional lawyer. He was born in Salisbury (now Franklin), N. H., Jan. 18, 1782, the son of Ebenezer Webster, who had been a Revolutionary soldier He graduated from Dartmouth College in 1801, and then studied law, first at Salisbury and later in the office of Christopher Gore (q.v.) in Boston. In 1805 he was admitted to the New Hampshire bar, from 1807 practicing at Portsmouth, where he soon acquired distinction Webster was, in 1812, elected by the party opposed to the war with England to a seat in Congress and was reelected in 1814. While a member of the important Committee on Foreign Relations, he spoke ably against the embargo and in favor of strengthening the navy, on the currency, the bank, and the tariff. In 1816 Webster removed to Boston, and for nearly seven years devoted himself to the practice of law. He soon rose to the position of one of the foremost advocates of the country and appeared before the United States Supreme Court in several famous constitutional cases, among them the Dartmouth College Case (q.v.); McCulloch *v.* Maryland (4 Wheaton 316), in which he argued successfully against the right of a State to tax a branch bank of the United States; and Gibbons *v.* Ogden (9 Wheaton 1), which established the complete control of Congress over interstate commerce. In 1820 he aided greatly in the revision of the constitution of Massachusetts. In the same year he delivered the oration at Plymouth on the second centennial of the landing of the Pilgrims, in 1825 an oration at the laying of the corner stone of the Bunker Hill Monument, and in 1826 a eulogy on Adams and Jefferson—three addresses which established his fame as one of the greatest of orators.

In the meantime, in 1822, Webster had been elected to Congress from the Boston district, and was twice reëlected by a practically unanimous vote. As chairman of the Judiciary Committee he was instrumental in securing a codification of the criminal jurisprudence of the United States. He made notable speeches on the Greek Revolution and in opposition to the protective tariff measure of 1824. In 1827 he was elected to the United States Senate. He now abandoned his opposition to protective tariffs and became a supporter of the measure of 1828 known as the "tariff of abominations." In 1830 his fame as an orator reached its culmination in his reply to the speech of Robert Y. Hayne (q.v.), Senator from South Carolina, on the nature of the Union and the right of nullification. In this epoch-making oration Webster successfully combated the theory of nullification and ably vindicated the nationalist view of the Union His argument was later supplemented and reënforced in debate with Calhoun (q.v.) on the Force Bill (see NULLIFICATION). In the controversy over the renewal of the charter of the United States Bank, Webster advocated renewal and opposed President Jackson's financial policy in general (see BANK, BANKING). Many of the principles of sound finance, developed by his speeches at this time, have been incorporated in the Federal Reserve System (see RESERVE BANK, FEDERAL). Upon the organization of the Whig party, Webster became one of its leaders, and in 1836 received the electoral vote of Massachusetts for President. Again in 1840 the Whigs failed to nominate either one or the other of their greatest statesmen, Webster or Clay. They offered Webster the vice presidency but he refused. Upon the election of Harrison, however, Webster was appointed Secretary of State, a position which he retained under Tyler. In this capacity

he managed, with tact, the cases growing out of the McLeod and *Creole* (q.v.) affairs and brought to a successful conclusion the negotiations with Lord Ashburton chiefly for the settlement of the northeast boundary dispute with Great Britain (see WEBSTER-ASHBURTON TREATY). He now retired from the cabinet, largely on account of President Tyler's break with the Whigs, declined a reelection to the Senate, and resumed his law practice in Boston.

In 1844 he was again suggested for the presidency, but his following was small, and in the succeeding year he reentered the Senate as the successor of Rufus Choate, in which capacity he opposed the annexation of Texas and the war with Mexico. Webster greatly desired the Whig nomination for the presidency in 1848, and was sorely disappointed at the nomination of Taylor, pronouncing it "one not fit to be made." He at first declined to support Taylor's candidacy, but later ably defended the Whig administration. His last years in the Senate were devoted to efforts to preserve the Union and maintain peace between the North and the South by means of compromise. His last great speech and one of the most notable of his life was that delivered in the Senate, March 7, 1850, on the Compromise Measures of 1850, in which he vindicated his own consistency in the matter of the extension of slavery, rebuked the North for violating the Fugitive Slave Law, and advocated concessions to the South. The speech aroused indignation at the North, where it was said that he was truckling to the South in order to gain support in his candidacy for President. Upon the succession of Fillmore to the presidency in 1850, Webster became Secretary of State. During this second tenure of the office he carried on a memorable correspondence with Chevalier Hulsemann, the Austrian Minister, boldly championing the right of the United States to recognize the new Hungarian Republic and its head, Kossuth (q.v.), and to sympathize with the development of "responsible and popular government in any part of the world." Again in 1852 he was disappointed in not receiving the Whig nomination for the presidency, refused to support the candidacy of General Scott, and took no part in the campaign. He returned to his home at Marshfield, Mass., in September, and there died on October 24.

Hardly in the history of the country has there been a more general expression of sorrow; the mourning can only be compared with that which followed the deaths of Washington and Lincoln. Hallam, the historian, who met Webster when he was in London, thus summarizes his character: "Mr. Webster approaches as nearly to the true ideal of a Republican Senator as any man I have ever seen in the course of my life; worthy of Rome or Venice rather than of our noisy and wrangling generation." In 1903 a collected edition of Webster's works in eighteen volumes was published in Boston as *Webster's Writings and Speeches*. This contains all the matter originally published in six volumes (1856) with memoir by Edward Everett, his *Private Correspondence* (ed. by his son Fletcher Webster in 1857), and many speeches and letters collected for the first time. Biographies of Webster have been written by George Ticknor Curtis (2 vols., Boston, 1870); H. C. Lodge (ib., 1883); H. E. Scudder (ib., 1882); N. Hapgood (ib., 1889); S. W. McCall (ib., 1902); J. B. McMaster (New York, 1902); E. P. Wheeler (ib., 1905); W. C. Wilkinson (ib., 1911), S. G. Fisher (Philadelphia, 1911); F. A. Ogg (ib., 1914). See, passim, UNITED STATES, *History*.

WEBSTER, HERMAN ARMOUR (1878–). An American painter and etcher. He was born in New York and studied under Laurens in Paris, where he settled. His etchings, which show the influence of Meryon, are especially notable, and usually present odd and unknown spots of old French towns rendered with an individual and poetic interpretation. They are represented in the permanent collections of the Luxembourg Museum (Paris), South Kensington Museum (London), the Congressional Library at Washington, the Art Institute of Chicago, the Boston Museum, the Darmstadt Museum, and elsewhere. He exhibited at the Paris Salon and the Royal Academy, London, and became a member of the Royal Society of Painter-Etchers and the Société Nationale des Beaux-Arts, Paris. In 1915 he was awarded a gold medal at the Panama-Pacific Exposition, San Francisco.

WEBSTER, HENRY KITCHELL (1875–). An American novelist, born in Evanston, Ill., and educated at Hamilton College, from which institution he graduated in 1897. For a year he was instructor in rhetoric in Union College. He collaborated with Samuel Merwin in *The Short Line War* (1899), *Calumet K* (1901), and *Comrade John* (1907). Alone he wrote: *The Story of a Corner in Land* (1900); *Roger Drake, Captain of Industry* (1903); *The Duke of Cameron Avenue* (1904); *A King in Khaki* (1909); *The Sky Man* (1910); *The Ghost Girl* (1913); *The Butterfly* (1914); and *Real Adventure* (1916).

WEBSTER, (ALICE) JEAN (1876–1916). An American author. She was born at Fredonia, N. Y., and graduated from Vassar in 1901. For some years she lived in Italy, and in 1906–07 she made a trip around the world. Miss Webster was a niece of Mark Twain. In 1915 she was married to Glenn Ford McKinney. Besides short stories contributed to magazines, she wrote: *When Patty Went to College* (1903); *The Wheat Princess* (1905); *Jerry Junior* (1907); *The Four-Pools Mystery* (1908); *Much Ado about Peter* (1909); *Just Patty* (1911); *Daddy Long-Legs* (1912; new ed., 1915); *Dear Enemy* (1915). *Daddy Long-Legs*, by which she became best known, was dramatized by her and produced in New York in 1914.

WEBSTER, JOHN (c.1580–c.1624). One of the greatest of English dramatists, best known for his tragedy *The Duchess of Malfi*. Of his life little is known. As early as about 1601 he began to write plays, collaborating with the group which included Drayton, Munday, and others. His alterations to Marston's play of *The Malcontent* appeared in 1604. With Dekker he produced the two comedies *Westward Hoe* and *Northward Hoe*, brought out in the winter of 1604–05, and printed in 1607. Much of his early work is irrecoverably mingled with that of inferior men. His own powers were first fully revealed in the tragedy of *The White Devil, or Vittoria Corombona*, which was printed in 1612, having been acted some time before. This is one of his masterpieces. The later *Appius and Virginia*, a tragedy based upon the familar Roman story, was well received, but is commonplace. The tragi-comedy of *The Devil's Law*

Case is in parts excessively coarse, and is inferior in construction. In 1623 was first printed *The Duchess of Malfi*, which had been played in 1616 The accumulation of horrors which gather about the end of the unhappy lady of Amalfi produces an intensity of impression that amply justifies Charles Lamb's well-known comment: "To move a horror skillfully, to touch a soul to the quick, . . . and then step in with mortal instruments to take its last forfeit; this only a Webster can do" Swinburne unhesitatingly places Webster next to Shakespeare among English dramatists. Gosse gives him a slightly lower place. In 1624 Webster wrote a Lord Mayor's pageant. He has been identified, doubtless erroneously, with a man of the same name who afterward wrote works of a quite different character, but this is the latest date that can be positively given in his life. His death has been variously set, from 1625 to 1652. Consult: Alexander Dyce, ed., *The Works of John Webster, now First Collected, with Some Account of the Author and Notes* (London, 1830, new ed., rev., ib, 1859); William Hazlitt, ed, *The Dramatic Works of John Webster*, with an introduction (ib., 1857); J. A. Symonds, ed, *The Best Plays of Webster and Tourneur, with an Introduction and Notes*, in the "Mermaid Series" (London, 1888); Edmund Gosse, *Seventeenth Century Studies* (ib., 1883); A. C. Swinburne, *Studies in Prose and Poetry* (ib., 1894); E. E. Stoll, *John Webster: Periods of his Work as Determined by his Relations to the Drama of the Day* (Cambridge, Mass., 1905); A. C. Swinburne, "John Webster," in *Age of Shakespeare* (New York, 1908).

WEBSTER, NOAH (1758–1843). An American lexicographer, born in Hartford, Conn. He entered Yale in 1774, served under his father, a captain of militia, in 1777, and then returned to college and graduated in 1778. From 1779 to 1781 he taught school in Hartford and studied law, but receiving no encouragement to practice, opened, in 1782, a classical school at Goshen, N. Y. In 1783 he returned to Hartford and published *A Grammatical Institute of the English Language* (1783–85), the first part of which was popularly known as Webster's Spelling Book In 1889 it was estimated that more than 62,000,000 copies of the Speller had been printed and sold. He also issued Governor Winthrop's *Journal;* contributed in 1783 to *The Connecticut Courant* a series of papers signed Honorius in defense of the soldiers' pay bill; published in 1785 *Sketches of American Policy*, advocating the formation of a new constitution, and in 1786 traveled in the South to procure the enactment of State copyright laws. In 1787 he became superintendent of an Episcopal academy in Philadelphia, and when the Constitutional Convention closed he published a pamphlet entitled *Examination of the Leading Principles of the Federal Constitution.* In December, 1787, he established in New York *The American Magazine*, but discontinued it after a year and returned to Hartford in 1789. After having practiced as a lawyer he returned to New York in 1793, where he started a daily newspaper, *The Minerva* (afterward *The Commercial Advertiser*), and a semi-weekly edition of *The Herald* (afterward *The New York Spectator*) for the support of the national administration. In 1795 he wrote for *The Minerva* a series of able articles under the signature of Curtius in defense of Jay's treaty with England, concluded the previous year. In 1798 he removed to New Haven, and published *A Brief History of Epidemics and Pestilential Diseases* (2 vols., 1799); *Historical Notices of the Origin and State of Banking Institutions and Insurance Offices* (1802); *Rights of Neutral Nations in Time of War* (1802); *A Compendious Dictionary* (1806); and *A Philosophical and Practical Grammar of the English Language* (1807); and began the preparation of his *American Dictionary of the English Language.* After devoting 10 years to the study of the English language he began his dictionary anew, spent almost the entire year 1824 in Paris and Cambridge, England, and returned to America in 1825 to complete his great work, the first edition of which was published in two volumes in 1828. It contained 12,000 more words and about 40,000 more definitions than had appeared in any English dictionary previous thereto. Webster issued a second edition of his great work in 1840, and completed an appendix only a short time before his death in 1843. Before the title of the dictionary had been changed to *Webster's International* in 1890, the work had already been revised by C. A Goodrich in 1847 and by Noah Porter in 1864.

From 1812 to 1822 Webster resided at Amherst, Mass., where he aided in founding Amherst College. He was for several years president of its board of trustees, and also represented Amherst in the State Legislature. He had previously represented New Haven in the Connecticut Legislature and had been a judge of one of the State courts. He returned to New Haven in 1822, where he died, May 28, 1843. Among Webster's works were. *Dissertations on the English Language* (1789); *The Revolution in France* (1794); *Letters to Dr. Priestley* (1800); *Origin, History, and Connection of the Languages of Western Asia and of Europe* (1807); *Letters to a Young Gentleman Commencing his Education* (1823); *Manual of Useful Studies* (1832); *History of the United States* (rev. ed., 1838); and *A Collection of Papers on Political, Literary, and Moral Subjects* (1843) His *Synopsis of Words in Twenty Languages*, written about 1817, has never been published. See the memoir by Goodrich prefixed to editions of the dictionary (last ed., 1890); Scudder, *Noah Webster* (Boston, 1882); and Mrs. E. E. Ford, *Notes on the Life of Noah Webster*, edited by E. E. Ford Skeel (2 vols., New York, 1912).

WEBSTER, PELATIAH (1725–95). An American publicist, born at Lebanon, Conn. He graduated at Yale in 1746, studied theology and preached in 1748–49, and amassed a fortune in business in Philadelphia. An active patriot during the Revolution, he later used his influence for the formation of the Federal union. Some, especially Hannis Taylor (q.v.), have claimed that the plan of the United States Constitution was his. Webster published: *Dissertation on the Political Union and Constitution of the Thirteen United States of North America* (1783); *Essays on Free Trade and Finance* (1785); *An Essay on Credit* (1786); *Political Essays on the Nature and Operation of Money, Public Finances, and Other Subjects* (1791). Consult Hannis Taylor, *Memorial* (to Congress) *on Behalf of the Architect of our Federal Constitution* (Washington, 1908); Max Farrand, *The Framing of the Constitution of the United States* (New Haven, 1913).

WEBSTER, SIR RICHARD EVERARD, first VISCOUNT ALVERSTONE (1842–1915). An English

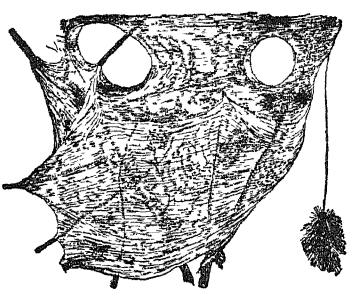
jurist. He was educated at Trinity College, Cambridge, was called to the bar in 1868, and became queen's counsel in 1878. As a Conservative he represented the Isle of Wight in Parliament from 1885 to 1900, and was Attorney-General in 1885–86, 1886–92, and 1895–1900. In 1900 he was made Master of the Rolls, and in the same year he was appointed Lord Chief Justice, taking the title of Baron Alverstone In 1903 he served as one of the three British members of the Alaskan Boundary Commission and his vote favored the claims of the United States as against those of Canada (see ALASKA, *History*). Upon retiring in 1913 he was created Viscount. He represented England before the Venezuelan Commission, in 1893 was associated with Sir Charles Russell in the Bering Sea Arbitration case, and also appeared on behalf of the *Times* before the Parnell Commission. He published *Recollections of Bar and Bench* (1914).

WEBSTER-ASHBURTON TREATY, commonly called the ASHBURTON TREATY A name given to the treaty concluded at Washington between the United States and Great Britain in 1842. In 1838–39 the dispute over the northeastern boundary had almost brought on a war between the two countries, but a conflict had been averted by a temporary arrangement which provided for joint occupation of the territory in dispute by both parties. In an attempt to arrive at a permanent settlement of this and other points at issue, Great Britain in 1841 sent Lord Ashburton to Washington, where, after some months spent in negotiations with Daniel Webster, then Secretary of State, the two at length, on Aug. 9, 1842, signed an agreement, which was afterward ratified by both governments The treaty provided for the free navigation of the St. John's River by both nations; gave about seven-twelfths of the 12,000 square miles of territory in dispute, as well as Rouses Point, N. Y., and some other doubtful territory in New Hampshire, to the United States; and contained a stipulation that, in consideration of the losses sustained by Maine and Massachusetts, the Federal government should pay these States the sum of $300,000. The treaty further provided for the mutual extradition of criminals, and contained a cruising-convention clause, which bound each nation to keep a squadron off the coast of Africa for the suppression of the slave trade. Other questions, such as the Oregon boundary, the *Caroline* affair, and the *Creole* case, were passed over in silence. A curious feature of the negotiations leading up to the treaty was that each nation secretly had in its possession a map that was unfavorable to its own claims. The Americans withheld one that had recently been discovered in the Paris archives and that was mistakenly supposed to have been marked by Franklin in 1782; the British withheld one made by Oswald, one of the commissioners who had negotiated the peace which had given the United States its independence. Later each government made use of the unfavorable map in its possessions to convince its people that it had secured a good bargain. The text of the treaty is given in William Macdonald, *Select Documents Illustrative of the History of the United States, 1776–1861* (New York, 1898) Consult G T. Curtis, *Life of Daniel Webster* (2 vols, New York, 1870), and J. W. Foster, *A Century of American Diplomacy* (Boston, 1900). See NORTHEAST BOUNDARY DISPUTE.

WEBSTER CITY. A city and the county seat of Hamilton Co., Iowa, 72 miles north by west of Des Moines, on Boone River, and on the Illinois Central, the Chicago and Northwestern and the Crooked Creek railroads (Map: Iowa, D 2). It has the Kendal Young Library, the Mercy Hospital, city and county parks, and a courthouse. There are shops of the Crooked Creek Railroad, and manufactories of sewer pipe, skates, sieves, troughs, canned goods, rugs, cigars, bricks and tiles, brooms, iron products, stock food, and felt shoes. The city manager plan of government was adopted in 1915. Pop, 1900, 4613, 1910, 5208.

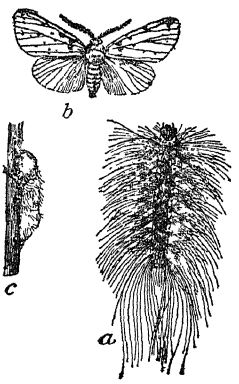
WEBSTER GROVES. A city in St. Louis Co., Mo., 9 miles southwest of St. Louis, on the Missouri Pacific and the St. Louis and San Francisco railroads. It is a residential suburb of St. Louis, and contains a Masonic home, Kendrick Seminary, Loretto Academy, and a public library. Pop, 1900, 1895; 1910, 7080.

WEBWORM (*web*, AS. *web*, OHG. *weppi*, dial. Ger. *Webb*, Ger. *Gewebe*, web, from AS. *wefan*, OHG. *weban*, Ger. *weben*, to weave + *worm*) Any one of several lepidopterous larvæ



WEB OF FALL WEBWORM
With one of the suspended caterpillars

which spin webs, and live gregariously in large colonies or occupy single webs. The commonest is the fall webworm, the larva of *Hyphantria textor*. The adult is a rather small, pure white moth, sometimes spotted with black It lays its eggs in clusters of 4 to 500 upon the leaves of trees. The caterpillars on hatching live together, each colony spinning a web which grows with the growth of the larvæ, and may include all the leaves of a limb. It with the forest tent caterpillar and gypsy moth is one of the worst enemies of the forests in the United States. Upon reaching full growth the larvæ leave the web and crawl down the trunk to spin their cocoons. There are two generations each year, and the insect hibernates in the pupal condition. When numerous it is abundantly parasitized, many ichneumon flies and chalcis flies laying eggs in the growing caterpillars. Burning the webs at nightfall or in dark weather, when the caterpillars are close together, is often practiced, a torch being used. Compare TENT CATERPILLAR.



FALL WEBWORM
a, caterpillar of *Hyphantria cunea*; *b*, spotted form of moth, *c*, cocoon.

The sugar-beet webworm is the green and black striped larva of a pyralid moth (*Loxostege sticticalis*). It feeds upon the leaves of the sugar beet, transforming to a pupa in May after passing the winter underground in a long silken tube. The imported cabbage webworm is the larva of another pyralid moth (*Hellula undalis*), which occurs throughout the Gulf region in the United States, and which is also found in the Mediterranean, Ethiopian, and Oriental regions. The moths lay their eggs in small batches on the leaves, upon the under sides of which the larvæ feed, concealing themselves with a silken web to which their excrement is attached. There are two generations each year. Cabbages and turnips are the favorite food, but radishes and beets are also attacked. An early trap crop of collards or radishes is recommended to be planted and sprayed with an arsenical poison.

WECHIKHIT, wĕch'ĭ-kĭt. See YOKUTS.

WECKERLIN, vĕk'ĕr-lĕn'; *Fr. pron.* vĕ'kâr'-lăN', JEAN BAPTISTE THÉODORE (1821–1910). A French musician, born at Gebweiler, Alsace. In 1844 he began his musical career, studying singing with Ponchard and composition with Halévy at the Paris Conservatory. In 1847 he brought out his heroic symphony *Roland.* In 1869 he was appointed assistant librarian to the Conservatory. In 1876 he became Félicien David's successor as librarian at the Conservatory and published in 1885 a biographical catalogue. Later he became librarian of the Société des Compositeurs. He retired in 1909, and died the following year in his native town. Among his works are: an oratorio, *Le jugement dernier;* the cantatas, *L'Aurore* and *Paix, charité, grandeur* (1886); the ode-symphonie, *Les poèmes de la mer,* for solo, chorus, and orchestra (1860); *L'Inde* (1873); and *La fête d'Alexandre,* in the same year. His *Histoire de l'instrumentation depuis le seizième siècle jusqu'à l'époque actuelle* won the gold medal of the Académie in 1875.

WECKHERLIN, vĕk'hĕr-lĕn, GEORG RUDOLPH (1584–1653). A German poet. He was born at Stuttgart, studied jurisprudence at the University of Tübingen, and entered the diplomatic service of Wurttemberg. After serving as secretary to Duke John Frederick (1614–c 1620) he removed to England, where he served (1624–41) as an Undersecretary of State. At the outbreak of the Civil War he chose the side of Parliament and from 1644 to 1649 held the position of secretary for foreign tongues. Upon his retirement he was succeeded by John Milton, and in 1652 was appointed assistant to the latter, but continued in office only a few months and died in London the following year. Weckherlin's German poems are for the most part imitated from the works of the French Pleiade, especially from Ronsard, or from English writers like Samuel Daniel. He ranks as foremost of the poets before Opitz who tried to introduce Renaissance forms and feelings into German verse. His lyrics are poetic in tone, though some may be considered hard and unwieldy in form. His chief English poems are "Triumphal Shows Set Forth Lately at Stuttgart" (1616) and "Panegyricke to Lord Hay, Viscount of Doncaster" (1619). His collected poems were edited by H. Fischer (Stuttgart, 1893–95). Consult: Fischer, as above; Cong, *Nachrichten von dem Leben und den Schriften R. Weckherlins* (Ludwigsburg, 1803); Höpfner, *Weckherlins Oden und Gesange* (Berlin, 1865); and Bohn, *Englands Einfluss auf Weckherlin* (Gottingen, 1893).

WECKLEIN, vĕk'līn, NIKOLAUS (1843–). A German classical scholar, born at Gänheim. He studied at Würzburg, Munich, and Berlin, taught in Gymnasia in Munich, Bamberg, and Passau, and from 1886 again at Munich. His publications include numerous excellent annotated editions of plays of Æschylus, Sophocles, and Euripides *Ars Sophoclis Emendandi* (1869); *Curæ Epigraphicæ* (1869), *Studien zu Aeschylos* (1872); *Studien zu Euripides* (1874); *Curæ Criticæ* (1877); *Beitrage zur Kritik des Euripides* (1895); *Studien zu Ilias* (1905).

WED'DERBURN, ALEXANDER. See ROSSLYN, first EARL OF.

WEDDERBURN, JAMES (?1495–1553). A Scottish poet. He was born in Dundee, studied at St Andrews University, and became a merchant. He was active in the Scottish Reformation, and in 1539 fled to France to escape prosecution as a heretic, and died there. With his brothers, John (?1500–56) and Robert (?1510–56), he wrote a work entitled *Ane Compendious Buike of Godly and Spirituall Sangs with Augmentation of sundrie gude and godlie Ballates not contenit in the first Editioun,* which appeared in 1567. The first edition referred to is unknown and it is thought that the poems may have originally appeared in broad sheets. The *Complaynt of Scotland* (1548), said to be the only classic work in old Scottish prose, has been attributed to one of the Wedderburns. The *Compendious Book* has been edited by David Laing (Edinburgh, 1868), and by Mitchell (ib., 1897); consult also the latter's *The Wedderburns and Their Work* (London, 1867).

WEDDING ANNIVERSARIES. The names given to the several anniversaries of a marriage are said to be of quite ancient origin, and arose from the gift which was regarded as the most suitable offering from the husband to the wife. The names commonly given to such anniversaries are for the first, paper; second, straw; third, candy; fourth, leather; fifth, wooden; seventh, floral, tenth, tin; twelfth, linen; fifteenth, crystal; twentieth, china; twenty-fifth, silver; thirtieth, pearl, thirty-fifth, coral; fortieth, emerald; forty-fifth, ruby, fiftieth, golden; seventy-fifth, diamond. The diamond wedding is often celebrated at the sixtieth anniversary. Those most frequently celebrated are the paper, wooden, tin, crystal, silver, and golden.

WEDEKIND, vā'de-kĭnt, EDGAR L. WALDEMAR OTTO (1870–). A German chemist. He was born in Altona, Prussia, and studied chemistry at Tubingen and at Munich (Ph.D., 1901). After some years of experience in teaching he was appointed professor of chemistry at Tübingen. In 1909 he was called to the chair of inorganic and physical chemistry, with directorship of the department of inorganic chemistry, in the University of Strassburg. His many researches gained for him important recognition and he received an award of 1000 marks from the Royal Prussian Academy of Sciences for his studies in magneto-chemistry. His larger works include: *Zur Stereochemie des funfwertigen Stickstoffs* (2d ed., 1907); *Lehrbuch der heterocyclischen Verbindungen* (1901); *Stereochemie* (2d ed., 1914); *Organische Chemie* (1910); *Magnetochemie* (1911).

WEDEKIND, FRANK (1864–1918) A German dramatist He was born at Hanover, the son of a well-to-do physician and of an actress,

who met in California Despite literary ambitions, he was compelled to study law at Munich and Zurich, where in his Bohemian life he met Hartleben, the two Hauptmanns, and other notables. In Munich, Paris, and London he soon ran through his inherited competence Upon his return to Munich he was given a place on the staff of *Simplicissimus* by Langen. Heine successfully produced his plays *Der Erdgeist* (1895; Eng. trans., *Erdgeist*, 1915), *Der Kammersanger* (1899), and *Der Liebestrank* (1899) in Leipzig. Lèse-majesté caused Wedekind's flight to Paris, whence, however, he soon returned to serve out his sentence in Königstein. Next he went on the stage in Berlin, mostly in his own plays, with no great success. In 1906 he married the actress Tilly Niemann, and in 1908 returned to Munich. Greatly influenced by Ibsen, Strindberg, and Shaw, Wedekind equals his teachers in ability to depict depravity of many kinds, mostly sexual, but he approaches these other dramatists neither in technique nor in style A broad bitter line of pessimistic satire and cynicism runs through his works. Although he is obviously talented and apparently in earnest, most of his works are classed by his critics as unpleasant and sometimes disgusting caricatures of the seamy side of life viewed by a morbid mind Among other dramatic works than those mentioned are: *Fruhlings Erwachen* (1891; 20th ed., 1908; Eng. trans., *Awakening of Spring*, 4th ed., 1915); *So ist das Leben* (1902; Eng. trans., *Such is Life*, 1912); *Die Buchse der Pandora* (1904; new revised ed., 1906), a continuation of *Der Erdgeist; Der Marquis von Keith* (1904); *Hidallah* (1904); *Totentanz* (1906); *Musik* (1907); *Der Stein der Weisen* (1909); *Mit allen Hunden gehetzt* (1910); *Franziska* (1912); *Leidenschaften* (1913); *Simson oder Scham der Eifersucht* (1914). His collected works appeared in six vols. (1913). Consult H. B. Samuel, *Modernities* (London, 1913); J. G. Huneker, *Ivory, Apes, and Peacocks* (New York, 1915).

WEDGE (AS. *wecg*, OHG. *weggi*, Ger. *Wecke*, *Weck*, wedge-shaped loaf). The wedge is in principle a modification of the inclined plane. A force is applied by pressure, or more generally by percussion to the back, thus driving the edge forward. The wedge is employed for such purposes as the splitting of wood, the fastening firmly of the handle of an axe, the raising of a ship in a dry dock, or for launching, etc. The investigation on statical principles of the mechanical advantage of the wedge is extremely unsatisfactory, the enormous friction on the sides of the wedge being generally neglected; the theoretical result thus incorrectly arrived at is that the force applied at the back : the resistance = ½ width of back of wedge ÷ length of side. In the application of the wedge to the splitting of wood in the direction of the fibres, the split generally extends some distance in advance of the edge of the wedge, and the action of the latter is then a combination of the action of the wedge with that of the lever; in fact, this compound action is found more or less in all applications of the wedge as a cutting or splitting weapon, and tends further to complicate the statical investigation of its mechanical properties.

WEDGE-TAILED EAGLE. See EAGLE.

WEDGWOOD. The name given to various kinds of pottery and stoneware invented by Josiah Wedgwood (q.v.) of Staffordshire, England. A cream-colored ware was made in the English potteries as early as 1725, which had been improved by Aaron Wedgwood and Enoch Booth, of Tunstall, and afterward by a firm of skillful potters named Warburton. It finally fell into the hands of Josiah Wedgwood, through whom it became the recipient of the enameler's best art, and was considered worthy of the tables of the royalty. Black ware had been made in England from time immemorial, but Wedgwood's improvement, known as *basaltes*, was so marvelous as to amount to a creation. Wedgwood was assisted by John Flaxman, who modeled the most characteristic designs. The ware consisted of tinted bodies of blue, sage green, and various colors, on which small cameo reliefs in white or tinted paste were applied while they were soft, and were then fired. The figures are very beautiful and classical and the microscopic delicacy of the detail is astonishing. Towards the end of the eighteenth century many imitations of the Wedgwood wares were made by different English manufacturers and they were copied at Sèvres, but with French designs The famous Barberini or Portland vase (q.v.), reproduced from the original antique, is probably the most famous example of Wedgwood jasper Consult: Eliza Meteyard, *The Wedgwood Handbook: a Manual for Collectors* (London, 1875); *Old Wedgwood and Old Wedgwood Ware*, published by the Birmingham Museum and Art Gallery (ib., 1885); Samuel Smiles, *Josiah Wedgwood, F.R.S.* (New York, 1895). See POTTERY; STONEWARE.

WEDGWOOD, HENSLEIGH (1803–91) An English philologist, grandson of Josiah Wedgwood. He was born at Gunville, in Dorset, and was educated at Rugby School and Cambridge University. He is best known for his work in philology. He was one of the original members of the English Philological Society, and, in spite of his imperfect preparation, a scholar of wide learning and much natural balance. He published: *The Principles of Geometrical Demonstration* (1844), *On the Development of the Understanding* (1848); *A Dictionary of English Etymology* (1857); *Contested Etymologies* (1882). His dictionary, which attracted much attention when it was published, is not now valued. Towards the close of his life he became a convinced spiritualist.

WEDGWOOD, JOSIAH (1730–1795). The most celebrated of English potters. He was born in Staffordshire of a family of potters, established there since the seventeenth century. His school career closed with his ninth year, and he worked at the potter's trade as apprentice to his brother, then independently until his association with Thomas Whieldon, of Fenton, a prominent potter. In 1759 he opened works of his own in Burslem, himself supplying the models and mixing the clay for his workmen. His interest turned especially to the Greek or Etruscan vases, from which he copied his designs for his famous Wedgwood wares (see WEDGWOOD). In partnership with Thomas Bentley, of Liverpool, he opened, in 1769, very extensive potteries at Etruria (Staffordshire), a village he had built for his workmen. After the death of Bentley Wedgwood became sole owner of the establishment. He took some part in public life, being a successful advocate of road improvement and canal extension in the pottery district. He published valuable pamphlets on pottery, was elected a fellow of the Royal So-

ciety in 1783, and of the Society of Antiquaries in 1786.—A descendant, JOSIAH CLEMENT WEDGWOOD (born 1872), became known as a leader in the single tax movement and as a writer on this subject and on the Wedgwood family and pottery. Consult. Eliza Meteyard, *Life of Wedgwood from his Private Correspondence and Family Papers* (2 vols., London, 1865–66); id, *Group of Englishmen, 1795–1815* (ib, 1871); Sir A H. Church, *Josiah Wedgwood: Master Potter* (new ed, New York, 1903); K E Farrar, ed., *Letters of Josiah Wedgwood* (2 vols, London, 1903; supplementary vol, ib., 1906), for private circulation; J. C. Wedgwood, *A History of the Wedgwood Family* (New York, 1909); Julia Wedgwood, *Personal Life of Josiah Wedgwood* (rev. and ed. by C. H Herford, ib., 1915); also Henrietta Litchfield, ed., *Emma Darwin: A Century of Family Letters* (2 vols., London, 1915).

WEDGWOOD, THOMAS (1771–1805). An English physicist and philanthropist, son of Josiah Wedgwood. He was born at Etruria Hall, Staffordshire, and was educated at home with the exception of a few terms at Edinburgh University It is said that Wedgwood was the first photographer, as he was the first to discover that a silhouette of any object might be obtained when its shadow was thrown on a surface moistened with nitrate of silver. He did not, however, discover any way of fixing the images, and so was obliged to keep them in the dark. When his father died, leaving considerable property, the son aided several men, among whom was Samuel Taylor Coleridge, the poet. Consult R. B. Litchfield, *Tom Wedgwood the First Photographer* (London, 1903).

WED'MORE, SIR FREDERICK (1844–1921). An English art critic and miscellaneous writer, born at Clifton. He was educated at Lausanne and Paris At 19 he took up journalism at Bristol, and afterward settled in London, where he became art critic of the *Standard*. In 1885 he visited the United States to deliver art lectures at Harvard and Johns Hopkins universities. In 1912 he was knighted. Among his many books on art are: *Studies in English Art* (two series, 1876, 1880); *Masters of Genre Painting* (1877); *Etching in England* (1895); *Fine Prints* (1896); *On Books and Art* (1899); *Turner and Ruskin* (1900); *Some of the Moderns* (1909); *Etchings* (1911); *Painters and Painting* (1913). He is known also for short stories and other imaginative pieces in *Pastorals of France* (1877), *Renunciations* (1893), *English Episodes* (1894), and *Orgeas and Miradou* (1896); and for a novel, *Collapse of the Penitent* (1900). In addition, he contributed a life of Balzac to the "Great Writers Series" (1890) and published his reminiscences, social and literary, as *Memoires* (1912).

WEDMORE, PEACE OF. See CHIPPENHAM.

WEDNESBURY, wĕnz'bĕr-ĭ. A municipal borough in Staffordshire, England, near the source of the Tame, 7½ miles northwest of Birmingham (Map: England, D 4). Its chief industry is the manufacture of heavy iron and steel goods. The city is named after the Saxon god Woden. The site of the ancient temple dedicated to pagan worship is occupied by a fine Perpendicular church. Pop., 1901, 26,544; 1911, 28,108

WEED (AS. *wīod, wēod,* of uncertain origin) A plant which grows wild in cultivated grounds, choking crops and exhausting the soil. Annual and biennial weeds, such as charlock, pigweed, burdock, and melilot, may be destroyed by clean cultivation, as may also perennial weeds, such as couch grass, Canada thistle, ox-eye daisy, and sorrel, but by persistent fighting For this purpose crops which require much cultivation are advantageously planted, and recourse may be made to summer fallowing in fields and frequent weeding in gardens Thistles and other large weeds are frequently pulled in grain fields before the ripening of the crop, and, to prevent their seeding, they are cut in pastures. Sedges and rushes in damp grounds disappear on thorough draining. Leafy crops, which thickly cover the soil, prevent growth of weeds by the exclusion of air and light. Weeds which appear in fallow grounds serve as green manure when they are plowed under Some weeds while young can be destroyed in growing grain without injury to the crop by spraying the fields with a solution of copper sulphate or iron sulphate. (See HERBICIDE) Most weeds are introduced by sowing impure seed. Clover and grass seeds are especially liable to contain weed seeds. See SEED TESTING.

WEED, CLARENCE MOORES (1864–). An American zoölogist, born at Toledo, Ohio. He was educated at the Michigan Agricultural College and at Ohio State University (Ph.D., 1890) He was entomologist and botanist at the Ohio Experiment Station (1888–91), professor of zoölogy and entomology at the New Hampshire College of Agriculture (1891–1904), and thereafter instructor in nature study at the State Normal School at Lowell, Mass. Among his publications are *Insects and Insecticides* (1891); *Fungi and Fungicides* (1894); *Life Histories of American Insects* (1897); *Birds in their Relation to Man* (1903; 2d ed., rev., 1916), with N. Dearborn; *Farm Friends and Farm Foes* (1910); *Seeing Nature First* (1913).

WEED, THURLOW (1797–1882). An American journalist and political leader, born at Cairo, Greene Co., N Y., Nov. 15, 1797. At the age of 14 years he was an apprentice in a printing office at Onondaga Hollow, N. Y.; and in the War of 1812 he served for a time as a volunteer on the northern frontier. In 1815 he went to New York City, and after a brief career in printing establishments there he engaged in several journalistic ventures in western New York, founding successively the *Agriculturist* at Norwich and the *Onondaga County Republican* at Manlius, N. Y. He became editor of the Rochester daily *Telegraph* in 1822, of which three years later he also became the proprietor. In 1826 he retired from the management of this paper and established the *Anti-Masonic Enquirer*, and became prominently identified with the Anti-Masonic party. He was for several years a member of the State Legislature, where he was noted for his remarkable adroitness as a political manager. In 1830 Weed removed to Albany and established the Albany *Evening Journal*, an anti-Jackson organ, which he edited with singular ability for 33 years, almost immediately attracting attention by his vigorous attacks upon the Albany Regency (q.v.). He had a wide acquaintance with public men, and for many years his influence in political affairs, first as a Whig and later as a Republican, was in some respects unsurpassed by that of any man in the country. Declining to accept any offices for himself except the profitable one of State printer, he dictated the nomination and appointment of others. It was owing to his management more than to that of any other man that Harrison and Taylor

were nominated for the presidency in 1840 and 1848 respectively, while he took a leading part in bringing about the nomination of Clay in 1844, of Scott in 1852, and of Frémont in 1856 Throughout his long career he was an intimate friend of Seward, and for a long time was an influential member of the powerful "political firm of Seward, Weed, and Greeley," which controlled the politics of New York State. During the Civil War he spent some months in Europe as a member of a commission charged with securing the neutrality of foreign governments For a brief period after the war he served on the editorial staff of the New York *Times*, and in 1867–78 was editor of the *Commercial Advertiser*. In 1866 he published *Letters from Europe and the West Indies*. He died in New York City, Nov. 22, 1882 His *Autobiography*, a useful contribution to the historical and political literature of the country, was published in 1884 (Boston), and a *Memoir* by Barnes (Boston, 1884). Consult De A. S. Alexander, *Political History of the State of New York* (New York, 1906).

WEED, WALTER HARVEY (1862–) An American geologist, born in St. Louis. He graduated at the Columbia School of Mines in 1883, became a geologist on the United States Geological Survey in the same year, and in 1883–89 was engaged on the geological survey of Yellowstone Park. From 1889 to 1898 he was engaged in the geological exploration of Montana, and subsequently devoted his attention chiefly to the study of economic geology, particularly of ore deposits His publications include: *Glaciation of Yellowstone Valley* (1893); *Secondary Enrichment of Mineral Veins* (1899); *Copper Mines of the World* (1907); *Ore Deposits* (1905), a translation from the German of Richard Beck, and many bulletins of the Survey.

WEE'DEN, WILLIAM BABCOCK (1834–1912). An American economist and historian. He was born at Bristol, R. I., and was educated at Brown University. In 1851 he entered upon the business of woolen manufacture at Providence. He served in the Civil War in 1861–62, resigning as captain He then returned to his business. He is well known for his publications in economic history: *Morality of Prohibitory Liquor Laws* (1875); *Social Law of Labor* (1882), *Economic and Social History of New England* (1890), *War Government, Federal and State* (1906); *Early Rhode Island, a Social History of the People* (1910).

WEEK (AS. *wucu, wicu*, OHG. *wohha, wehha*, Ger. *Woche*, week). A subdivision of the month, usually consisting of seven days. Its origin is somewhat obscure, although it may be based on the moon's phases, which are approximately seven days apart—each quarter of the lunar month exceeding the seven-day week only by three-eighths of a day. Such was the basis of the Chinese and of the ancient Peruvian week. If, however, the week of seven days came first from Babylonia, as seems most probable, the number seven may be derived from the sun and moon with the five planets, in the order Nimib (Saturn), Marduk (Jupiter), Nergal (Mars), Shamash (Sun), Ishtar (Venus), Nabu (Mercury), and Sin (Moon). With this astronomical basis the influence of the widespread belief in the sacred prime number seven probably cooperated. Furthermore, in Babylonia every seventh day of the month was an evil day, on which certain things were taboo and certain offerings were incumbent. The names of the intervening days are unknown, and the date and frequency of celebration of the day *shabattu*, devoted to the "contentment of the heart (of the gods)," are also uncertain. Among the Jews, on the other hand, the week of seven days prevailed from earliest times. There is here no trace of planetary influence. The names of the Hebrew days of the week are unknown, although from the analogy of the New Testament and Rabbinical usage they would seem to have been numbered from the Sabbath, so that "four after the Sabbath" would be Wednesday. Like the Semites, the Egyptians had a week of seven days, and these were named according to the seven planets. Over each hour of the Egyptian day a planet presided, in the order of its distance from the earth according to the geocentric system, thus giving the succession Saturn, Jupiter, Mars, Sun, Venus, Mercury, Moon. If then Saturn presides over the first hour of the first day (Saturday), the twenty-fifth hour will fall to the sun, the forty-ninth hour to the moon, and so for the rest. From Alexandria this week with its system of nomenclature came to the Greeks and Romans. The Greeks had previously divided each month into three decades, while the Romans had had eight-day periods, the eight days or *nundinæ* being primarily market days and based on the changes of the moon. The week of seven days was not officially adopted, however, until the time of Constantine. In Greece the week had been introduced by Greek-speaking Jews from Alexandria, in Rome by Chaldæan astrologers about the beginning of our era. From Rome this system spread to the Teutonic and Celtic peoples conquered by the Latins, and the names of the days of the week were translated, so that the *Dies Jovis* (French *jeudi*, Italian *giovedì*), day of Jupiter, became the Icelandic *þorsdagr*, day of Thor, the English Thursday From the Greeks the week was imported to India, along with much other astronomical science, so that, since Brihaspati is the Sanskrit name for the planet Jupiter, *Brhaspativāra* corresponds to Thursday. In India, however, the week is of little importance. Among the Iranians the month of 30 days was divided into quasi weeks of 7, 7, 8, and 8 days each, although no special sanctity attached to the dividing days. The Islamitic peoples borrowed the week from the Jews, and like them number the days, as do also the Greeks, Slavs, Finns, and as did the French revolutionists, instead of naming them like the Latins (except the Portuguese, who retain the ecclesiastical enumeration, as *quinta feria*, "fifth day, Thursday"), Teutons, Celts, and Albanians. In the French Revolutionary calendar, officially decreed Oct. 3, 1793, and suppressed Dec. 31, 1805, the months, of 30 days each, were divided into three decades each, the tenth day of each decade being a holiday. Consult: Ludwig Ideler, *Handbuch der mathematischen und technischen Chronologie* (2d ed., 2 vols, Breslau, 1883); E. R. Roesler, *Ueber die Namen der Wochentage* (Vienna, 1865); Otto Schrader, *Reallexikon der indogermanischen Altertumskunde* (Strassburg, 1901)

WEEK, HOLY. See HOLY WEEK.

WEEK OF PRAYER. See PRAYER, WEEK OF.

WEEKS, FEAST OF. A name commonly given among the Jews to the second of their great festivals, from its being the culminating point of the seven weeks after the Passover, the same idea being expressed by the Greek word Pentecost (fifty). Its observance was connected with

the supplication for divine blessing on the harvest, and the day was in later times supposed to commemorate the giving of the law on Mount Sinai. When the day of Pentecost became one of the earliest of the Christian festivals, an analogy was easily traced between this event and the formal organization of the Christian Church on that day

WEEKS, EDWIN LORD (1849–1903). An American painter He was born in Boston and lived in Paris, where he studied under Gérôme and Bonnat. Early in his career he began a series of journeys to Egypt and Asia which led him to take the subjects of most of his paintings from the Orient. He received the grand diploma of honor at Berlin in 1891, and a special medal and prize at the Empire of India Exhibition in London (1896) and was made Chevalier of the Legion of Honor of France in 1896, and officer of the Order of St. Michael of Bavaria in 1898. His work, which shows accuracy of observation and detail, is well represented in the Corcoran Gallery, Washington, the Academy of Fine Arts, Philadelphia, the Metropolitan Museum, New York, and the Brooklyn Institute Museum. Weeks published two books on his travels

WEEKS, JOHN WINGATE (1860–1926). An American banker and legislator, born at Lancaster, N. H. In 1881 he graduated from the United States Naval Academy and for two years was a midshipman. After acting as land commissioner in Florida for the Southern Railroad (1886–88) he became a member of the banking house of Hornblower & Weeks of Boston, Mass. A Republican, he served as mayor of Newton (1903–04) and as Representative in Congress (1905–13). In the House he became known as a legislator possessing great talent for details and ability in finance. In 1912 he was elected to the United States Senate. There he took a prominent part in the debate concerning the Glass-Owen Currency Act and the other important finance measures. In 1914–15 he was mentioned in connection with the Republican nomination for the presidency

WEEKS, RAYMOND (1863–). An American philologist and phonetician, born at Tabor, Iowa. He graduated from Harvard in 1890, from 1893 to 1895 as traveling fellow studied at Paris and Berlin, and then became professor of Romance languages at the University of Missouri. In 1897 he took his Ph.D. at Harvard. He accepted a call to the University of Illinois in 1908 and in 1909 to Columbia. He wrote numerous articles on Old French literature, invented several instruments for use in the development of the study of phonetics, and was assistant editor on the *New Standard Dictionary* (1913). His works include: *Origin of the Covenant Vivien* (1902); *La Chevalerie Vivien*, facsimile edition (1909); *The N. E. A. Phonetic Alphabet* (1912), with J. W. Bright and C. H. Grandgent; and occasional poems and short stories. In 1910 he founded, in collaboration with H. A. Todd (q.v.) and other scholars, the *Romanic Review*, and he became general editor of the "Oxford French Series."

WEEMS, MASON LOCKE (c.1760–1825). An American preacher and writer, the author of a famous biography of George Washington He was a native of Maryland, was educated for the Anglican ministry in London, and in 1784, there being no bishop of the Church of England in America, applied, but without success, to various bishops in England for admission to holy orders. An account of his difficulties in this respect may be found in McMaster's *History of the People of the United States*, vol. i (New York, 1900). The incident was an important factor in the establishment in the United States of the Protestant Episcopal church, distinct in organization from the Church of England. After Weems's return he preached at various places, though he seems never to have had a regular rectorship, and about 1790 he became a book agent for Matthew Carey (q.v.). Weems is remembered chiefly for his *Life of Washington*, one of the most popular books ever published in America. It first appeared in 1800 and in 1891 had gone through more than 70 editions. The fifth edition (1806) contained such anecdotes as that of the hatchet and cherry tree, now generally discredited. Weems wrote several other works, none of them important.

WEENIX, vā'niks, JAN (1640–1719) A Dutch animal and still-life painter, born in Amsterdam. He was the son and pupil of Jan Baptiste Weenix (1621–60), and his first pictures of subjects in the Roman Campagna and seaports are in the manner of his father Under the influence of his uncle, Hondecoeter, he became a painter of hunting scenes and dead game He is especially celebrated for his painting of dead hares, but his pictures often contain birds and sumptuous vases, with landscape backgrounds From 1702 to 1712 he was court painter to the Elector at Dusseldorf, for whom he decorated the Castle of Bensberg with paintings of this character, most of which are now in the Munich Gallery and at Schleissheim. Nearly all the chief galleries of Europe and America possess his pictures, which are characterized by truthfulness, decorative arrangement, delicate brush work, and good color.

WEEPING PHILOSOPHER, THE. An appellation occasionally given to the Greek philosopher Heraclitus.

WEEPING TREE. Any one of several kinds of trees upon which leaf hoppers (especially *Proconia undata*) and their kin congregate, usually in the early summer, and copiously discharge honeydew (q.v.).

WEERTS, vārt, JEAN JOSEPH (1847–). A French decorative, historical, and portrait painter. He was born at Roubaix and studied at the Ecole des Beaux Arts under Cabanel. Among his best-known paintings, which are interesting, but hard and somewhat theatrical, are "The Death of Joseph Bara" (Luxembourg), "Exorcism in the Middle Ages" (Bordeaux Museum), "Assassination of Marat" (Evreux Museum), and "The Eternal Moment" (Petit Palais, Paris). He helped to decorate the grand gallery of the Court of Honor and the chapel of the Sorbonne, also the Hôtel de la Monnaie and the Hôtel de Ville, Paris, and the Hôtel de Ville at Limoges. His official portraits include those of Henri Brisson, Robert Fleury, and Alfred Roll. He became an officer of the Legion of Honor.

WEEVER (variant of *weaver*), or STINGFISH. A fish of the genus *Trachinus*, of the spiny-rayed fishes of the family Trachinidæ, interesting because of the sharp dorsal and opercular spine by which these fishes can inflict an unpleasant wound. Two species inhabit the sandy bottoms of the European coasts, both excellent for the table. There is no evidence that their sting is poisonous.

WEEVER, JOHN (1576–1632). An English poet and antiquary. He was born in Lancashire and was educated as a sizar at Queens' College,

Cambridge In 1599 he published *Epigrammes in the Oldest Cut and Newest Fashion*, worthless, except that the references to Shakespeare, Daniel, Drayton, Ben Jonson, Marston, Middleton, and others throw light on contemporary opinion of those poets In 1601 Weever published *The Mirror of Martyrs*, which relates to Sir John Oldcastle and enables us to date *Julius Cæsar*. His antiquarian researches were of value despite occasional inaccuracies. Consult Fuller, *History of the Worthies of England* (ed, Nuttall, London, 1840).

WEEVIL (AS. *wifel*, Ger. *Wiebel*, weevil; connected with AS. *wefan*, OHG. *weban*, Ger. *weben*, to weave). A name applied to many of the snout beetles of the suborder or series Rhynchophora, and to species of the family Bruchidæ of the series Phytophaga. The heads of the beetles of the former group, which it is said includes 25,000 species, are prolonged into a beak which in some species exceeds the length of the body The jaws are at the tip of the snout, by means of which holes are drilled, and in some species the eggs pushed into place According to Sharp only four families of snout beetles can be accepted with certainty. Other authors subdivide the order into more than twice as many families The commoner North American species belong to Otiorhynchidæ, Curculionidæ, Calandridæ, and Scolytidæ, the first including over 100 North American species, commonly known as scarred snout beetles because the appendage borne on the mandible of the pupa, or even of the young adult, later falls and leaves a scar. *Aramigus fulleri*, which is destructive to roses (see Rose Insects), belongs to this family. *Epicærus imbricatus* (see Imbricated Snout Beetle) is destructive to trees, shrubs, fruits, and vegetables. Certain weevils of the Rhynchitidæ, which in the larval stage roll the leaves of plants, are the only true leaf rollers (q.v.) among the beetles. The family Curculionidæ includes more than 20,000 species, among which are some of the most destructive of beetles. In this family the mandible is not scarred. The antennæ are frequently elbowed. The maggot-like larvæ are especially injurious to fruits, seeds, and nuts. Two species (*Balaninus querous* and *Balaninus rectus*) breed in acorns, *Balaninus nasicus* in hickory nuts, and *Balaninus caryatrypes* in chestnuts. *Conotrachelus nenuphar* is the cause of wormy plums and cherries. See Plum Insects.

To this group belong certain destructive species of the genus *Anthonomus*. The strawberry weevil (*Anthonomus signatus*) destroys the buds of strawberry. (See Strawberry Insects.) The most destructive, perhaps, of the whole series, is the sharpshooter, picudo, an insect most widely known as the Mexican cotton-boll weevil (*Anthonomus grandis*), one of the largest species of its genus. This insect, whose normal habitat is Central America and the West Indies, and whose ravages stopped the cultivation of cotton in the Monclova district of the State of Coahuila, Mexico, in 1863, appeared near Matamoros about 1888, spread across the river to Brownsville, Texas, and at the close of 1902 ranged over practically all of the best cotton-growing region of Texas. where in 1901 and 1902 its ravages were estimated at about $10,000,000. The adult insect is a small, long-snouted grayish weevil less than one-quarter of an inch long. Throughout the season it punctures and lays its eggs in the squares and bolls. The larva is a fat, white maggot about three-eighths of an inch long when full grown. It lives upon the internal tissues of buds and bolls When the square is attacked it usually drops, but most of the damaged bolls remain upon the plant and become stunted or dwarfed except late in the season, when they either dry or rot. The larva pupates within the boll, which may contain several larvæ. The adult weevils hibernate in grass, in late cornstalks, in old bolls on the cotton plants, and in piles of seed about the cotton gins They appear when the cotton blossoms, or earlier, and feed on young twigs and leaves There are four or more generations each summer, the larvæ being found as late as December. No food plant other than cotton is known. The infestation of a field is evident from the falling blossoms The Department of Agriculture recommends as the best remedies early planting, thorough cultivation, the planting of wide rows in order to admit the sun, and the destruction of the plants by fall plowing and fire in the autumn.

The rice weevil (*Calandra oryzæ*) is economically a very important beetle, which infests stored rice. (See Rice Insects.) *Calandra palmarum* or *Rhyncophorus palmarum* is the palm weevil, and does great damage to cocoa palms Its larvæ are roasted and eaten by the natives of tropical America. (See Grugru.) To this group belong the bill bugs of the genus *Sphenophorus*, whose larvæ live on the roots of corn and other grains and grasses. One species (*Sphenophorus obscurus*) infests sugar cane in the Pacific Islands The Scolytidæ are the bark or engraver beetles, which burrow between the bark and wood of trees, or even in the wood, leaving visible tunnels. When numerous they kill trees or else greatly damage the wood for commercial purposes. See Bark Beetle; Ambrosia Beetles.

The Bruchidæ, of which there are about 800 species, are not snout beetles, although they are commonly called weevils. They are small, usually dull-colored stout beetles. The legless larvæ are fat maggots which live in the seeds of plants, mainly of the family Leguminosæ. One species (*Bruchus pisi*), which is the largest pea and bean feeding weevil found in North America, has caused the abandonment of pea cultivation in some sections of the United States. Since it does not thrive in cold countries, Canadian peas find a ready market in the United States. The eggs are laid on the very young pea pod. The larvæ, on hatching, bore through the pod and into the pea, from which the beetle emerges in the spring. *Bruchus obtectus*, a very formidable enemy of bean culture, not only breeds in the young pod, but also in stored beans. Infested beans will float in water; they should not be planted.

Certain other beetles inhabiting flour (e.g. *Silvanus surinamensis* of the family Cucujidæ, *Tribolium confusum* of the family Tenebrionidæ, and *Trogosita mauritanica* of the family Trogositidæ) and stored grain have erroneously been called weevils. Even a lepidopterous insect, the Angoumois grain moth (*Sitotraga cerealella*), is known in the southern United States as the fly weevil. See Bean Weevil; Grain Insects.

Consult: L. O. Howard, in United States Bureau of Entomology, *Circulars*, 6, 14, 27, 33 (Washington, 1895); F. H. Chittenden, in United States Department of Agriculture, *Year Book* (ib, 1898); David Sharp, "Insects," in *Cambridge Natural History*, vol. vi (London, 1901); V. L. Kellogg, *American Insects* (2d ed.,

New York, 1908), J. H. Comstock, *Manual for the Study of Insects* (8th ed, Ithaca, 1909).

WEFA, Abul See Mohammed ben Mohammed ben Yahaya.

WEGELIUS, vā-gā'lī-ŭs, Martin (1846–1906). A Finnish composer, born at Helsingfors After the completion of his university studies he went to Vienna in 1870. The following year he studied with Richter and Paul in Leipzig. He began his career as chorus master at the opera in Helsingfors. After further study in Leipzig (1877–78) he was appointed conductor of the Finnish Opera at Helsingfors and director of the Conservatory. As a composer, and still more as a teacher, he exerted a marked influence upon the younger Finnish composers, among whom Sibelius, Jarnefelt, Melartin, and Palmgren were his personal pupils Wegelius' compositions include an overture, *Daniel Hjort;* a *Rondo quasi fantasia* for piano and orchestra; several cantatas; piano works; songs. See Finnish Music.

WEGENER, vā'gen-ĕr, Georg (1863–). A German traveler and writer, born in Brandenburg He studied at Heidelberg, Leipzig, Berlin, and Marburg, and after 1892 traveled in all parts of the world In 1910–11 he accompanied the Crown Prince on an Asiatic journey. His publications include: *Herbsttage in Andalusien* (1895; 4th ed., 1908); *Zum ewigen Eise* (1896; 2d ed, 1897); *Der Südpol* (1897); *Deutsche Ostseekuste* (1900); *Zur Kriegszeit durch China 1900–01* (1st and 2d ed., 1902); *Deutschland im Stillen Ocean* (1903); *Tibet und die englische Expedition* (1904), *Reisen im Westindischen Mittelmeer* (1904); *Reisen* (3 vols, 1905–08); *Der deutsche Kolonialreich* (2 vols., 1910), with others; *Madeleine* (1910); *Reisehandbuch Indien* (1913).

WEGG, Silas. A wooden-legged rascal, in Dickens's *Our Mutual Friend.*

WEGSCHEIDER, vāk'shī-dĕr, Julius August Ludwig (1771–1849). A German theologian. He was born at Kubbelingen, Brunswick, studied at Helmstedt, and became professor at Rinteln in Hesse in 1806 and at Halle in 1810. His *Institutiones Theologiæ Christianæ Dogmaticæ* (1815; 8th ed., 1844) was considered the standard exposition of German rationalism.

WEHNER, Arthur Adolf, Count von Posadowsky-. See Posadowsky-Wehner, A. A., Count von.

WEIDNER, wīd'nĕr, Revere Franklin (1851–1915). An American Lutheran theologian, born at Centre Valley, Pa. He graduated at Muhlenberg College in 1869, and at the Lutheran Theological Seminary, Philadelphia, in 1873. From 1882 till 1891 he was professor in Augustana Theological Seminary (Rock Island, Ill.), and from 1891 till his death was president of and a professor in the Chicago Lutheran Theological Seminary. His publications include: *Theological Encyclopedia* (3 vols., 1885–91); *Biblical Theology of the Old Testament* (1886); *Introduction to Dogmatic Theology* (1888); *Biblical Theology of the New Testament* (1891); and various doctrinal works.

WEIERSTRASS, vī'ĕr-shträs, Karl (1815–97). A German mathematician, born at Ostenfelde, in Westphalia. In 1834 he went to Bonn for the purpose of studying law and finance, but four years later he took up the study of mathematics at Münster. In 1842 he became a teacher in the Gymnasium at Münster, and in 1848 was appointed to a similar position at Braunsberg. In 1856 he became instructor in the Industrial Institute at Berlin, and in 1864 professor of mathematics at the university in that city. His works relate chiefly to Abelian integrals and differential equations, and to the general theory of functions, the modern treatment of which he may be said to have introduced. His *Abhandlungen aus der Funktionenlehre* was published in Berlin in 1886. His other works, including *Zur Theorie der Abel'schen Integrale* (1849), *Formeln u. s. w. der elliptischen Funktionen* (ed. by Schwarz, 1885), and his numerous memoirs, appear in his *Mathematische Werke,* published under the patronage of the Prussian Academy of Sciences (Berlin, 1894–1903). He also edited Jacobi's (1881–91) and Steiner's (1881–82) works.

WEIGALL, wī'gąl, Arthur Edward Pearse Brome (1880–). An English Egyptologist. He studied at Wellington College and for a short time at New College, Oxford At 18 he took up archæological work, and in 1901–02 served as an assistant to Flinders Petrie at Abydos. He worked at Saqqara (1902–04); excavated the mortuary temple of Thothmes III at Thebes (1905); investigated the condition of the antiquities in Nubia (1906–07), explored the eastern desert and, in 1908, Wady Hammamat, Kassair, and other places From 1907 to 1912 Weigall was also occupied with excavating and preserving the tombs of the nobles of Thebes. He published: *A Report on the Antiquities of Lower Nubia* (1907); *A Catalogue of the Weights and Balances of the Cairo Museum* (1908); *Travels in the Upper Egyptian Deserts* (1909); *A Guide to the Antiquities of Upper Egypt* (1910); *The Life of Akhuaton, Pharaoh of Egypt* (1910); *The Treasury of Ancient Egypt* (1911); *History of Events in Egypt from 1798 to 1914* (1915).

WEIGAND, vī'gänt, Gustav (1860–). A German philologist, born at Duisburg. He studied in 1884 at Leipzig, where, after traveling in France and Italy, he became a lecturer (1891) and assistant professor (1897). Among his more important works are: *Die Sprache der Olympo-Walachen* (1888); *Vlacho-Meglen* (1892); *Die Aromunen* (2 vols., 1894–95); *Der Banater Dialekt* (1896); *Kórosch und Marosch Dialekte* (1897); *Linguistischer Atlas des dakorumanischen Sprachgebietes* (1898–1907); *Praktische Grammatik der rumänischen Sprache* (1903); *Die Dialekte der Bukowina und Bessarabiens* (1904); *Bulgarische Grammatik* (1907); *Albanesische Grammatik im südgegischen Dialekt* (1913); *Bulgarisch-deutsches Worterbuch* (1913); *Albanisch-deutsches und deutsch-albanisches Worterbuch* (1914).

WEIGEL, vī'gel, Valentin (1533–88). A German mystic. He was born at Grossenhain, near Dresden; studied at Leipzig and at Wittenberg, and from 1567 to his death was preacher at Zschopau, near Chemnitz. He emphasized the necessity of internal unction and illumination. His main thesis as a psychologist was that knowledge does not come from without, but from the eye of the cognitive subject. In cosmology he stands near Paracelsus Of his writings only an unimportant funeral sermon appeared before his death. His productions were published from 1604 to 1618 in various places, and Weigelianism became widely spread. His opponents represented him as a dangerous revolutionary, who aimed at the overthrow of all political and social order. Weigel's most prominent writings are: *Libellus de Vita Beata*

(1609), *Ein schon Gebetbuchlein* (1612); *Philosophia Theologica* (1614), *Principal und Hauptttractat von der Gelassenheit* (1618); *Soli Deo Gloria* (1618). Consult: Opel, *Valentin Weigel* (Leipzig, 1864), Punjer, *History of Christian Philosophy of Religion* (Edinburgh, 1887); and Israel, *M. Valentin Weigels Leben und Schriften* (Zschopau, 1888).

WEIGELA, wī-gē'la (Neo-Lat., named in honor of Christian Ehrenfried von Weigel, a Swedish physician of the early nineteenth century). A common name for certain species of Diervilla, one of which (*Diervilla florida*) was introduced into cultivation from China as *Weigela rosea*. There are two American species known as bush honeysuckle. The northern species, *Diervilla lonicera*, is common in the middle and northern States, extending to Hudson Bay and to the Rocky Mountains. It grows from 1 to 4 feet high, bears oblong-ovate petioled leaves, and pale-yellow axillary flowers, usually three on a stalk. The southern species, *Diervilla sessilifolia*, grows along the southern Alleghanies, and has sessile leaves. The foreign species, all of which are Asiatic, number only 6 or 8, but the colors of the flowers vary from white to deep rose. Among the best known are *Diervilla japonica* and *Diervilla coraccnsis*. All are grown in the United States, but require winter protection in the North.

WEIGHING MACHINE. A contrivance for ascertaining the weight of objects. The most common form of weighing machine is the platform scale, in which a small known weight at one end of multiplying beams is made to balance a heavy unknown weight at the other end. The principle of the unequal beam balance is simply the principle of the lever (see LEVER; BALANCE), and as applied to scales it may be illustrated by the accompanying diagram. Here we have the beam hinged at *l* and *m* and attached by a rod *no* to the scale beam *oq*. At *rjks* is a U-shaped lever hinged to fixed pivots at *j* and *k* and to the lever *lnm* at *r* and *s*. If now we let the broken lines *a*, *b*, *c*, *d* represent a stiff platform, which is carried on the two levers by means of standards at *e*, *f*, *g*, and *h*, we have represented all the principal operating parts of the ordinary platform scale. To understand the mode of operation, assume that a load is placed upon the platform *a*, *b*, *c*, *d*. This load is conveyed to the system of levers by the standards *e*, *f*, *g*, and *h*, and depresses them so that they exert a pull downward on the rod *no* and the short arm of the lever *op*. This pull is balanced by sliding the weight *w* along the lever or scale beam *oq*, which is so graduated into pounds and fractions that the weight of the article on the platform is read at a glance. It is now plain that we have only to vary the number of levers and relative lengths of the arms of these levers to secure almost any multiplication of the weight that we please. In ordinary platform scales a weight *w* of 1 pound balances a load of 100 pounds on the platform. But this ratio is increased to 1 to 500 or to 1 to 1000 in scales for weighing loaded wagons and cars. The arrangement of levers shown in the accompanying diagram is a common one, but there are many others in use, each of which is adapted to some particular application or use.

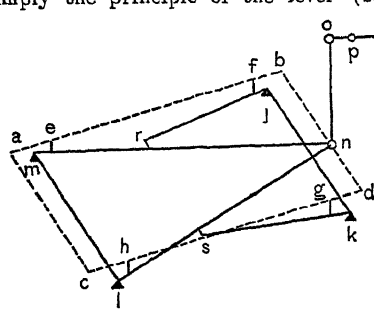


DIAGRAM OF PLATFORM SCALE.

Some scales work automatically, taking material from a large hopper, weighing out a certain amount and discharging it and then repeating the operation. Such contrivances are used for bagging sugar, coffee, etc., and for weighing grain or coal in or out of bin or elevator. Scales are built which have a capacity for weighing very heavy loads; examples of these are railway car and locomotive scales, cattle scales with a capacity of weighing from 20 to 200 head of cattle, and grain scales of 500 bushels capacity and more. Besides scales operating on the principle of the balance, there are weighing machines which operate by compressing a coiled spring or by twisting a bar of metal. The spring scale is a very common device, and in the form of a dynamometer for registering the pull of locomotives is made with very large capacities. For the most part, however, spring scales are of small capacity. They are not as reliable as balance scales. Consult *The Scale Journal* (Chicago, monthly) for discussion of new types as well as practice and theory of weighing machines. See SPRING BALANCE.

WEIGHT. See MATTER.

WEIGHTS, ATOMIC. See ATOMIC WEIGHTS.

WEIGHTS, MOLECULAR. See MOLECULES—MOLECULAR WEIGHTS.

WEIGHTS AND MEASURES. Standards of magnitude, weight, and value are essential for commercial and scientific purposes, and the facility with which national and international intercourse is carried on depends largely upon the uniformity of these standards. Naturally the units of measure adopted by primitive peoples were varied and imperfect, but as civilization advanced, trade increased, science developed, and more accurate standards became necessary. Their selection, whether by government action or common consent, was left almost to chance, so that they have differed from nation to nation, from county to county, from town to town, and even from one trade or guild to another. The last two centuries, however, have witnessed a great advance in favor of uniformity. England, the United States, France, and several other nations have established uniformity in their respective territories, and most of the leading nations have adopted the metric system. The same advantage accruing from uniformity for one or several countries would evidently obtain if a universal system were adopted by the whole world.

The setting up of a system of measures is fraught with many difficulties. The selection, determination, construction, and copying of the standard furnish peculiar problems. The chief considerations affecting the selection of a standard are its relation to a recognized physical constant and the relative ease with which these standards may be determined. In the case of the unit of length, two constants have been favored, a fractional part of a terrestrial merid-

ian, and the length of a seconds pendulum in a given locality. The nautical mile of 6080 20 feet or of 6080 feet is an example of the former and the seconds pendulum of 39.13+ inches an example of the latter. It is quite remarkable that the French meter, based upon the length of a meridian arc, should approximate so closely the length of the seconds pendulum. There need be no difficulty in establishing units of capacity, since these can be based upon the unit of length as exemplified in the metric system (q v).

In the case of the unit of weight it is necessary to select a quantity of some substance easily obtainable, and easily standardized as to quantity, purity, and density. Water is a substance which meets these requirements fairly well, and although the British system declares the weight of 1 cubic inch of distilled water at 62° F. to be 252.458 grains, and the metric system (q.v.) fixes the kilogram as the weight of 1 cubic decimeter of water at maximum density, the Anglo-Saxon still uses the troy pound and the avoirdupois pound (see below).

Even though a fortunate selection should be made, the determination and construction of a standard are difficult matters. The French engineers spent seven years in determining a kilometer, and even then failed to obtain 0.0001 of the earth's quadrant as they desired. The difficulties of establishing a standard pendulum and computing the lengths of others vibrating in given times are many and great In the first place, the experiments are made in air, and the buoyancy of the air lessens the actual weight of the pendulum. Then, since the earth has a diurnal motion on its axis, every object placed on it has a centrifugal tendency which modifies what otherwise would be its gravitation. This centrifugal tendency produces the earth's oblateness and causes a variation in the intensity of gravitation from one latitude to another. Thus a stone is actually heavier in Boston than in New York. This change in gravitation cannot be measured by a balance because the weights at each end of the balance are changed alike, but it is apparent in the motion of a clock; for a pendulum regulated to beat seconds in Washington is found to go too fast when taken to a higher latitude, and to lose time when carried nearer to the equator; and again the attraction which the earth exerts upon bodies placed near it diminishes with their distances from its centre, being inversely proportional to the squares of the distances, so that a clock carried from the bottom to the top of a hill loses time perceptibly. In addition to these niceties, there are others connected with the manipulation, such as the parallelism of the knife edges, their bluntness, the amplitude of the oscillation, and the stability of the support, so that altogether the exact measurement of the length of the seconds pendulum is a matter of very great difficulty (See PENDULUM.) But granted that a length is chosen and is expressed as a distance between two lines on a metal bar, the tendency to oxidize in air, to change with temperature, and to wear with handling, all combat the preservation of the standard and interfere with the process of copying.

The principles of metrology summarized above, however, are modern compared to weights and measures themselves. Before man had developed beyond the savage state he felt the need of some methods of measurement. So old is the idea that there is found in Josephus the statement that Cain invented weights and measures Upon the idea of numbers followed closely those of time, distance, and quantity Measurement of time has been simplified by nature, which furnished the aboriginal, as well as the modern, standard, the diurnal rotation of the earth upon its axis. A measure of distance was easily furnished in the day's journey, as the Indian of the West indicates distance by the number of repetitions of the sign meaning from sunrise to sunset. As a smaller unit became necessary, the stride, or pace, came into use, and finally, as a still smaller unit, the dimensions of parts of the body appear. Although reference is made in Deuteronomy (xi 5) to the foot breadth, and although the foot came into very general use in Greek, Roman, and subsequent times, nevertheless the common unit in Asia Minor and Egypt was the cubit, derived from the length of the forearm, from the point of the elbow to the end of the middle finger In the inscriptions and records of these countries continual reference is made to this unit and its subdivisions, and several specimens of the ancient cubit still exist Among the Greeks and Romans the pace and foot came into almost universal use, and by them were handed down to subsequent Western nations. The passus became the pace, the mille (passuum) the mile, and the pondus the pound, which have remained in most European nations until now. Under the Roman Empire the standards were preserved in a Roman temple, and were the standards for the civilized world. With the fall of the Empire and the rise of small principalities, a chaotic condition as to standards developed which extended through the Middle Ages and thereafter, until in Italy alone, as late as the end of the eighteenth century, there were over 200 lengths called the foot. Every little dukedom and principality had its own standards of weight and measure, and although the intercourse between these small towns was so insignificant that they did not suffer from these conditions, those who made use of the maritime leagues felt the need of common standards.

An example of the method of deriving the standards in the sixteenth century in Germany is given by the following quotation from Koebel's work on surveying:

"To find the length of a rood in the right and lawful way, and according to scientific usage, you shall do as follows: Stand at the door of a church on a Sunday and bid sixteen men to stop, tall ones and small ones, as they happen to pass out when the service is finished; then make them put their left feet one behind the other, and the length thus obtained shall be a right and lawful rood to measure and survey the land with, and the sixteenth part of it shall be a right and lawful foot."

In England we find Henry I establishing the yard as the distance from the point of his nose to the end of his thumb, and Parliament seriously establishing standards of length and weight according to grains of wheat or barley. Doubtless few people realize that shoes are still numbered according to the length of a grain of barley, in a system of numeration by thirteens. We have, as example of other units from the dimensions of the body, the fathom (*faethm*, the embrace), the length of the two arms from tip to tip; the hand, 4 inches; the span, 9 inches; the finger, ⅛ of a yard; the nail, 2¼ inches, from the tip of the thumb nail to the

base joint Yard is derived from the word "gyidan," possibly meaning the girth of the body.

It might appear surprising that the length of the cubit should have remained rather constant so long in Egypt, but where such important buildings were constructed and such continuity of dynasties was maintained, as was the case along the Nile valley, it should not be surprising that the unit or standard of length should have remained constant, inasmuch as the standards would naturally be handed down from dynasty to dynasty, and indeed, if destroyed, could easily be recovered from the dimensions of existing buildings, just as to-day it would be possible to restore the foot from the dimensions and descriptions of existing structures Just as a carpenter to-day might lose a two-foot rule in the wall of a house, so 3000 years ago an Egyptian stonemason lost his two-cubit rule in the wall of a temple at Karnak. Subsequent ruin and excavation brought it to light, and allowed a direct comparison with the temple dimensions. At the present day, in some parts of China, the first step toward building a house is making a measuring stick, according to which all materials are purchased and the dimensions determined. This method suffices for simple exchange.

Standards of quantity or weight seem to have developed in a still more arbitrary manner. The cuneiform tablets of Babylon tell of vessels of oil and skins of wine, the volume being as arbitrary as the jar or amphora of the Romans. For dry produce the standard was often simply a heap, large or small With the introduction of the balance, weighing became possible, and pondus appears, designating essentially a weight. Many steel yards and balances (see BALANCE) have been unearthed in the ruins of Pompeii As the pondus seems to be a haphazard unit, so also is the stone (14 pounds), still used in England, and the base of such units as the hundredweight (cwt) or 112 pounds (8 stone), the ton of 2240 pounds or 160 stone, the bushel of 56 pounds (4 stone), and so on.

The earliest systems of linear units seem to be based upon either the cubit (20.62 inches = 52.4 centimeters) or the digit (0 73 inch, or 1.85 centimeters), probably derived from the breadth of the finger. The cubit appears first in Egypt in the fourth dynasty, and from the dimensions of the great pyramid we have the value above given. Nevertheless, as might be expected, considerable variation occurs, even in Egypt (20.5 inches to 20.7 inches). The cubit was divided into hundredths, but as incommensurate, approximate subdivisions the one-seventh, palm, and one-twenty-eighth, digit, were used. Several extant cubit rods give an average of 20 65 inches. At the Nilometers it is 20.75. As multiples of the cubit (mahi) the xylon, 3 cubits, walking staff, the neut, 4 cubits, and the khet of 40 cubits, are found along with the schoenus of 12,000 cubits. About the same time a similar unit appears in Babylon, especially as the half of 20.89 inches or span of 10.44 inches, or 16 digits of 0.653 inch. A cubit of 20.5 inches is found from the dimensions of various buildings in Assyria and Babylonia, where an imperfect sexagesimal system existed In Asia Minor the cubit derived from temples appears as 20.55 inches at Ephesus, 20.62 inches at Samos, while the stadium at Laodicea gives 20.94 inches. Three-fifths of the cubit of 20.75 inches, a combination of the Egyptian decimal and the Assyrian sexary system, is the commonest of Greek derivatives (12 44 inches) occurring in the Propylæa, the Temple of Ægina, the Olympian course, etc. Other and less important derivations from the cubit occur in restricted localities or periods. The digit appeared about simultaneously with the cubit, and some confusion arose from the belief that it was one twenty-eighth of a cubit; in reality they appear to be incommensurate, although 10 digits were often indicated on cubit sticks as the lesser span. Practically the same unit appears in Assyria, Persia, and Asia Minor. The common Egyptian small unit of volume was the hon = about 29 cubic inches. The artaba was the practical equivalent of the Attic metretes. The Egyptian unit of weight was the kat = 146 grains, 100 kat = 10 uten = 1 tema In Babylonia the talent = 360 stone = 3600 shekels = 66.4 pounds. The stadion appears very early as equal to one-thirtieth of a parasang, or about 148 meters, or 485 feet, the parasang being 14,550 feet, or 2 76 miles. This is the old itinerary stadion, used in measuring distances from place to place. As examples of Greek measures of length the following may be given:

1 stadion = 6 plethra or length of a furrow.

1 plethron = 16⅔ orgyia, similar to the fathom, the distance from tip to tip of the outstretched arms.

1 orgyion = 4 pecheis or cubits.

1 pechus = 1½ pous (foot).

1 pous = 1⅓ spithame (span) from tip to tip of outstretched thumb and finger.

1 spithame = 3 palaistē or handbreadth

1 palaistē = 4 dactyloi or finger breadth.

2 stadia = a diaylos, 4 a hippikon, and 12 a dolichos. This Attic or Olympian stadion = 184.97 meters or 606 feet.

The common Greek measure of area was the plethron or square, on the unit of length = 0.095 hectare or 0.235 acre

Greek units of volume, Attic, were as follows for liquids:

1 metretes = 12 chous = 72 xestes = 144 kotylē = 288 tetarton = 576 oxybaphon = 864 kyathos.

1 metretes = 39.39 liters or 43.33 quarts. For dry materials.

1 medimnos = 6 hecteus (modios) = 12 hemihectons = 48 choinix = 96 xestes = 192 kotylē = 1152 kyathos; 1 medimnos = 52.53 liters or 57.9 quarts.

The Greek units of mass or weight were 1 talent = 60 minæ = 6000 drachmai = 36,000 oboloi = 288,000 chalkia = 26.2 kilograms = 57.7 pounds.

In the Roman system we find the foot of 29.57 centimeters or 11.64 inches, duodecimally subdivided with special names as quincunx = $\frac{5}{12}$ foot, etc., also 1 pes (foot) = 4 palmi = 16 digiti = $\frac{4}{5}$ palmines = $\frac{3}{4}$ cubitus, used in building: for geodetic work we have 1 actus = 12 decempeda (pertica, perch) = 24 passus = 48 gradus = 120 pedes. In traveling the following were used: A Roman mile (mille passuum) = 8 stadia = 1000 passus = 5000 pedes. The Romans used the jugerum (as) as the fundamental unit of area = 0.252 hectare or 0.623 acre. As multiples we have 1 saltus = 4 centuriæ = 400 heredia = 800 jugera; 1 jugerum = 2 actus = 8 clima = 288 scripula (decempeda quadrata) = 28,800 pedes quadrati.

Roman units of capacity were for liquids: 576 cyathus = 384 acetabulum = 192 quartarius = 96 hemina = 48 sextarius = 8 congius = 2

urna = 1 amphora = 26.26 liters = 28 9 quarts. For dry materials, 192 cyathus = 128 acetabulum = 64 quartarius = 32 hemina = 16 sextarius = 2 semodius = 1 modius = 8.754 liters = 9.62 quarts. The Roman unit of weight, the pound, was subdivided duodecimally with special names as semis ½, bes ⅔, etc., into 12 unciæ each equal to 4 sicilici = 24 scripula = 48 oboli = 144 siliquæ = 27.29 grams = 1.09 ounces.

Passing over the details of mediæval European units, it appears that in England, up to 1400, an old building foot existed, about 13 22 inches, and the mile = 79,200 inches, subdivided into 10 furlongs (100 chains) or 1000 fathoms This fathom is half the Belgian pertica or perch, equals two yards or six feet. Unfortunately, this system was legally suppressed and gradually driven out in favor of the foot of 12 inches, which had been legally enforced as early as the tenth century. The league is a Gallic unit, and lasted in Wales (= 1.56 miles) till the seventeenth century.

Prior to 950 A D. the Saxon standards were kept at Winchester, where copies were compared and stamped. The measure at Winchester shall be the standard, was the decree of King Edgar. Under the Normans the standards were transferred to Westminster and placed in the care of the chamberlains of the exchequer, but their dimensions were not changed. These came later to be known as The Standards of the Exchequer. In 1224 the rule is laid down that: 3 barleycorns = 1 inch, 12 inches = 1 foot; 3 feet = 1 ell (*ulna*); 5½ ulnæ = 1 perch; 40 perches long and 4 in breadth = 1 acre. The barleycorns are to be dry, laid end to end, and taken from the middle of the ear. Under Henry VI, Richard II, and Anne an extra inch or thumb's breadth was added to the yard for stretching, of cloth. Richard II decreed uniformity for the Kingdom except in Lancaster, which always had larger measures

A yard of Henry VII, dated 1490, and one of Elizabeth, 1588, are undoubtedly the oldest British standards of length, and they differ only about one hundredth of an inch from the present Imperial British yard. Still extant are also the Guildhall yard of 1660, Rowley's Tower standard of 1720, etc. In 1742 the Royal Society had an accurate yard made, called Graham's yard. A committee of Parliament in 1758 had two very accurate yards made by John Bird, who made another in 1760. These were 39.73 inches long and near each end was inserted a gold plug upon which the mark was made; they were of brass rods a trifle over an inch square in cross section.

In 1797 Sir George Shuckburgh Evelyn first used a comparator by Troughton for the accurate comparison of standards. The results obtained by him are as follows:

	Year	Inches
Henry VII standard	1490	35.924
Elizabeth standard	1588	36 015
Guildhall standard	1660	36.032
Clockmaker's Co. standard	1671	35 972
Graham's scale, by Sisson	1742	36.0013
Graham's scale, by Sisson in the Exchequer		35 9933
General Roy's scale, by Bird.	1745–60	36.00036
Mr Aubert's scale, by Bird.	1745–60	35.99880
Royal Society's scale, by Bird	1745–60	35.99955
Bird's Parliamentary standard	1758	36 00023
Bird's Parliamentary standard	1760	36.00002

The Clerk of the House of Commons took charge of the Bird standards until they were finally adopted by Parliament under George IV on June 17, 1824, after another exhaustive investigation by Capt Henry Kater. The legalization went into effect Jan 1, 1826. The Act made elaborate provision for the restoration of this standard yard from its relation to the seconds pendulum, but when the Houses of Parliament burned down in 1834, destroying these standards, a royal commission decided against the recovery of the standard from the pendulum, and proceeded to derive a new standard from the extant standards. This new standard was adopted June 30, 1855. In 1870 it was recommended that mural fixed standards be established in populous towns for easy public comparison Bronze blocks were inserted in the granite on the north side of Trafalgar Square, London, every 10 feet to 100, and for the chain of 66 feet, and these standards were legalized in June, 1876, by Act of the Council. Frequent committees have recommended to Parliament the adoption of the metric system, but with no success as yet. England and America will probably be forced to adopt the metric system for purposes of foreign trade, making the move at nearly the same time; neither alone can get along without it if the other takes it.

Early in the thirteenth century it was enacted under Henry III that there should be uniformity in the weights and measures throughout the realm, and a little later it was determined that measures of capacity should be based upon weights. Soon afterwards weights were established upon the weight of grains of wheat, as follows: 32 wheat grains = 1 penny (pennyweight); 20 pence = 1 ounce; 12 ounces = 1 pound; 8 pounds = 1 gallon; 8 gallons = 1 London bushel; 8 bushels = 1 quarter. This was known as the Tower pound and was in use until the middle of the fifteenth century.

As early as the thirteenth century, the gallon appears as eight pounds of wine, and the bushel as eight gallons; also in 1452 the gallon was defined as eight troy pounds of wheat, which in Elizabeth's time had become eight pounds avoirdupois. A statute of 1689 defines the wine gallon as 231 cubic inches, a unit still legal in the United States. The Imperial gallon of Great Britain contains 277.274 cubic inches and is used for the measurement of all liquid and dry substances The Imperial British bushel contains 2218.192 cubic inches, and the Winchester bushel, the legal standard of the United States, contains 2150.42 cubic inches.

In England as well as elsewhere in Europe two pound units have prevailed from mediæval times, a light pound for weighing articles of high value and a heavy pound for weighing articles of low value. Many of the lighter pounds used in the Latin States are variations of the old Roman standards, others are of Saxon origin, and still others of more recent date. The Italian pounds have varied from 300 to 350 grams, the average being about the weight of the old Roman pound of 325 8 grams. The Spanish, Portuguese, and Prussian light pounds have varied from 459 to 470 grams. The English light pound is the troy pound of 12 ounces, named from the city of Troyes, and declared a legal standard by Great Britain (1497) for weighing gold, silver, silk, and other valuable commodities. The troy pound of Elizabeth (1588) served as a standard for such articles until 1824 (still legal in the United

States), and the Imperial standard troy pound (1758) was the only legal standard in Great Britain until 1856 The present standard troy pound is defined as 5760 grains, the troy pound used in the United States.

Of the heavy or so-called commercial pounds there have likewise been a great number. Their range is practically from 15 to 24 ounces, but heavy pounds of 28 and 36 ounces are said to have been used in Milan and Valencia. The standards of France, Germany, Denmark, and Holland range mostly from 488 to 500 grams. The avoirdupois pound was recognized as a standard in England during the reign of Edward III, and the Elizabethan standard (1588) of 7002 grains was derived from that of Edward. The Imperial pound avoirdupois of 7000 grains has been the English standard since 1856 and is generally copied by the United States. At the time it was legalized it was provided that in case the standards were destroyed they were to be recovered by the fact that 1 cubic inch of water at 62° F. and a barometric pressure of 30 inches of mercury, against brass weights in air, weighs 252.458 grains. When this standard perished in 1834 with the yard, it was not recovered by this method, but from other standards

The development of the standards of France was essentially similar to that in other countries, except that the Revolution at the close of the eighteenth century precipitated the new conditions and resulted in the metric system (q.v.).

In the early colonial days in America the standards of the colonists were naturally those of the mother country, and in most cases copies of the home standards were brought over and intrusted to the care of special officers of the Commonwealth In the English colonies it was usually the yard of 1588 that was employed. At the time of the Revolution the new country naturally continued with its existing English standards, and although the Constitution empowered Congress to fix the standard of weights and measures, nothing was done for a very long time Thomas Jefferson in 1790, at the suggestion of Washington, brought in to Congress a proposition for a decimal system based upon a natural standard. He was not satisfied with proposed standards and urged the establishment of the Leslie pendulum, a straight bar vibrating mean seconds when suspended at one end = 38.72368 inches.

In 1813 the Coast Survey imported a Troughton scale of 82 inches similar to the one used by Shuckburgh, and Superintendent Hassler made a very complete investigation of this as well as all the other standards which he could get, and finally recommended that the distance from the 27th to the 63d mark on the Troughton scale be adopted as the yard, at 62° F. This was adopted by the Treasury Department In 1817 Hassler compared this American yard with the meter and toise, with the following result: 1 meter = 39.38024749 inches and 1 toise = 76.74 + inches.

On March 3, 1817, the Senate called upon the Secretary of State for an elaborate report relative to weights and measures of the United States and other countries. John Quincy Adams presented a very complete and exhaustive report, but practically advised that nothing be done at that time. The appendices of this report are very rich in early legal enactments. The matter was taken up again by the Senate in 1830, and again Mr. Hassler undertook a complete investigation of the standards. The Troughton scale of 1813 was taken as the standard, with the following results:

	Inches
The old Exchequer yard of 1820 . . .	35 987497
The old Exchequer ell of 1820	45 026101
Latter reduced to yard	36 020881
Copy of Exchequer yard, by Jones	35 9990285
Copy of Exchequer ell, by Jones	45 0389644
Reduced to yard	36 031171
Brass yard of Jones	35 993835
Brass ell of Jones	45 03343
Brass ell reduced to yard	36 026744
Troughton yard, mean of 52-inch scale	36 0003465
The scale of the University of Virginia	35 9952318
Iron yard of the Engineering Department . .	35 998776
The New York brass yard	36 01545

Gallatin in 1821 brought over to America a standard platinum meter and kilogram. In 1827 he brought a troy pound of brass which was made the standard of mass in 1828 and has been the Mint standard ever since. The Treasury Department in 1830 adopted 231 cubic inches as the gallon and 215042 cubic inches as the bushel.

In 1856 the English government sent to the United States two certified copies of the standard of length, and these are now known as bronze standard No. 11 and Low Moor iron standard No. 57. In the same year, in order to encourage uniformity among the States, the Treasury Department sent to the Governor of each State a set of weights and measures complete On July 28, 1866, the metric system of weights and measures was legalized by Act of Congress. In 1875 the United States joined with a number of others in the establishment of the International Bureau of Weights and Measures at Paris, and as a result thereof received in 1889 Standard International Meters No. 21 and No. 27 and International Standard Kilograms No. 4 and No. 20. These are made of an alloy of platinum with 10 per cent of iridium. April 5, 1893, the Treasury Department adopted meter No. 27 and kilogram No. 20 as the standards of the country, and since that time all measures are standardized against these, following the law of 1866 which defined the ratio of the yard to the meter as 3600 to 3937, and the ratio of the pound to the kilogram as 1 to 2.2046. See STANDARDS, UNITED STATES NATIONAL BUREAU OF.

False Weights and Measures. The necessity for prescribing and establishing a uniform system of weights and measures was early recognized by the English law. Before the Conquest there were Anglo-Saxon laws regulating the sizes of measures used in market places, and since then Parliament has enacted many statutes upon the subject, the present English law being incorporated in the Weights and Measures Act. In the United States the power of regulating weights and measures was vested in Congress, but as that body has not attempted to exercise its authority, except in regard to standards for the collection of customs and internal revenue, the several States have been obliged to fix their own standards and prescribe penalties for the violation of their statutory provisions on this subject. Inspectors are usually appointed with power to visit places of business where either weights or measures are used, in order to detect and prosecute violations of the law. Besides forfeiture of the false instruments, a penalty of fine or imprisonment is usually imposed upon the offender. Such laws have been held to be a legitimate exercise of the police power.

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and Measures (Philadelphia, 1821); Woolhouse, *Measures, Weights, and Moneys of All Nations* (London, 1881); Hultsch, *Griechische und Romische Metrologie* (Berlin, 1862); Giessler, *Journal of the Franklin Institute*, vol 126, p. 122 (Philadelphia); Bockh, *Metrologische Untersuchungen uber Gewichte u. s. w. des Altertums* (Berlin, 1838); Chisholm, *On the Science of Weighing and Measuring* (London, 1877); Clarke, *Weights, Measures, and Money of All Nations* (New York, 1875); Kelly, *Universal Cambist* (London, 1835), on English weights and measures; Alexander, *Universal Dictionary of Weights and Measures, Ancient and Modern* (Baltimore, 1850); Cavalli, *Tableaux comparatifs des mesures, poids, etc., de tous les états du monde* (Paris, 1874); Harkness, "The Progress of Science as Exemplified in the Art of Weighing and Measuring," *Bulletin of the Philosophical Society of Washington* (Washington, 1888); Hilliger, "Studien zu mittelalterlichen Maszen und Gewichten," *Historische Vierteljahrsschrift* (Leipzig, 1900), Hultsch, "Die Gewichte des Altertums," in the *Abhandlungen d. Kon. Sachs. Gesellsch. d. Wissenschaften*, vol. 18 (ib, 1898); Mendenhall, "Fundamental Units of Measure," *Smithsonian Report* (Washington, 1893); Noel, *Science of Metrology* (London, 1889); Hallock and Wade, *Outline of the Evolution of Weights and Measures and the Metric System* (New York, 1906). See also the *Proceedings of the American Metrological Society* (New York) and bulletins and circulars of United States Bureau of Standards (Washington, 1901 et seq.). See METRIC SYSTEM; MILE, C. G. S. SYSTEM.

The following tables include the chief units of extension, volume, and weight in use in the United States and in Great Britain, together with the ratios of the various units of the same class. There are various local divergencies from these usages, and in many trades and for special purposes, other units and systems of measures, based more or less on the Anglo-Saxon measures, are employed. In the United States, State legislation and commercial usage define the weights and measures of trade rather than strict adherence to a single national scheme. Thus, in different States, a bushel may be defined as the weight of a certain agricultural product or other commodity only approximate to the volume of a United States bushel. In different States legislation differs as to whether commodities should be sold by weight or by volume, and often the exact form of measure is prescribed for a single commodity. In some States the gallon for milk is not the United States legal gallon, but a larger or ale gallon, while in others the long and short ton are indicated for specific uses. Nevertheless, the general system of weights and measures as used in the United States is based upon the following tables. For the special usage in various States and Territories see *Laws Concerning Weights and Measures of the United States*, compiled by the United States Bureau of Standards, Washington, D. C., 1904.

LONG MEASURE. UNITED STATES AND BRITISH

12	inches	1 ft. = 0 30480 meter
3	feet	1 yd = 36 in. = 0.914402 meter
5½	yards	1 rod, pole, or perch = 16½ ft. = 198 in.
40	rods	1 furlong = 220 yds = 660 ft.
8	furlongs	1 statute or land mile = 320 rods = 1760 yds. = 5280 ft. = 63,360 in.
3	miles	1 league = 24 furlongs = 960 rods = 5280 yds = 15,840 ft.

Gunter's chain formerly used in surveying contained 100 links of 7.92 inches and was 66 feet or 4 rods in length.

SQUARE OR LAND MEASURE. UNITED STATES AND BRITISH

144	sq. in	1 sq ft. (100 sq ft. = 1 square)
9	sq ft	1 sq yd = 1296 sq in
30¼	sq. yds	1 sq rod = 272¼ sq. ft
40	sq. rods	1 rood = 1210 sq yds = 10,890 sq ft
4	roods	1 acre = 160 sq rods = 4840 sq yds. = 43,560 sq. ft
640	acres	1 sq mile or 1 section = 27,878,400 sq ft = 3,097,600 sq. yds

One acre contains 10 square Gunter's chains.

CUBIC OR SOLID MEASURE. UNITED STATES AND BRITISH

1728 cubic inches	1 cubic or solid foot
27 cubic feet	1 cubic or solid yard
128 cubic feet	1 cord

LIQUID MEASURE. UNITED STATES ONLY

4 gills	1 pt = 28.875 cu in.
2 pints	1 qt. = 57 750 cu. in. = 8 gills
4 quarts	1 gallon = 231 cu. in. = 8 pts. = 32 gills
63 gallons	1 hogshead
2 hogsheads	1 pipe or butt
2 pipes	1 tun

British Imperial gallon is 277.274 cubic inches.

DRY MEASURE UNITED STATES ONLY

	Edge of a cube of equal capacity
2 pts. = 1 qt = 67.2006 cu in. = 1 16365 liquid qts	4 066 in.
4 qts = 1 gallon = 8 pts = 268.8025 cu. in = 1 16365 liquid gallons	6 454 in.
2 gallons = 1 peck = 16 pts. = 8 qts = 537.6050 cu in	8.131 in.
4 pecks = 1 struck bushel = 64 pts = 32 qts = 8 gallons = 2150 4200 cu. in	12 908 in.

British bushel is 2218.192 cubic inches

AVOIRDUPOIS OR COMMERCIAL WEIGHT. UNITED STATES AND BRITISH

27.34375	grains	1 dram
16	drams	1 ounce = 437½ grains
16	ounces	1 lb = 256 drams = 7000 grains
28	pounds	1 quarter = 448 ounces
4	quarters	1 hundredweight = 112 lbs
20	hundredweights	1 (long) ton = 80 quarters = 2240 lbs.

The short ton of 2000 pounds is largely used in the United States.

TROY WEIGHT UNITED STATES AND BRITISH

24 grains	1 pennyweight (dwt)
20 pennyweights	1 ounce = 480 grains
12 ounces	1 lb. = 240 dwts. = 5760 grains

APOTHECARIES' WEIGHT

20 grains or minims	1 scruple
3 scruples	1 drachm = 60 grains
8 drachms	1 ounce = 24 scruples = 480 grains
12 ounces	1 pound = 96 drachms = 288 scruples = 5760 grains

APOTHECARIES' FLUID MEASURE

60 minims	1 fluid drachm (f℥)
8 drachms	1 fluid ounce (f℥)
16 fluid ounces	1 pint (O)
8 pints	1 gallon (Cong)

CIRCULAR OR ANGULAR MEASURE

60 seconds	1 minute (1′)
60 minutes	1 degree (1°)
90 degrees	1 right angle
360 degrees	1 circumference

1 radian or unit of circular measure is the angle subtended at the centre of a circle by an arc equal to the radius and is equal to 57.29577 degrees.

WEIGL, vī'g'l, JOSEPH (1766–1846). An Austrian composer, born at Eisenstadt, Hungary. He studied with Albrechtsberger and Salieri, and when but 16 years of age wrote an opera, *Die unnütze Vorsicht*. His first opera produced, however, was *Il pazzo per forza*, which appeared in 1788 and was very successful. Encouraged by this, he brought out—between that year and 1825—30 more operas, both Italian and German, besides a number of ballets. He also wrote two oratorios and many German and Italian cantatas. Upon the death of Salieri, in 1825, he received

the position of second court conductor and devoted his entire time to masses, offertories, and graduals. His opera *Die Schweizer Familie*, produced at Vienna in 1809, became exceedingly popular

WEIHAIWEI, wā'hī'wā'. A port on the north coast of the promontory of Shantung, China, about 40 miles east of Chifu (q.v.), and about the same distance west of Yung-ching-hien, near the extreme end of the promontory (Map: China, M 4) It is situated on a moderately large bay with a small island in its mouth which protects the harbor from all sides except one. It was fortified by the Chinese in 1883–85, was made a naval station, and an arsenal was established. In 1895 the Japanese captured it from the landward side. It was evacuated in 1898, and shortly thereafter leased by Great Britain to be held by her so long as Russia should hold Port Arthur, on the opposite coast. In 1905 when Japan took over the lease of Port Arthur the British lease was made to run as long as the Japanese occupied Port Arthur. With the concession went a strip of land 10 miles wide, lying east of 121° 40′ E., and covering an area of about 285 square miles. Pop , about 150,000, all under British rule. Only Chinese and British war vessels may enter the harbor.

WEIL, vīl, GUSTAV (1808–89). A German Semitic scholar He was born at Sulzburg, Baden, studied at Heidelberg and Paris, and, after a five years' residence in the East, became connected with the library at Heidelberg. He was made professor of Oriental languages in the university in 1848. His more important publications include: *Die poetische Litteratur der Araber* (1837); the translation of the *Thousand and One Nights* (1837–41; 3d ed., 1866); *Mohammed der Prophet* (1843); *Historisch-kritische Einleitung in den Koran* (1844); *Geschichte der Chalifen* (1846–51); *Geschichte des Abbassidenchalifats in Aegypten* (1860–62); *Das Leben Mohammeds nach Mohammed Ibn Ishak bearbeitet von Abd el Malik Ibn Hischam* (1864); *Geschichte der islamitischen Volker von Mohammed bis zur Zeit des Sultans Selim* (1866).

WEIL, HENRI (1818–1909). A French classical scholar, born at Frankfort-on-the-Main, Germany. He studied at Bonn, Berlin, and Leipzig, and in 1847 was an associate professor at Paris, whence he was called two years later to Besançon. In 1876 he went to Paris as professor of Greek at the Ecole Normale Supérieure and the Ecole des Hautes-Etudes. He resigned both positions in 1891. Among his works are: *De l'ordre des mots dans les langues anciennes, comparées aux langues modernes* (1844; 3d ed., 1879; Eng. trans by C. W. Super, 1887), his masterpiece, and editions of *Æschylus*, with a Latin commentary (2 vols., 1861–67; 2d ed., 1884); seven tragedies of *Euripides*, with a French commentary (1868; 2d ed., 1879); *Les harangues de Démosthène* (1873; 2d ed., 1881); *Les plaidoyers politiques de Démosthène* (1877–86); *Etudes sur le drame antique* (1897); *Etudes de littérature et de rhythmique grecques* (1902).

WEIMAR, vī'mär. The capital of the Grand Duchy of Saxe-Weimar, Germany, situated 50 miles west-southwest of Leipzig (Map: Germany, D 3) The quaint old town lies in agreeable surroundings on the Ilm. The Stadtkirche, dating from 1488, rises in the middle of Weimar. It contains Cranach the Elder's valuable "Crucifixion," in which are to be discerned the faces of Luther and Melanchthon.

On the east side of the town looms the grand ducal palace, an interesting edifice, begun in 1790, and constructed under Goethe's supervision Near the palace is the modern building completed in 1896, and devoted to the preservation of the precious and extensive Goethe and Schiller archives South of the palace is the fine library, with over 287,000 volumes and more than 8000 maps. Southwest of the palace, in the market place, rises the striking Gothic town hall, with the remarkable house of the two Cranachs close at hand. Not far distant is the Schiller house, owned by the municipality since 1847. In front of the court theatre, which bears such high repute, is the great bronze Goethe-Schiller monument, by Rietschel. It was unveiled in 1857. Towards the southern part of the town is the famous Goethe home, where the poet lived. It is open to the public as the Goethe National Museum. In the cemetery on the southern edge of Weimar are buried Goethe and Schiller. To the east lies the beautiful park through which the Ilm flows. Weimar has among its many public and special schools a good art school, dating from 1860. With it are connected several names prominent in the German art world. The valuable new museum is housed in a striking yellow and red stone Renaissance structure. The finest of the contents is the cycle of frescoes by Preller on subjects from the *Odyssey*. There are also a natural history museum, with ethnological and antiquarian collections, the Liszt museum, a geographical institute, large orphanages, etc. Weimar has manufactures of iron, wood, straw, cloth, leather, and stoves, and is an important seat of the book trade. Pop., 1900, 28,509; 1910, 34,581, nearly all Protestants. Weimar dates from the ninth century. It passed to the Ernestine line of Saxony about 1500. Owing to the enlightened patronage of Duke Charles Augustus (q.v.), it is famous for literary associations pertaining to the classic epoch of German literature. Goethe resided here more than 50 years of his life; Schiller, Wieland, Herder, and Liszt also lived here; and it was for decades the German Athens and the resort of those famed or interested in letters.

WEINBERGE, vīn'bĕr-ge, or KÖNIGLICHE WEINBERGE. The former capital of a district in Bohemia, Austria, on the Moldau River, near Prague, of which it is an important suburb. It is now incorporated with its larger neighbor.

WEINEL, vī'nel, HEINRICH (1874–). A German Protestant theologian, born at Vonhausen, Hesse. He was educated at the universities of Berlin and Giessen (Ph.D., 1898), and at the theological seminary at Friedberg, Hesse. In 1904 he accepted the chair of New Testament exegesis at Jena. His publications include: *Jesus im 19. Jahrhundert* (1903; 3d rev. ed., 1914; Eng. trans., *Jesus in the Nineteenth Century*, 1914); *Paulus, der Mensch und sein Werk* (1904, Eng. trans., *St. Paul, the Man and His Work*, 1906); *Die Gleichnisse Jesu* (1904; 3d ed., 1910); *Ibsen, Bjornson, Nietzsche, Individualismus und Christentum* (1908); *Biblische Theologie des Neuen Testaments: Die Religion Jesu und des Urchristentums* (1911; 2d ed., 1913).

WEINGARTNER, vīn'gärt'nĕr, FELIX (1863–). An Austrian musical conductor, born at Zara, Dalmatia. He studied for two years at the Leipzig Conservatory, where he won the Mozart Prize, made a short stay with Liszt at

Weimar, and in 1884 produced his opera *Sakuntala* there. He was conductor of the theatres at Königsberg, Danzig, and Hamburg and for two years at Mannheim. In 1891 he was appointed kapellmeister at the Berlin Court Opera, and also of the Royal Symphony concerts. In 1898 he settled at Munich as conductor of the Kaim orchestra, but resigned in 1904. In 1908 he succeeded Mahler as director of the Vienna Opera and conductor of the Symphony concerts, remaining, however, for only two years. From 1912 to 1914 he was first conductor at the Stadttheater in Hamburg, and thereafter was general musical director at Darmstadt and director of the conservatory. He visited the United States for the first time in 1905 as guest conductor of the New York Philharmonic Society. During the seasons 1912–14 he conducted the Wagner performances of the Boston Opera Company. As a conductor he ranks among the world's greatest interpreters, but as a composer he falls short of his lofty aims because of lack of genuine inspiration. His works include the operas *Sakuntala* (1884); *Malawika* (1886); *Genesius* (1893); *Orestes*, a trilogy after Æschylus: 1, *Agamemnon*, 2, *Das Totenopfer*, 3, *Die Erinyen* (1902); *Fruhlingsmarchenspiel* (1908); *Kain und Abel* (1914); *Dame Kobold* (1916); three symphonies (G, E flat, E); two symphonic poems, *König Lear* and *Die Gefilde der Seligen;* considerable chamber music; choral works, songs; piano pieces. Among his literary works the following are of more than passing value: *Die Lehre von der Wiedergeburt und das musikalische Drama* (1895); *Ueber das Dirigieren* (1895; 4th ed., 1913); *Bayreuth, 1876–96* (1896); *Die Symphonie nach Beethoven* (1897; Eng. trans., *Post Beethoven Symphonists*, 1906). Together with Charles Malherbe he became editor of the monumental edition of Berlioz's works published by Breitkopf and Härtel, and also one of the editors of the same firm's complete edition of Haydn. Consult P. Raabe, *Felix Weingartner als schaffender Künstler* (Berlin, 1908); J. C. Lusztig, *Felix Weingartner, Persönlichkeiten* (ib., 1908).

WEINHEIM, vīn'hīm. A town in the Grand Duchy of Baden, Germany, 11 miles northeast of Mannheim (Map: Germany, C 4). It is a popular health resort and tourist centre. Leather, machinery, weapons, dyestuffs, chairs, and soap are manufactured. Pop., 1900, 11,168; 1910, 14,170.

WEINHOLD, vīn'hôlt, KARL (1823–1901). A German philologist and student of Germanic culture He was born at Reichenbach, in Silesia, and studied at Breslau and Berlin. He became privatdocent at Halle in 1847, removed to Breslau in 1849, and became professor of German language and literature at Cracow in the following year, at Gratz in 1851, at Kiel in 1861, at Breslau in 1876, and at Berlin in 1889. His services to Germanic grammar and anthropology are valuable. The more important of his publications include: *Die deutschen Frauen im Mittelalter* (1851; 3d ed., 1897); *Altnordisches Leben* (1856); *Die Riesen des germanischen Mythus* (1859); *Die Heidnische Totenbestattung in Deutschland* (1859); *Alemannische Grammatik* (1863); *Bayrische Grammatik* (1867); editions of the Old High German *Isidorfragment* (1847), of the *Pilatusfragment* (1877) of Lampricht's *St. Francisken Leben und Tochter Syon* (1880); and of Lenz's dramatic remains; *Mittelhochdeutsche Grammatik* (1877; 2d ed., 1883); *Mittelhochdeutsches Lesebuch* (1850; 4th ed., 1891); *Verbreitung und Herkunft der Deutschen in Schlesien* (1887); *Ueber den Mythus vom Wanenkrieg* (1890), *Zur Geschichte des heidnischen Ritus* (1896); *Mystische Neunzahl* (1897); *Die Verehrung der Quellen in Deutschland* (1898). He was editor of *Germanistische Abhandlungen* in 1882–91, and in the latter year founded and edited the *Zeitschrift des Vereins fur Volkskunde*. Consult K. W. Vogt, article in the *Zeitschrift fur deutsche Philologie*, vol. 34 (Halle, 1902).

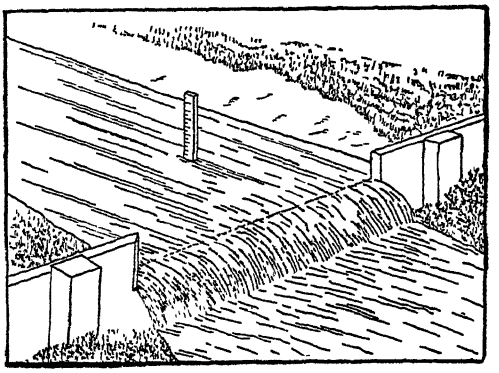
WEINMAN, wīn'man, ADOLPH ALEXANDER (1870–). An American sculptor. He was born in Karlsruhe, Germany, and at 10 came to New York, where he studied at the Art Students' League under Saint-Gaudens and at Cooper Union. His work, which is original in conception and shows clever and facile modeling, is well represented in the General Macomb monument (1908) at Detroit, Mich., the two Lincoln memorials at Hodgenville, Ky., and Madison, Wis., the "Indian Head" in the Brooklyn Institute Museum, and a seated statuette of Lincoln in the Metropolitan Museum, New York Weinman was elected to the National Academy (1911), the National Sculpture Society, the New York Architectural League (1902), and the National Institute of Arts and Letters. In 1915 he was a member of the International Jury of Awards at the Panama-Pacific Exposition, San Francisco, where he exhibited 27 pieces, including portrait busts and plaques and medals.

WEIPERT, vī'pērt. A town in the Austrian Crownland of Bohemia, on the slope of the Harz Mountains, near the Saxon frontier, 68 miles northwest of Prague. The manufactures include firearms, silks, laces, and paper. Pop., 1900, 10,037; 1910, 10,972.

WEIR (AS. *wer*, Ger *Wehr*, weir, dam, dike; connected with AS. *werian*, OHG. *werjan*, Ger. *wehren*, to guard, protect) A barrier or dam thrown across a stream to facilitate the measurement of its flow, to raise its level, or to direct the water for any useful or ornamental purpose. The word is also used to denote several varieties of fish traps. (See FISHERIES.) In the United States the term is but little employed except for measuring weirs and waste weirs or spillways; but in Great Britain, Egypt, India, and Australia it is quite commonly applied to such dams as have water flowing over their tops, either continuously or in floods. For ordinary dams for waste weirs or spillways, see DAMS AND RESERVOIRS.

Measuring Weirs are generally restricted to gauging the flow of comparatively small natural streams, sewers, and the like, and to serve as checks on other methods of measuring flows, such as meters, or the displacement of pumps. There is an increasing use of weirs in steam-power plants—in feed-water heaters to measure the water furnished the boilers. As a rule field weirs are temporary structures and therefore are more commonly built of wood. Sometimes metal is employed, but such is rarely the case, except for the crest of the weir. Ordinary flow dams may be used as weirs, either by changing their crests to make them conform to the accepted types, or by making allowances in computations. The standard measuring weir has a perfectly horizontal knife-edge, with vertical ends, and its back, or upstream face, a vertical plane surface. This is known as a sharp-crested rectangular weir. If the ends of the weir proper

do not extend the full width of the stream, allowance must be made for what are called end contractions. When the two ends of the weir are inclined to the crest the weir is known as trapezoidal. If two such inclined ends join in a common point, so there is no horizontal crest, the weir is called triangular. In determining the



TYPICAL TEMPORARY WEIR ON SMALL STREAM

flow of water over weirs the observer merely determines the depth of the water on the weir, taking care that the measurement is made far enough above the weir to avoid the curved surface which is formed as the water pitches over. The readings are taken at sufficient intervals to include all marked variations in the depth of the water, or automatic recording gauges may be employed. The actual volumes are finally determined from the tables giving the discharge for various lengths of overflow, depths on the weir, and the character of the weir. The accepted formula for a simple weir with end contractions is. $Q = 3.33(L - 0.2H)H^{\frac{3}{2}}$, where Q = flow in cubic feet per second, L is length of weir in feet, and H is height of water over crest, in feet. See IRRIGATION.

Consult. Turneaure and Russell, *Water Supply Engineering* (New York, 1901); Mansfield Merriman, *Hydraulics* (ib., 1905), and papers in *Transactions American Society of Civil Engineers* (ib., March and May, 1900); also engineering periodicals.

WEIR, J(ULIAN) ALDEN (1852–1919). An American portrait, genre, and landscape painter and etcher. He was born at West Point, N. Y., and received his first instruction from his father, Robert Walter Weir (q.v.). He then studied at the National Academy of Design, New York, and at the Beaux-Arts, Paris, under Gérôme (1873–76) but was more influenced by the Impressionists. After his return to America he was one of the founders of the Society of American Artists (1877), and at one time its president, but seceded as one of the "Ten American Artists" in 1898. He was elected a member of the National Academy in 1886, and its president in 1915, succeeding John W. Alexander. He was chosen a member of the American Academy of Arts and Letters and received numerous important prizes, including gold medals at St. Louis (1904), National Academy of Design, New York (1906), the Corcoran Art Gallery, Washington (1914), and was hors concours, San Francisco, in 1915. Weir's work, rightly classed as impressionistic, is characterized by a skillful and original handling of delicate color, and a harmonious arrangement of masses. He combines much refinement of feeling with an able and sure technique. Examples of his paintings are to be found in most public collections in America, including the Metropolitan Museum, New York, the Art Institute, Chicago, the Albright Art Gallery, Buffalo, the National and Corcoran galleries, Washington, and the Pennsylvania Academy of Fine Arts, Philadelphia. In the Luxembourg Museum, Paris, is his "Portrait of a Young Girl."

WEIR, JOHN FERGUSON (1841–1926). An American painter and sculptor, the son of Robert Walter Weir (q.v.). He was born at West Point, N. Y., and studied with his father and at the National Academy, New York. In 1861 he opened a studio in New York and he became a member of the National Academy in 1866. In 1868 he studied abroad. After his return he served as director of the School of Fine Arts at Yale University (1869–1913). Among his best-known paintings are "The Gun Foundry" (1867), "Forging the Shaft" (1868, Metropolitan Museum, New York); "Tapping the Furnace"; and various portraits, including those of Admiral Farragut, President Dwight of Yale, and Wells Williams. His statues of President Woolsey and the elder Professor Silliman are at Yale University; he also designed the public fountain on New Haven Green. Among his writings are *John Trumbull and his Works* (1902); and *Human Destiny in the Light of Revelation* (1903).

WEIR, ROBERT WALTER (1803–89). An American historical and genre painter. He was born in New Rochelle, N. Y., and studied under Jarvis in New York City, from 1824 to 1828 under Benvenuti at Florence, and in Rome. He was elected to the National Academy in 1829, and in 1832 was appointed professor of drawing at the United States Military Academy at West Point, a post which he held for 42 years. Weir was among the first American painters to devote himself to historical subjects. Among his paintings are the "Embarkment of the Pilgrims" (1845), in the rotunda of the Capitol at Washington; the "Landing of Hendrik Hudson" (1842); the "Church of the Holy Innocents" (1847, Corcoran Gallery, Washington); and "Columbus Before the Council of Salamanca" (1884). His finest production is probably the large allegorical work, "Peace and War," executed for the chapel at West Point. He also designed the stained-glass windows of Trinity Chapel and Calvary Church, New York City. Some good portraits by him are at West Point. For his sons, see WEIR, J. A., and WEIR, J. F.

WEISBACH, vīs'bäĸ, JULIUS (1806–71). A German mathematician and mining engineer, born near Annaberg. He studied at Freiberg, Göttingen, and Vienna, and became professor in the school of mines at Freiberg (1833). He is principally known for his work in hydraulics and mechanics, his introduction and development of the surveying of mines, and the extension of axonometry. He wrote: *Handbuch der Bergmaschinenmechanik* (1836); *Experimentalhydraulik* (1855); *Lehrbuch der Ingenieur- und Maschinenmechanik* (1845–60, and subsequent editions); *Der Ingenieur* (1848; 7th ed by Reuleaux, 1896); *Die neue Markscheidekunst* (1851–59); *Anleitung zum axonometrischen Zeichnen* (1857).

WEISER. A city and the county seat of Washington Co., Idaho, 82 miles northwest of Boise, on the Pacific and Idaho Northern, and the Oregon Short Line railroads (Map: Idaho,

B 5). It is the seat of the Intermountain Institute. The leading industries are mining, stock raising, and flour milling. Pop., 1900, 1364; 1910, 2600.

WEISHAUPT, vīs'houpt, ADAM (1748–1830). A German mystic and religious leader He was born at Ingolstadt, studied law in his native city, and after 1772 was professor of canon law in the university there. In 1776 he declared himself an open enemy of the Jesuits, whose pupil he had been, and on May 1 of that year founded the Order of the Illuminati, or, as it was at first called, *Gesellschaft der Perfectabilisten*, the members of which were entirely subservient to their superiors, though theoretically vowed to the propagation of liberty. Weishaupt attracted great numbers of young men, especially those of good family, by his teaching, and made Ingolstadt a cosmopolitan centre till 1785, when his lecture hall was burned by his enemies. He then removed to Gotha, where he died. Among his writings were the following: *Apologie der Illuminaten* (1786); *Geschichte der Verfolgung der Illuminaten* (1786); *Das verbesserte System der Illuminaten* (1787; 3d ed., 1818). See ILLUMINATI

WEISMANN, AUGUST (1834–1914). A German zoologist, born Jan. 17, 1834, at Frankfort-on-the-Main. He studied medicine at Göttingen, was clinical assistant at Rostock for three years and then began to practice medicine at Frankfort. In 1861–62 he was private physician to Archduke Stephen of Austria. In 1863 he studied zoölogy as a student of Leuckart at Giessen, and from that year was identified with the University of Freiberg, where he was professor of zoölogy from 1871 till his retirement in 1912. He died at Berlin Nov. 6, 1914. Weismann's zoölogical investigations, especially those dealing with the embryology of insects and crustaceans, were of the greatest importance. Failing eyesight made it necessary for him to abandon microscopic work from 1864 to 1874, and again after 1884, and while for a part of this time he carried out his investigations with the aid of his wife and his assistants, he was eventually obliged to give it up entirely. His attention now turned to some philosophical phases of zoölogy, and in this field he did the epoch-making work upon which his scientific reputation mainly rests. The *Origin of Species* came to his attention in 1861 and he at once accepted the evolution theory and was one of the first scientific men in Germany publicly to defend it.

Although Jäger first (1876) proposed the term "continuity of the germ plasm," Weismann greatly expanded the idea, and added many new and original suggestions, establishing the present theory that heredity (q.v.) has a physical basis. He was also led to deny what is known as use inheritance (q.v.), or the Lamarckian doctrine that characters acquired during the lifetime of an animal may be transmitted to its posterity. Subsequently he proposed a theory of germinal selection. Weismann was an admirable investigator, a strong thinker, and the leader of the Neo-Darwinian or Weismannian school of evolutionists. His theories, which are bold, original, and suggestive, have been criticized as superscientific speculations and assumptions, especially that related to the architecture or mechanical arrangement of his hypothetical elements or determinants of the germ plasm (q.v.), but it is recognized that he was a powerful agent in placing modern biological studies on a higher plane, and in rendering the theory of descent of practical value in psychological and philosophical studies (see WEISMANNISM) His principal works are: *Die Entwickelung der Dipteren* (1864); *Studien zur Descendenztheorie* (2 vols., 1875–76; Eng. trans., *Studies in the Theory of Descent*, 1882); *Beitrage zur Naturgeschichte der Daphnoiden* (1876–79), *Ueber die Zahl der Richtungskorper und über ihre Bedeutung auf die Vererbung* (1887); *Essays upon Heredity and Kindred Biological Problems* (2 vols, 1889–92); *Amphimixis oder die Vermischung der Individuen* (1891); *Aufsatze über Vererbung* (1892); *Das Keimplasma* (1892; Eng. trans., *The Germ-Plasm, A Theory of Heredity*, 1893); "The All-Sufficiency of Natural Selection," in *Contemporary Review*, in February, March, and May, 1893; *The Effect of External Influences upon Development* (1894), Romanes Lecture at Oxford; *Neue Gedanken zur Vererbungsfrage: Eine Antwort an Herbert Spencer* (1895); "New Experiments on the Seasonal Dimorphism of Lepidoptera," in *Entomologist* (January–August, 1896); *Ueber Germinalselektion* (1896); *Vorträge uber Descendenztheorie* (1902; 3d ed., 1913; Eng. trans., *The Evolution Theory*, 2 vols, 1905).

WEISMANNISM. The essence of the doctrines which were taught by August Weismann, and which differ from the more moderate views of Darwin, Romanes, and others, is the all-sufficiency of natural selection; the sweeping denial that use inheritance (q.v.) operates at all; the view that variation is mainly due to sexual reproduction, or amphimixis; and the elaborate and complicated relations of the ultimate elements or determinants (biophores) of the germ plasm. He thus states his theory as to the nature of the nuclear substance: "The germ plasm, or hereditary substance of the Metazoa and Metaphyta, therefore, consists of a larger or smaller number of idants, which in turn are composed of ids; each id has a definite and special architecture, as it is composed of determinants, each of which plays a perfectly definite part in development" (*The Germ-Plasm*, p. 453). He admits that the primary cause of variation is always the effect of external influences, but when these changes of conditions only affect the body in general their effects are limited to the simple life of the individual, and are not transmitted by heredity; but when they occur in the germ plasm they are transmitted to the next generation, and cause corresponding hereditary variations in the body. The opponents of this view hold that whatever external changes affect the body in general must necessarily affect the reproductive cells and the chromosomes of the nucleus of such cells. Indeed, the Weismannians treat the germ plasm as if it were a parasite, getting shelter and food from the body containing it.

In maintaining the all-sufficiency of natural selection Weismann argues that external influences act only as stimuli by which latent powers in the germ are called forth. Hence the changes in external conditions which appear to determine characters are not in any sense a true *causa efficiens*, but merely a necessary condition for the appearance of that which is inherent in the organism at some stage of development. His critics assert that in taking such extreme ground as this he overlooks the thoroughgoing effects of past geological changes, and their persistent effects as seen in the different lines of develop-

ment of series of extinct animals. Weismannism, they say, also overlooks the fact that in the beginning natural selection had no materials to operate with, the earliest types having been originated by the action of the primary factors of organic evolution. Accounting for the disappearance of a typical organ, Weismann says it is "always due to variations of the primary constituents of the germ," whereas Darwin and Lamarck attribute the loss of or reduction in the number of digits or other parts to simple disuse.

Another phase of Weismannism is the principle of intraselection. Taking the hint from Roux's principle of selection, or the struggle for existence between the parts of the organism, Weismann has greatly extended it, claiming that the selective process must take place not only in cells and tissues, but also in the smallest conceivable particles of the germ plasm, which he calls biophores This process he calls intraselection. Here as elsewhere his opponents argue that Weismann minimizes, or sets aside even in the case of plants, the effects of the action of the primary factors, such as gravity, light, heat, moisture, and chemical stimuli, and asserts that all the various adaptations of the parts of plants "must likewise be referred to the process of intraselection." In the same manner Weismann, in the words of a friendly critic, driven back from acquired characters as a cause of phylogenetic variation, came to regard the mingling of germ characters in amphimixis as the source of all variation, though he does allow that in the lowest organisms variation is due to the direct influence of changes in the environment.

Although Weismann struck a deathblow at the ancient preformation theory, his speculations have led him and his followers to a modern phase of preformation. He denies that epigenetic development exists, and claims that individual development (ontogenesis) "can be explained only by evolution, and not by epigenesis." In his view the germ "is an exceedingly complicated living being, a microcosm in the truest sense, in which every independently variable part that ever appears throughout the whole life is represented by a living particle." (Hertwig.) It should be said that Weismann from time to time modified his views, especially in proposing his theory of germinal selection, which admits that the environment may produce permanent modifications of the germ plasm, but supposes that it does so through favoring or inhibiting the activity of distinct determinants.

Consult: J. G. Romanes, *An Examination of Weismannism* (Chicago, 1893); Oskar Hertwig, *The Biological Problem of To-day* (New York, 1894); and for more general treatment: E. B. Poulton, *Essays on Evolution* (Oxford, 1908); and various authors in *Darwin and Modern Science* (Cambridge, 1909); also references under WEISMANN.

WEISS, vās, ANDRÉ (1858–1914). A French international law scholar, born at Mulhouse. He became a doctor of law in 1880. He taught at the University of Paris, was a member of various commissions, contributed to numerous reviews, and was made a Knight of the Legion of Honor. He became a member of the Academy of Moral and Political Sciences in 1914. His works, clear in exposition and monumental in scope, include: *Etude sur les conditions de l'extradition* (1880); *Traité élémentaire de droit international privé* (1885); *Traité théorique et pratique de droit international privé* (1892–98; 2d ed, 1907–13); *Le droit civil et la législation comparée* (1900), *Manuel de droit international privé* (1905); *Le code civil et le conflit des lois* (1906).

WEISS, vīs, BERNHARD (1827–) A German theologian He was born at Konigsberg, and studied there and at Halle and Berlin. In 1857 he became professor at Königsberg, in 1863 at Kiel, and in 1877 at Berlin. He took a deep interest in the Inner Mission (q.v.), and held positions at Berlin as official adviser concerning matters of religious education. His publications include: *Lehrbuch der biblischen Theologie des Neuen Testaments* (1868; 7th ed., 1903, Eng. trans., 1882–83), *Leben Jesu* (1882; 4th ed., 1902; Eng. trans., 1883–84); *Einleitung in das Neue Testament* (1886; 3d ed., 1897; Eng. trans, 1889); *Das Neue Testament* (4 parts, 1894–1900; 2d ed, 1902–05); *Die Religion des Neuen Testaments* (1903; 2d ed., 1908); *Die Quellen des Lukasevangeliums* (1907); *Paulus und seine Gemeinden* (1914). For the new edition of Meyer's commentary he prepared the volumes on the Gospels of Matthew and John, the Epistles to the Romans, Timothy, Titus, and the Hebrews, and the Epistles of John, and with his son, Johannes Weiss, that upon the Gospels of Mark and Luke.

WEISS, wīs, JOHN (1818–79). An American author and clergyman, born in Boston. He graduated at Harvard in 1837 and at the Harvard Divinity School in 1843. He then preached at Watertown and New Bedford, Mass, till failing health compelled him to devote several years to travel. In 1859 he returned to Watertown, where he remained till 1870 in charge of the Unitarian church. He was a zealous Abolitionist, a transcendentalist in philosophy, an advocate of woman's rights, and a champion of rationalism in religion. His publications included a *Life and Correspondence of Theodore Parker* (1864), *American Religion* (1871), and a translation of Schiller's *Philosophical and Æsthetic Letters and Essays* (1845).

WEISSE, vī'se, CHRISTIAN FELIX (1726–1804) A German poet. He was born at Annaberg, in Saxony, and was educated at the University of Leipzig In 1761 he became receiver of taxes in Leipzig. He tried imitations of Shakespeare, such as *Richard III* (1759) and *Romeo und Julia* (1767); but failing in these, he turned to light pastoral dramas and operettas, such as *Die Liebe auf dem Lande* (1768) and *Die Jagd* (1770), very popular in their day. He also wrote many lyrics and books for children, as his *Kinderfreund* (24 vols., 1776–82), still well known. Consult Minor, *Christian Felix Weisse und seine Beziehungen zur deutschen Litteratur* (Innsbruck, 1880).

WEISSE, CHRISTIAN HERMANN (1801–66). A German philosopher. He was born at Leipzig. After taking his degree from the university in his native city in 1823 he taught there till 1837, when he retired to his estate near the city; but he was recalled to academic activity in 1846 by an appointment as professor. Weisse was with Fichte one of the founders of the system of speculative theism which opposed the pantheistic idealism of Hegel. His most important writings were: *System der Aesthetik als Wissenschaft von der Idee der Schonheit* (2 vols., 1830); *Die Idee der Gottheit* (1833); *Grundzuge der Metaphysik* (1835); *Kritik und Erläuterung des Goetheschen Faust* (1837); *Die Christologie Luthers* (1852); *Philosophische*

Dogmatik oder Philosophie des Christenthums (3 vols, 1855–62); *Psychologie und Unsterblichkeitslehre* (1869) Consult Seydel, *Christian Hermann Weisse* (Leipzig, 1866).

WEISSE, wīs, FANEUIL DUNKIN (1842–1915). An American surgeon, born at Watertown, Mass. He graduated in 1864 from University Medical College, New York, where between 1865 and 1888 he was successively clinical professor of dermatology, professor of surgical pathology, and professor of practical and surgical anatomy. From 1865 to 1875 he was also professor of surgical pathology of the New York College of Veterinary Surgeons, and after helping to found the New York College of Dentistry (1865), was there professor of anatomy, surgical pathology, and oral surgery till his death, and from 1897 also dean. He published *Practical Human Anatomy* (1886) and many medical articles.

WEISSENBURG, vīs'en-bŭrk. A town of Lower Alsace, on the Lauter River, about 20 miles west of Karlsruhe (Map: Germany, B 4). It has manufactories of stockings, paper, leather, and matches. Pop, 1900, 6294. It is noted as the scene of the first important battle of the Franco-German War, Aug. 4, 1870, in which the French under Douay were defeated by the advance guard of the German army under the Crown Prince of Prussia. The lines of Weissenburg were fortifications extending from Weissenburg along the right bank of the Lauter for a distance of about 13 miles to its confluence with the Rhine. They were built in 1706 and played an important part in the war of the Austrian Succession and in the wars of the French Revolution. Their demolition was begun in 1873.

WEISSENFELS, vī'sen-fēls. A town in Saxony, Prussia, 23 miles southwest of Leipzig on the Saale (Map: Germany, E 3). The old Augustusberg Palace is now an important military school. It has important industries, including the manufacture of shoes, paper, nails and chains, machinery, sugar, electrical appliances, and organs. Pop., 1900, 28,201; 1910, 33,581.

WEITENKAMPF, wī'ten-kămpf, FRANK (1866–). An American authority on engraving and library official. He was born in New York, where he studied for two years at the Art Students' League. He was placed in charge of the department of art and prints of the New York Public Library, which became widely known through the interesting print exhibitions he arranged. Weitenkampf gained recognition as one of the foremost authorities on engraving in the United States. In 1914 New York University gave him the degree of L.H.D. Among his publications are *How to Appreciate Prints* (4th ed., 1911), *American Graphic Art* (1912), and many contributions to periodicals. He also contributed to several encyclopædias, among them the NEW INTERNATIONAL.

WEITLING, vīt'ling, WILHELM (1808–71). A German Socialist, born in Magdeburg. He was a tailor by trade, but traveled through his native country preaching communism and other radical doctrines. After taking part in the revolutionary movement of 1848 he settled in America, which he had previously visited, and formed a Socialist society in New York City called the Arbeiterbund. He was identified with a Socialistic colony in Wisconsin, but lived in New York, where he had a clerkship. The ideal society of Weitling was to be fashioned on the old ethnic lines, a federation of the families of the world, with leaders chosen by acclamation, who should divide the products of labor, giving to every one a fixed share He wrote *Die Menschheit wie sie ist und sein soll* (1838), *Garantien der Harmonie und Freiheit* (1842), and *Das Evangelium eines armen Sunders.*

WEITSPEC, wīts'pĕk. See YUBOK.

WEITZEL, vīt'sel, GODFREY (1835–84). An American soldier, born in Cincinnati, Ohio. He graduated at West Point in 1855, and was assigned to the corps of engineers. In April, 1861, on the outbreak of the Civil War, he was sent to aid in the defense of Fort Pickens, Fla In February, 1862, he became chief engineer on the staff of General Butler, with whom he was stationed for some time at New Orleans. In August, 1862, he was promoted brigadier general of volunteers, and from October, 1862, to April, 1863, he commanded in the Lafourche campaign. In April and May, 1863, he commanded General Banks's advance guard, and later a division at the siege of Port Hudson, where his gallantry earned him the brevet of lieutenant colonel in the regular army. During May, 1864, he commanded a division before Richmond, was then appointed chief engineer of the Army of the James, and constructed fortifications. He was second in command of the first Fort Fisher expedition, and later commanded all the troops north of the Appomattox River. On April 3, 1865, he entered Richmond. On March 13, 1865, he was brevetted brigadier general and major general in the regular army, and soon afterward was assigned to the command of the Rio Grande district in Texas. On March 1, 1866, he was mustered out and was commissioned major of engineers. From that time he was employed in the construction of fortifications and in river and harbor improvements. He was promoted to the rank of lieutenant colonel of engineers in 1882.

WEIZSÄCKER, vīts'ĕk-ēr, KARL (1822–99). A German theologian. He was born at Oehringen, Württemberg, and studied theology at Tübingen and Berlin. In 1851 he became court preacher at Stuttgart, and in 1859 was appointed superior consistorial counselor there. In 1861 he was called to the chair of theology at Tübingen and in 1894 he became a councilor of state. His publications include *Untersuchungen über die evangelische Geschichte* (1864; 2d ed, 1901); *Das apostolische Zeitalter der christlichen Kirche* (1886; 3d ed., 1901; Eng. trans., *Apostolic Age of the Christian Church,* 2 vols., 1894–95); and a translation of the New Testament (10th ed., 1912). He was also editor of the *Jahrbücher für deutsche Theologie* from 1856 to 1878. Weizsäcker was one of the most distinguished German theologians of his day.

WE'JACK. See FISHER.

WEKA, wā'kă *or* wē'kă. A native (Maori) name for the peculiar New Zealand rails of the genus *Ocydromus,* which, although provided with wings, are unable to make any effective use of them, on account of the wide-angled relation between the scapula and coracoid. They are brown, rail-like birds; one species frequents the seashore and feeds on shellfish and the like found among the kelp. These birds are rapidly disappearing, but are still quite numerous in places. Consult Buller, *Birds of New Zealand* (2d ed., (London, 1888). See EXTINCT ANIMALS, *Liability of Insular Faunas to Destruction;* FLIGHTLESS BIRDS; and Plate of RAILS, ETC.

WEKERLE, vā'kĕr-le, ALEXANDER (1848–1921). An Hungarian political leader, born at Moor, in the county of Stuhlweissenburg After pursuing the study of law he received a post in the Ministry of Finance in 1870, holding at the same time the position of privatdocent in financial and administrative law at the University of Budapest. He became Ministerial Councilor in 1884 and two years later was made Under-Secretary of State in the Ministry of Finance, and was elected to the Lower House of the Diet. In 1889 he was summoned by Koloman Tisza to the office of Minister of Finance, to the duties of which he devoted himself with such success that in the following year he was able to submit to the national legislature a budget minus the classic deficit. This he was enabled to effect through a skillful reconversion of the public debt. He also dealt successfully with the problems of excise, government monopolies, and the regulation of the coinage. In November, 1892, he succeeded Szapáry as president of the Ministerial Council and made the chief feature of his programme the enactments of legislation looking toward the establishment of a more liberal régime in religious affairs. Laws providing, among other things, for the recognition of the Jewish religion, making civil marriage compulsory, and leaving the religious education of children of mixed marriages to the parents' decision were passed by large majorities in the Lower House, but failed in the Table of Magnates. After a struggle, the Magnates were compelled to give assent to most of the ministerial programme Recognition of the Jewish faith was refused. Despite his victory, Wekerle found his position untenable, and resigned in 1894, and was succeeded by Bánffy (q.v.). From 1897 to 1906 he was president of the Hungarian Court of Administration. After more than a year of crisis precipitated by the refusal of the Independence party to take office, Wekerle was Premier and Minister of Finance in a compromise cabinet in 1906–10. See HUNGARY.

WELBY, wĕl'bĭ, REGINALD EARLE, first BARON (1832–1915). A British financial expert, born at Hareston, County Leicester. He was educated at Eton, and at Trinity College, Cambridge. Entering the Treasury in 1856, he became Assistant Financial Secretary of the Treasury in 1880, and Auditor of the Civil List in 1881, and was Permanent Secretary of the Treasury in 1885–94. In the latter year he was elevated to the peerage.

WELCH, ASHBEL (1809–82). An American civil engineer. He was born in Nelson, Madison Co., N. Y. In 1835 he became chief engineer of the Delaware and Raritan Canal. During the 39 years that he had charge of this important waterway and the railroads laid in connection with it, he devised for the New York and Philadelphia Railway a system of safety signaling (1865), doubled the capacity of the canal locks by fitting them with steam (1868), built the Chesapeake and Delaware Canal, and was elected to the presidency of the United Railroads and Canals of New Jersey (1867). After the acquisition of this system by the Pennsylvania Railroad (1871) he became consulting engineer to many important enterprises. In 1882 he served as president of the American Society of Civil Engineers.

WELCH, HERBERT (1862–). An American Methodist Episcopal clergyman and educator, born in New York City. He graduated from Wesleyan University in 1887 and from Drew Theological Seminary in 1890, and in 1902–03 studied at Oxford He entered the ministry of the Methodist Episcopal church in 1890, joining the New York Conference In 1905 he became president of Ohio Wesleyan University. From 1897 to 1912 he was president of the Methodist Federation for Social Service and thereafter its vice president, after 1908 he was a member of the University Senate of his denomination; and he held various other offices. In 1916 he was elected Bishop and was assigned to Seoul, Korea. He edited *Selections from the Writings of John Wesley* (1901); *The New Age and its Creed* (1906)

WELCH, WILLIAM HENRY (1850–). An American pathologist, born at Norfolk, Conn. He graduated from Yale in 1870 and from the College of Physicians and Surgeons, New York, in 1875. Afterward he studied pathology at Strassburg, Leipzig, Breslau, and Berlin. From 1879 to 1884 he was professor of pathological anatomy in Bellevue Hospital Medical College, New York. He was then called to Baltimore, where he became professor in Johns Hopkins University and pathologist to the Johns Hopkins Hospital, being also dean of the medical school from 1893 to 1898 He became eminent as an authority in bacteriology and pathology. In 1901 he was elected president of the Board of Directors of the Rockefeller Institute for Medical Research in New York, and in 1906 trustee of the Carnegie Institution of Washington. He was president of the Congress of American Physicians (1897), the Association of American Physicians (1901), the American Association for the Advancement of Science (1906–07), the American Medical Association (1910–11), and the National Academy of Sciences (for the term 1913–19). Welch published: *General Pathology of Fever*, which has been a standard textbook since its publication in 1888; *Biology of Bacteria* (1894); *Infection and Immunity* (1894); *Bacteriology of Surgical Infection* (1895); but many of his writings are incorporated in compilations, e.g., in Flint's *Practice of Medicine* (5th and 6th eds.), in Pepper's *System of Medicine*, in Dennis's *System of Surgery*, in Allbut's *System of Medicine*, and in *A Textbook of Medicine by American Teachers*. He also contributed to medical journals numerous papers on pathological and bacteriological subjects.

WELCKER, vĕl'kĕr, FRIEDRICH GOTTLIEB (1784–1868). A German classical archæologist and philologist. He was born at Grünberg, in Hesse-Darmstadt; studied at Giessen; was appointed teacher at the Gymnasium there in 1803; and in the year 1806 went to Rome, where he remained two years as tutor in the family of Wilhelm von Humboldt, who became his warm friend. On his return from Italy, he was appointed to a professorship of ancient literature in Giessen. In 1814 he served in the War of Liberation. For political reasons he left Giessen, went the following year to Copenhagen, to edit the posthumous works of the Danish archæologist Zoëga, and accepted a chair at Göttingen in 1816. Thence he was called in 1819 to Bonn, where he remained until his death, though he resigned his chair in 1859. Welcker's studies covered a wide range, but his chief influence was exerted in the fields of Greek literature, art, and mythology. He belonged, like Böckh and his pupil K. O. Müller, to that school of German

philologists who took as their aim the complete reconstruction of the ancient life, in distinction from the school of G Hermann, who were disposed to limit the field to the language and text of the Greek and Roman writers. Welcker was thoroughly imbued with the harmony of the whole Greek conception, whether expressed in art, literature, or religion, and it was to the presentation of this as a complete whole that he devoted his efforts. Among his editions of Greek texts are the collection of the fragments of Hipponax (1817), Theognis (1826), Philostratus (1825), and the *Theogony* of Hesiod (1865). Of his other works may be mentioned *Der epische Cyklus* (1835, 1849; reprinted 1865, 1882), *Die Æschyleische Trilogie Prometheus, und Nachtrag* (1824, 1826); *Die griechischen Tragodien mit Rucksicht auf den epischen Cyklus geordnet* (1839–41), *Griechische Gotterlehre* (1857–62). Shorter essays were collected in *Alte Denkmaler* (1849–64) and *Kleine Schriften* (1844–67). Consult Kekulé, *Das Leben Friedrich Gottlieb Welckers* (Leipzig, 1880); J. E. Sandys, *A History of Classical Scholarship*, vol. iii (Cambridge, 1908).

WELD (Dutch *wouw*, Swed., Dan. *vau*, Ger. *Wau*, weld; of unknown etymology), Woold, Dyer's Rocket, Dyer's Weed, or Yellow Weed (*Reseda luteola*). A plant of the family Resedaceæ and of the same genus as mignonette (q.v.), a native of waste places in many parts of Europe and introduced in some places in the eastern United States. It is cultivated to some extent for dyeing. For the greatest production of coloring matter the plant should be cut before the fruits show much development, otherwise the pigment diminishes. Though in part supplanted by chemical dyes, weld is still a valuable dyestuff. It serves equally for linen, woolen, and silk, dyeing with proper management all shades of yellow, and producing a bright and beautiful color. Large quantities of weld are exported from France. This plant is sometimes called wild woad, but should not be confused with woad, *Isatis tinctoria*, which yields a blue dye.

WELD, Angelina Emily (Grimké). See Grimké Sisters, The.

WELD, Isaac (1774–1856). An Irish topographical writer, born in Dublin, and educated in England. In 1795–97 he traveled through the United States and Canada, visiting not only the long-settled eastern seaboard, but also the still unbroken wildernesses of the West; and after his return to Europe published *Travels through the States of North America and the Provinces of Upper and Lower Canada during the Years 1795, 1796, and 1797* (1799). Several editions were issued, and translations were made into French, German, and Dutch. Among his other publications were a paper by which he sought to divert Irish emigration from the United States to Canada (1801); *Illustrations of the Scenery of Killarney and the Surrounding Country* (1807; 2d ed., 1812); and a *Statistical Survey of the County of Roscommon* (1838). Consult *The Dublin University Magazine*, vol. xlix (Dublin, 1857).

WELD, Theodore Dwight (1803–95). An American reformer and abolitionist, born at Hampton, Conn. In 1833 he entered the Lane Theological Seminary in Cincinnati, where, during the famous antislavery debate, he took the lead among the students by his eloquence. On the suppression of the antislavery society by the trustees of the seminary, he was one of the students who withdrew, and during the next three years he devoted himself to lecturing on slavery and its evils. In 1836, however, he lost his voice, and was thenceforth compelled to earn his living by his pen and by teaching school. He edited the publications of the American Antislavery Society, and in 1854 he opened a school at Perth Amboy, N. J., where he received boys and girls of both races. In 1864 he removed his school to Hyde Park, Mass., where he passed the remainder of his life In 1838 he married Angelina Grimké (See Grimké Sisters.) His publications include *The Power of Congress over the District of Columbia* (1837); *The Bible against Slavery* (1837); *American Slavery as it is: or, the Testimony of a Thousand Witnesses* (1839), composed of extracts from southern papers; and *Slavery and the Internal Slave Trade in the United States* (1841).

WELDE, WELD, or **WELLS,** Thomas (c.1590–1662). A Puritan divine He was born in England, and graduated at Cambridge in 1613. He was minister at Terling, Essex, in 1624–31, when he was deprived for nonconformity and went to America. He was the first pastor of the church at Roxbury, and opposed the religious views of Anne Hutchinson (q.v.) at her trial in 1637; he aided John Eliot and Richard Mather in the preparation of the *Bay Psalm Book* (q.v.). He went to England with Hugh Peters as agent for the colony (1641), but did not return; was pastor of a church at Gateshead (1649), but was ejected for nonconformity, 1662. He published *A Short Story of the Rise, Reign, and Ruin of the Antinomians, Familists, and Libertines that Infected the Churches of New England* (1644); and *A Further Discovery of that Generation . . . Called Quakers* (1654).

WELDING (from *weld*, variant of *well*, influenced, by Dan. *waelde*, to boil). The process of uniting two pieces of metal (such as iron, steel, or platinum) by heating them to a temperature at which they become sticky. Platinum can be welded by heating to a white heat and pressing or hammering the two surfaces together. To weld iron or steel, the metal is heated to about 1300° C. As the surfaces must be clean and free from oxide, sand or borax is used as a flux. There are several types of welds, such as butt weld where the surfaces merely come together, and lap weld where they overlap (as in pipes); also V weld where the two pieces fit into each other, and split weld where they form a step, as a carpenter joins two pieces of wood. As the welding temperature is so high the grain of the metal becomes very coarse and ought to be refined by hammering or by heat treatment if strength is required. Autogenous welding is done by actually melting the metal as in lead burning. In this way joints are made in aluminium, copper, cast iron, steel, etc.

In recent years a number of processes of welding have been developed. The Thermit process (see Alumino-Thermics) uses the heat developed in the reduction of oxide of iron by finely powdered aluminium. The oxyacetylene blowpipe is widely used for autogenous welding. There are two types of welding by the electric current: (1) resistance of the joint to the electric current as in spot welding, etc., and (2) arc welding, using a carbon electrode, as in joining fish plates to rails, patching breaks or filling up worn spots, by melting in metallic rods, and using a metallic electrode which melts off and

forms the weld metal One form of electric-welding equipment, used in welding the tracks of street railways, consists of an air compressor and sand blast, by which the rails at the joints are thoroughly cleaned after removing the splice plates, and the welder, which is simply a large transformer with jaws that can be clamped upon the rail. By means of these jaws a bar of steel is clamped to the rail on each side with a pressure of about 1400 pounds. Current is then turned on and continued about two minutes. This heats the splice bars and rails sufficiently to cause the metals to flow and the bars and rails to unite firmly. Current is then turned off and the clamping pressure is increased to about 35 tons and continued until the joint cools. See OXYACETYLENE WELDING AND CUTTING.

Consult: L. A Groth, *Welding and Cutting of Metals by Aid of Gases or Electricity* (2d ed., New York, 1913); R. N. Hart, *Welding: Theory, Practice, Apparatus, and Tests* (2d ed., ib., 1914); Granjon and Rosemberg, *A Practical Manual of Autogenous Welding*, English translation by D. Richardson (3d ed., London, 1915); Theodore Kautny, *Autogenous Welding and Cutting* (Eng. trans., New York, 1915).

WELDON, RICHARD CHAPMAN (1849–). A Canadian legal scholar and educator. He was born at Sussex, New Brunswick, graduated at Mount Allison University in 1866, at Yale (Ph.D.) in 1872, and studied at Heidelberg. He was professor of mathematics at Mount Allison University in 1875–83, and in 1883–1914 was professor of constitutional law and dean of the law faculty, Dalhousie University. In 1884 he was called to the bar. He was a Conservative member of the House of Commons in 1887–96.

WEL'DON, WALTER (1832–85). An English chemist, born at Loughborough, Leicestershire. He was for a time engaged in his father's manufacturing business. In 1860 he founded a monthly entitled *Weldon's Register of Facts and Occurrences Relating to Literature, the Sciences, and the Arts*, which continued for four years. Then began a scientific career the more remarkable as the inventor was without practical knowledge of chemistry when he took out the first patents for his manganese regeneration process. By the manganese process (patented in 1867, but not applied commercially till 1869) the price of bleaching powder was reduced £6 a ton, while paper, calico, etc., became much cheaper in consequence. He was president of the Society of Chemical Industry in 1883–84.

WELFARE WORK. The special efforts of an industrial or commercial establishment designed adequately to maintain and improve the physical condition of its employees. Contemporaneously with the introduction of more efficient management and operation in factories and workshops, efforts of this kind have increased in number and, under expert social workers, have widened greatly in scope. Recognizing that the physical well-being of employees has a direct influence upon the quality and quantity of the product turned out by them, industrial welfare work may not be entirely altruistic, and in its simplest form involves providing adequate ventilation and light and generally more hygienic surroundings for the workers. In addition, there may be provided rest and lounging rooms, gymnasiums, athletic fields, shower baths, and swimming pools. For the largest establishments, hospitals and dispensaries are usual, where even the most trifling injuries to employees may be treated; lunch counters or restaurants supplying wholesome meals at cost, and, in some cases, stores selling direct to employees without profit Frequently, systematic and periodical physical examinations of employees are insisted on, and outside of the works, attention is devoted to their proper housing, along with providing an uncontaminated water supply and a sewage-disposal system. In not a few instances the surroundings of both homes and workshops have been beautified by landscape gardening, while lyceums, recreation centres, libraries, concerts, and other wholesome amusements are maintained, stimulated, or assisted by the management or owners.

WELHAVEN, vĕl'ha'ven, JOHAN SEBASTIAN CAMMERMEYER (1807–73). A Norwegian poet, born at Bergen, and educated at the University of Christiania. In 1825, while yet a student, he opposed himself to the patriotic but wild and tasteless first attempts of Henrik Wergeland to form a national literature. In 1832 he attacked the latter's poetry in a bitter book, *Henrik Wergelands Digtekunst og Polemik*, which raised a great storm and made Welhaven the champion of the cultivated and conservative classes. He followed this up by the publication of a cycle of satirical sonnets, *Norges Dæmring* (1834), and ultimately won over Wergeland as well as Norwegian writers generally to his literary standard In 1840 he became lecturer and in 1846 professor of philosophy in the University of Christiania. Welhaven's poetry by its perfection of form and delicate feeling for nature holds a permanent place in Norwegian literature. He published volumes of poems in 1839, 1845, 1848, 1851, and 1860, as well as two literary studies, *Holberg* (1854) and *Ewald og de norske Digtere* (1863) His collected works were published in eight volumes in 1867–69. Consult: J. B. Halvorsen, *Norsk Fortfatterlexikon* (Christiania, 1885–1908); Jaeger, *Illusteret Norsk Literaturhistorie* (ib., 1896); Gerhard Gran, *Norges Dæmring* (ib., 1899); id., *Nordmænd i det 19de Aarhundrede* (3 vols., ib., 1914); Arne Löchen, *J. S. C Welhavens Liv og Skrifter* (ib., 1900).

WELL. See ARTESIAN WELLS; WATER SUPPLY; WELL SINKING.

WELLAND, wĕl'and. A town and the county seat of Welland Co., Ontario, Canada, on Welland Canal (q.v.) and Welland River, 22 miles northwest of Buffalo, N. Y., and on the Michigan Central, Grand Trunk, Canadian Pacific, Pere Marquette, and other railways (Map: Ontario, F 8). There are two government docks and a turning basin. Pop., 1901, 1863; 1911, 5318.

WEL'LAND CANAL. An important Canadian ship canal, 27 miles long, between Lake Erie and Lake Ontario, begun in 1824 and completed in 1833. Its original dimensions were greatly enlarged until there was a depth of 14 feet. In 1913 a new and enlarged canal was started estimated to cost some $50,000,000 and entitled to rank as an engineering work with the Panama and New York State Barge canals. The new canal in the main follows the old line from Port Colbourne on Lake Erie to Allanburg, whence there is a new route to Lake Ontario The new canal is 200 feet wide at the bottom and has a depth of 25 feet, which later can be increased to 30 feet, the depth provided in the locks which are arranged for vessels of as great length as 800 feet. Seven lift locks, each with a lift of 46½ feet, are required, and the flight of three locks at Thorold will have a lift of

139½ feet, or greater than that of the locks at Gatun. The locks will be double and will have swinging single-leaf gates During the great war German agents plotted to destroy the Welland Canal, but were detected before any damage was done.

WEL'LER, SAM A witty and faithful cockney engaged by Mr. Pickwick, at the opening of Dickens's *Pickwick Papers*, as a body servant. The character is modeled on a comic actor, Sam Vale, well known in London for his wit and repartee

WELLES, wĕlz, **GIDEON** (1802–78). An American statesman. He was born in Glastonbury, Conn., and was a student for a time, without graduating, at Norwich University He early entered politics and, as editor and part owner of the Hartford *Times* from 1826 to 1836, he exerted a powerful influence in his State in favor of the Democratic party. He was an enthusiastic adherent of Andrew Jackson, and was said to have been the first to advocate his election to the presidency. From 1827 to 1835 he was a member of the State Legislature, where he advocated the abolition of imprisonment for debt and opposed a proposed measure for excluding from the courts such witnesses as did not believe in "a future state of rewards and punishments" He was comptroller of the State in 1835 and again in 1842 and 1843, was postmaster at Hartford from 1835 to 1842, and from 1846 to 1849 was chief of the Bureau of Provisions and Clothing in the Navy Department. Joining the Republican party soon after its organization, he was a delegate to the National Convention at Chicago in 1860, and in 1861 became Secretary of the Navy in President Lincoln's cabinet. In this position, though utterly ignorant of navigation and ship construction, he evinced great executive ability, managing the navy with the greatest efficiency during the Civil War, and was besides a valuable adviser of the President on matters of general policy. Being reappointed by President Lincoln in 1865, he was retained by President Johnson, and served throughout the latter's administration. Subsequently, in 1872, he joined the Liberal Republicans, and in 1876, as an adherent of Samuel J. Tilden, took an active and somewhat acrimonious part in the Tilden-Hayes controversy. He published a volume entitled *Lincoln and Seward* (1874). *The Diary of Gideon Welles* (3 vols., 1911) is a most important source for the period of the Civil War.

WELLESLEY, wĕlz'lĭ. A town, including several villages, in Norfolk Co., Mass., 15 miles west of Boston, on the Boston and Albany Railroad (Map· Massachusetts, E 3). It is attractively situated and has well-shaded streets and many handsome residences. The chief feature of the town is Wellesley College (q.v.). There are also here Dana Hall, a school for girls, the Academy of the Assumption, and a large public library. Pop., 1900, 5072; 1910, 5413; 1915 (State census), 6439.

WELLESLEY, ARTHUR, first **DUKE OF WELLINGTON.** See WELLINGTON.

WELLESLEY, HENRY RICHARD CHARLES. See COWLEY, first EARL.

WELLESLEY, RICHARD COLLEY WELLESLEY, MARQUIS (1760–1842). A British administrator of India. He was the eldest son of Garret Wellesley, first Earl of Mornington, and brother of the Duke of Wellington. He was born at Dangan Castle, Ireland, and was educated at Harrow, Eton, and Christ Church, Oxford, but never took a degree, on account of his father's death in 1781, which compelled him to end his studies. In 1784 he entered the English House of Commons, and in 1793 became a member of the Board of Control of Indian Affairs. On the resignation of Lord Cornwallis in 1797 Wellesley was appointed Governor-General of India. He immediately concluded several treaties with the powerful native rulers, which assured either their alliance or neutrality in the impending struggle with France In 1799 Mysore, the country of the hostile Tipu Sahib, son of Hyder Ali (q.v.), was invaded by a British force, and in a very short time the dreaded Sultan was overthrown. Wellesley now established several dependent principalities, a procedure which became for a long time the British policy in dealing with the native states. As a reward for his services he was created Marquis Wellesley in the Irish peerage. He extended British rule in many directions, and also paid much attention to the internal affairs of the British provinces. The Mahratta War of 1803–05 was marked by the victories of Arthur Wellesley, Lake, and others. The administration of the Marquis of Wellesley terminated in 1805. In 1809 he was sent as envoy to Spain, and in the same year he became Secretary of State for Foreign Affairs under Perceval. He acquitted himself well in the many important negotiations that required his attention. After Perceval's assassination in 1812 he tried to form an administration of his own, but in vain. Until 1821 Wellesley remained out of office, and was usually in opposition, believing that it would have been better to allow Napoleon to continue to rule, though with restricted power. In 1821 he accepted the position of Lord Lieutenant of Ireland, and was at first well received by all parties, but when he sought to reconcile Catholics and Protestants, he aroused the opposition of the Orangemen. He resigned in 1828, but held the same office again in 1833–34. He retired to private life, and died Sept. 26, 1842. He was one of the greatest colonial administrators Great Britain has ever had, and together with Dalhousie and Hastings firmly established the British power in India. Consult: Montgomery Martin, *Despatches, Minutes, and Correspondence of the Marquis Wellesley during his Administration in India* (5 vols., London, 1836); W. H. Hutton, *The Marquis Wellesley* (Oxford, 1893); *The Wellesley Papers*, by "The Editor of the Windham Papers" (2 vols., ib., 1914). See INDIA.

WELLESLEY COLLEGE. An institution for higher education of women, founded in 1875 at Wellesley, Mass., by Henry Fowle Durant. Students are admitted either by examination or by certificate from approved schools. Courses are largely elective and lead to the degree of B.A. and M.A. The college is a contributor to the American schools of classical study at Rome and Athens, to the Marine Biological Laboratory at Woods Hole, Mass., and to the Zoölogical Station at Naples. On May 12, 1914, the main building of the college was destroyed by fire. The attendance in 1915–16 was 1512. The force of instructors numbered 134, and the library contained 85,114 volumes in the same year. The endowment was $2,074,512, and the gross income (exclusive of dormitories) was $413,812.71. The dean in 1916 was Ellen F. Pendleton. Consult Florence Converse, *The Story of Wellesley* (Boston, 1915).

WELLESLEY PROVINCE. A province of Penang (q.v.), the most northerly of the British Straits Settlements (q.v.), on the west coast of the Malay Peninsula (Map: Burma, C 5). Area, 280 square miles; pop., 1911, 128,978. Tapioca, rice, sugar, and pepper are produced.

WELLHAUSEN, vĕl'hou-zen, JULIUS (1844–). A German Orientalist and biblical scholar. He was born at Hameln, and studied under Ewald at Gottingen. In 1872 he became professor of theology at Greifswald, but resigned in 1882, and became first privatdocent and then associate professor of Oriental languages in the philosophical faculty at Halle In 1885 he was called as professor to Marburg and in 1892 to Göttingen, he retired from his chair in 1913. As an Old Testament scholar Wellhausen holds a unique position for his work in literary criticism and historical reconstruction. Through his writings he probably exercised a greater influence on his generation than any other biblical critic Among his numerous publications are: *Text der Bucher Samuelis* (1871); *Pharisaer und Sadducaer* (1874); *Geschichte Israels* (1878), expanded into *Prolegomena zur Geschichte Israels* (1883; 6th ed., 1905; Eng. trans, *Sketch of the History of Israel and Judah*, 3d ed., 1891); *Israelitische und judische Geschichte* (1894, 7th ed., 1914); *Die Composition des Hexateuchs* (1885; 3d ed., 1899); *Die Kleinen Propheten* (1892; 3d ed., 1898); *The Book of Psalms*, in Haupt's *Sacred Books of the Old Testament* (1895; Eng. trans., 1898); and an edition of Bleek's *Einleitung in das Alte Testament* (6th ed., 1893). In the field of early Arabic literature and history he published *Muhammed in Medina* (1882); *Lieder der Hudhailiten* (1884); *Reste arabischen Heidentums* (1887; 2d ed., 1897); *Medina vor dem Islam* (1889); *Prolegomena zur altesten Geschichte des Islams* (1899); *Ein Gemeinwesen ohne Obrigkeit* (1900), *Die religios-politischen Oppositionsparteien im alten Islam* (1901); *Das arabische Reich und sein Sturz* (1902). His later works, chiefly on New Testament literature, include: *Das Evangelium Marci* (1903); *Das Evangelium Matthai* (1904); *Das Evangelium Lucä* (1904); *Einleitung in die drei ersten Evangelien* (1905; 2d ed., 1911); *Analyse der Offenbarung Johannis* (1907); *Evangelium Johannis* (1908). A complete bibliography is given by A. Rahlfs in *Studien zur semitischen Philologie und Religionsgeschichte Julius Wellhausen gewidmet* (Giessen, 1914).

WELLINGBOROUGH. A town in Northamptonshire, England, 10½ miles east-northeast of Northampton (Map: England, F 4). It has manufactures of boots and shoes, and there are iron-ore mines, blast furnaces, and chalybeate springs. Pop, 1901, 18,412; 1911, 19,753.

WELLINGTON. The capital of New Zealand, beautifully situated on a bay of Port Nicholson, an inlet of Cook's Strait, on the south coast of North Island (Map: New Zealand, N. I., B 8). The harbor is a fine expanse of water six miles long and five miles broad, and has excellent wharf accommodations. In 1913 the total volume of its trade, both imports and exports, amounted to $58,387,770. Since the removal of the seat of government hither from Auckland in 1865 the town has made rapid progress; it possesses a number of good public buildings, including a handsome structure for the use of the House of Representatives and the Legislative Council. The streets are generally spacious. Wellington has two cathedrals, together with numerous other denominational places of worship, Freemasons' Hall, a public library, fine botanical gardens, a public park, and extensive water works. Victoria College is affiliated with the University of New Zealand The industrial establishments include flour and saw mills, tanneries, foundries, meat-preserving factories, soap and candle works, brick kilns, breweries, etc. Founded by Colonel Wakefield in 1840, Wellington was the first settlement of the New Zealand Company. Pop., 1911, 64,372, with suburbs, 70,729.

WELLINGTON. A city and the county seat of Sumner Co., Kans., 30 miles south of Wichita, on Slate Creek, and on the Chicago, Rock Island, and Pacific, and the Atchison, Topeka, and Santa Fe railroads (Map. Kansas, E 8). It is an important shipping centre for grain, live stock, and farm produce, and has large flouring mills, grain elevators, a broom factory, an ice plant, and railroad shops. There are extensive salt deposits. Wellington has a Carnegie library and fine city hall and courthouse buildings. The commission form of government has been adopted Pop., 1900, 4245; 1910, 7034.

WELLINGTON, ARTHUR MELLEN (1847–95). An American civil engineer, born in Waltham, Mass. He graduated from the Boston Latin School at 16 and for three years was an articled student with John B. Henck, an engineer and author of *Henck's Field Book.* After about a year as assistant engineer in the construction of Prospect Park, Brooklyn, under F. L. Olmsted (q.v), he began his railway engineering career in 1868 in charge of a locating party on the Blue Ridge Railroad, South Carolina After various other railway engineering engagements he was chief assistant in the engineering department of the New York, Pennsylvania, and Ohio Railway in 1878–81, afterward held positions with the Mexican Central and the Mexican National railways. He became an editor of the *Railway Gazette* in 1884, and one of the chief editors and owners of the *Engineering News* in 1887. With the latter journal he continued until his death, serving also as consulting engineer for many enterprises, including the abolition of grade crossings at Buffalo, the improvement of railway terminals and erection of the Board of Trade building at Toronto, and the plans for the Boston subway. He published: *Computation of Railway Earthwork from Diagrams* (2 vols, 1874); *The Economic Theory of Railway Location* (1877 and 1887), which won him international recognition; *Car Builders' Dictionary* (1884); *Field Work of Railway Location and Laying Out of Works* (1889).

WELLINGTON, ARTHUR WELLESLEY, first DUKE OF (1769–1852). A British general and statesman. He was the fourth son of Garret Wellesley, first Earl of Mornington, and was born in 1769, probably on the 29th of April, at Dublin, though both the date and the place are doubtful His education was begun at a private school at Chelsea, whence he was sent to Eton, where he remained until the death of his father in 1781. He was an unpromising boy, and his mother, deciding that her "ugly boy Arthur" was "fit food for powder and nothing else," sent him to a military academy at Angers, France, for one year. He entered the army in 1787, and rose rapidly, receiving his commission as colonel in 1796. At first he saw but little of military service, but in 1794–95 he served with conspicuous

gallantry in Holland against Pichegru. In 1796 Wellesley was ordered to India, and arrived at Calcutta with his regiment in the following year. His brother, the Earl of Mornington, afterward the Marquis of Wellesley, was named Governor-General, and landed at Calcutta in May, 1798. In August Wellesley was transferred to the Madras establishment. In 1799 the campaign of the English against Tippu Sahib, ruler of Mysore, was undertaken. Wellesley commanded the English left at Malavelly, but remained with the reserves when Seringapatam was stormed. Nevertheless he was named Governor of the conquered state, and until the beginning of 1803, save for brief intervals, was in control of both the military forces and the civil administration. In 1800 he pursued and defeated Dhundiah Waugh, a freebooter who had collected an army of 40,000 and was invading Mahratta territory. In the Mahratta War of 1803–05, Wellesley commanded the English forces in the south. After capturing the fortress of Ahmednagar, he unexpectedly found himself at Assaye in the presence of about 40,000 Mahratta troops with 100 guns, while he had only 4500 men and 17 guns, together with about 5000 auxiliary troops. He assumed the offensive, and by means of daring but hazardous movements won a complete victory (September 23). The battle of Argaum and the storming of Gawilgarh completed the discomfiture of the Mahratta chiefs. Wellesley received the thanks of Parliament and was made K.C.B. In 1805 he sailed for England.

During the three years from Wellesley's landing in England until his departure for Portugal he held various minor military offices. In 1806 he took his seat in Parliament for Rye. He was returned again in 1807, and in the same year was named Privy Councilor and Chief Secretary for Ireland, holding the latter office for two years. He distinguished himself in the expedition against Copenhagen in 1807, and in the following year was commissioned lieutenant general. In July, 1808, Wellesley sailed from Cork with the first English contingent destined to aid the Portuguese and Spanish in their revolt against Napoleon. It was intended that he should be fourth in command, the superior officers following with reënforcements. He landed at Mondego Bay and gained the victory of Vimeiro (August 21), which resulted in the Convention of Cintra, providing for the peaceful withdrawal of the French troops in English vessels from Lisbon. Wellesley was superseded on the day following the battle, and, finding his advice disregarded, retired to England. Both he and his two superiors were brought before a court of inquiry to justify the Convention of Cintra, which was unpopular in England. The English army, however, which had been under the command of Sir John Moore (q.v.), having been forced to embark at Corunna owing to the overwhelming numbers of the French, Wellesley was sent to Portugal with a new force, landing at Lisbon April 22, 1809.

Throughout the Peninsular campaigns Wellesley was hampered by the lack of supplies and men, and by the incompetence of his Spanish allies. He had, moreover, to cope with overwhelming numbers of the enemy. There were about 300,000 French soldiers in the Peninsula during the greater part of the time. The necessity of keeping down an insurgent population involved their wide dispersal, however, and gave Wellesley his opportunity to attack them in detail, relying on the badness of the Spanish roads to prevent their rapid concentration. On May 12, 1809, Wellesley drove Soult from Oporto, and on July 27–28 defeated an army nearly twice as large as his own under Victor at Talavera, not far from Madrid But he had insufficient forces to maintain the position gained, and retreated to Portugal. For these victories he was made Baron Douro of Wellesley and Viscount Wellington of Talavera. Early in 1810 Napoleon sent 150,000 reënforcements into Spain, and formed an army of 80,000 under Masséna to drive the English into the sea. Wellington retired stubbornly before the superior forces of the enemy, devastating the country as he went, until he reached the lines of Torres Vedras (q.v.), barring the way to Lisbon. Masséna remained helpless before the English position from Oct. 12, 1810, to March 11, 1811, when scarcity of supplies forced him to retreat, stubbornly followed by Wellington. On April 5 Masséna recrossed the Portuguese frontier, having lost 30,000 men. This marks the turning point in the Peninsular War. Parliament no longer wavered in its support, and Napoleon was already withdrawing troops for the Russian campaign. Wellington captured the frontier fortresses of Ciudad Rodrigo (Jan. 19, 1812) and Badajoz (April 6), and the way was open into Spain. On July 22 he utterly defeated a superior force under Marmont at Salamanca, and entered Madrid amid great enthusiasm The French completely abandoned southern Spain and gathered in such numbers that Wellington, after besieging Burgos in vain, retreated to Portugal. For this campaign he was made Marquis of Wellington. The campaigns of 1813 and 1814 were fought with the fortunes of Napoleon in full decline. On June 21, 1813, Wellington defeated King Joseph at Vitoria. The fortresses of San Sebastián and Pamplona fell into his hands and the French forces under Soult were driven across the Pyrenees. In 1814 Wellington was already in possession of Bordeaux, and after an engagement with Soult in April he was on the point of entering Toulouse when news of peace put an end to hostilities. For these closing campaigns Wellington was made Marquis of Douro and Duke of Wellington, and received a grant of £400,000. In July, 1814, he was sent as Ambassador Extraordinary to France, but in February, 1815, was transferred to the Congress of Vienna. Upon the return of Napoleon from Elba he was summoned to command the forces of the English and allies in Belgium, in coöperation with a Prussian army under Blücher. The battles of Ligny (q.v.) and Quatre Bras (q.v.) were followed on June 18, 1815, by the great battle of Waterloo (q.v.), which finally shattered the power of Napoleon. From 1815 to 1818 Wellington commanded the army of occupation in France.

On his return to England he was made master general of the ordnance, with a seat in the cabinet. He represented England in the Congress of Verona (1822), where he advocated the policy of noninterference in Spanish affairs. In 1826 he went to Russia to negotiate a treaty providing for the partial independence of Greece. He was an extreme Tory, contending for the political influence of wealth and the supremacy of the landed aristocracy. He distrusted and disliked popular movements and was inclined to regard them as the result of artificial and unscrupulous agitation. He advocated the supremacy of

the English settlers in Ireland, deprecated political concessions to the Irish people, and opposed Catholic emancipation and the reform of Parliament. He was a member of the cabinet until the retirement of Lord Liverpool, February, 1827, but he refused to serve during the short premiership of Canning. After the brief administration of Goderich, Wellington was Prime Minister from January, 1828, to November, 1830. His previous military career unfitted him in many ways for the office, and there was much dissension in the Ministry In 1829 Wellington forced through Parliament the Catholic Emancipation Act, having become convinced that it was the only way to avert a war with the Irish nation. In 1830 he declined to consider proposals for the reform of parliamentary representation, and his Ministry was outvoted in the House of Commons. Wellington incurred intense unpopularity by his stubborn resistance to the Reform Bill in 1831–32. His house was mobbed and he was hooted in the streets. In the end he persuaded the Lords to give way in order to avert the creation of new peers. In 1834 he was elected chancellor of the University of Oxford. From December, 1834, to April, 1835, he was Secretary of State for Foreign Affairs under Peel. He took a less active part in subsequent political events, yet the prestige of his name was so great and his advice so prized that he was made a member of Peel's second cabinet without a portfolio (1841–46). In 1842 he was named commander in chief for life, a post which he had previously occupied for short periods. From 1845 to 1846 he was President of the Privy Council. In his last years he regained his popularity, and was the idol of the English nation. He died Sept. 14, 1852, and was buried in St. Paul's Cathedral.

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WELLMAN, WALTER (1858–). An American journalist, explorer, and aëronaut, born at Mentor, Ohio. He received a common school education. In 1879 he founded the Cincinnati *Evening Post*, and after 1884 was the Washington correspondent successively of the Chicago *Herald* and the Chicago *Times-Herald*. In 1892 he attempted to locate the first landfall of Columbus, and built a monument on Watling Island, in the Bahamas, on the assumed spot. In 1894 he led an expedition to the Arctic regions to a point on the eighty-first degree of latitude, northeast of Spitzbergen. In 1898–99 he led another expedition to the Arctic regions, making Cape Tegetthoff in Franz Josef Land his base of operations, and spending the winter there. He established an outpost at Cape Heller, from which in the early spring of 1899 he started on a dash for the pole, but at the end of March, when the party had reached a point off the coast of Rudolf Land, near the eighty-second parallel, he was compelled by an accident to retreat From 1906 to 1910 he devoted his energies wholly to aviation. In the three summers of 1906, 1907, and 1909, he made efforts to explore the unknown areas of the polar regions to the north of Spitzbergen, using Danes Island as his base The first two attempts were wholly without results, but in 1909 his balloon traveled about 60 miles to the northeast before falling on the ice pack. In 1910, with five companions, he made a daring attempt to cross the Atlantic in the airship "America." After a hazardous voyage of 1000 miles or more, the balloon fell into the ocean about 375 miles from Cape Hatteras, where the aviators were rescued by a passing steamer.

WELLS. A city in Somersetshire, England, pleasantly situated at the foot of the Mendip Hills, 15 miles southwest of Bath (Map: England, D 5) The cathedral dates from the first half of the thirteenth century, and is for the most part in Early English; its west front, one of the noblest façades in the Kingdom, enriched with 300 statues, is Gothic. One of the most important of Wessex towns in Saxon times, Wells was created a see in 905. Pop, 1901, 4849; 1911, 4655.

WELLS, FROZEN. See FROZEN WELLS.

WELLS, BENJAMIN WILLIS (1856–). An American scholar and editor, born at Walpole, N. H. He graduated in 1877 at Harvard, and there took the degree of Ph.D. in 1880. Later he studied for a time at Berlin, held a fellowship at Johns Hopkins University, was an instructor in the Friends' School, Providence, R. I., from 1882 to 1887, and from 1891 to 1899 was professor of modern languages in the University of the South at Sewanee, Tenn. In 1899 he joined the editorial staff of the *Churchman* in New York City, and remained a member of that staff until 1912. Besides writing numerous magazine articles, he edited a number of school texts in French and German, contributed to the NEW INTERNATIONAL ENCYCLOPÆDIA, and published: *Modern German Literature* (1895); *Modern French Literature* (1897); and *A Century of French Fiction* (1898). With W. P. Trent, he edited *Colonial Prose and Poetry, 1607–1775* (1901).

WELLS, CAROLYN (?–). An American author. Born in Rahway, N. J., she was engaged after 1895 in literary work, chiefly in New York. In addition to series of books for young people, her writings—stories, sketches, light and humorous verse, clever parodies—include: *At the Sign of the Sphinx* (1896); *The Story of Betty* (1899); *Children of Our Town* (1902); *A Matrimonial Bureau* (1905); *Emily Emmins Papers* (1907); *Fluffy Ruffles* (1907), which caught the popular fancy, and was widely read; *The Rubaiyat of Bridge* (1909); *The Gold Bag* (1911); *The Lover's Baedeker* (1912); *Technique of the Mystery Story* (1913); *The Maxwell Mystery* (1913); *Two Little Women* (1915); *The Curved Blades* (1916). As an anthologist she was responsible for: *A Nonsense Anthology* (1902); *A Parody Anthology* (1904); *A Satire Anthology* (1905); *A Whimsey Anthology* (1906).

WELLS, CHARLES (1838–1917). An English Orientalist, born in London and educated at King's College, London, where he won the Turk-

ish prize in 1860 He was professor of English at the Imperial Naval College at Constantinople in 1870–74, and became professor of Turkish in King's College, London, in 1889, and Oriental translator to the Foreign Office in 1892. His publications are *Ilm Tedbir-i-Mulk* (1860), an essay on Turkish political economy, *Mehemet, the Kurd, and Other Tales from Eastern Sources* (1865); *A Practical Grammar of the Turkish Language* (1880); *The Literature of the Turks* (1891). He also published a revised and enlarged edition of Redhouse's *Turkish Dictionary* (1880).

WELLS, CHARLES JEREMIAH (c.1799–1879). An English poet, born probably in London. He was a friend of Keats, who dedicated a sonnet to him Wells published anonymously a volume called *Stories After Nature* (prose) in 1822, and in 1824 *Joseph and His Brethren, a Scriptural Drama*, which bore the pseudonym H. L. Howard on the title-page. These having met with no success, he abandoned literature, retired for a time to Wales; then removed to Brittany. Subsequently *Joseph* was lavishly praised by critics of the Swinburnian school, and in 1876 a revision of it was published with a critical introduction by Swinburne. It is distinguished by brilliant character study and richness of diction.

WELLS, DAVID AMES (1828–98). An American economist, born at Springfield, Mass. He graduated at Williams College in 1847 and at the Lawrence Scientific School (Harvard) in 1851. His early interests were in the natural sciences and he published textbooks on physics, chemistry, and geology. In 1864 he won a considerable reputation in politics through an essay *Our Burden and Our Strength*. In 1865 he was made chairman of a commission to inquire into methods of raising Federal revenues, and in 1866 was appointed special commissioner of the revenue. Later he was a member of several commissions, State and Federal, and he rendered distinguished service in private enterprises, notably in the reorganization of the Alabama and Chattanooga Railway and of the Erie Railway. He was a prolific writer on economics and finance, at first defending the protectionist policy, later becoming an extreme advocate of free trade. His principal works are: *Our Merchant Marine* (1882); *A Primer of Tariff Reform* (1884); *Practical Economics* (1885); *The Relation of the Tariff to Wages* (1888); *Recent Economic Changes* (1889); *The Theory and Practice of Taxation* (1900).

WELLS, F(REDERIC) LYMAN (1884–). An American psychiatrist. He was born in Boston, and was educated at Columbia (A.B., 1903; Ph.D., 1906), where he was an assistant in psychology (1905–06). He lectured at Barnard College in 1906–07, and thereafter was assistant pathological psychologist of McLean Hospital at Waverley, Mass. His investigations dealt with mental tests, the psychology of speech lapses, and psychopathology.

WELLS, HERBERT GEORGE (1866–). An English novelist. His father was a shopkeeper and his mother, who had been a lady's maid, became a housekeeper to eke out the family fortunes. He says himself, "I was born in that queer indefinite class that we in England call the middle class. I am not a bit aristocratic." He was born at Bromley, Kent. The winning of scholarships enabled him to study at the Royal College of Science and at London University, where he took his B.Sc. with honors, having studied under Professor Huxley. Earlier, however, he had been a drug clerk and a dry-goods clerk. After graduating from the university he taught biology for several years His beginnings in literature were contributions to the magazines and reviews, among them the *Pall Mall Gazette*, *Nature*, and the *Saturday Review*. His first hit he made with *The Time Machine* (1895), one of a number of popular romances or fantasies, which include scientific and sociological forecasts, and some of which are not without their indebtedness to Jules Verne's stories. Among these may be mentioned: *The War of the Worlds* (1898), in which our planet is invaded by monstrous creatures from Mars; *When the Sleeper Wakes* (1899), which pictures a world where men are the slaves of a huge tyrannical trust; *The Food of the Gods* (1904), where we are amongst the giants; and *In the Days of the Comet* (1906), in which human nature undergoes a sudden change for the better. In a group of his books concerned with socialistic theories and a variety of sociological topics stand: *Anticipations* (1901), which presents a picture of a society organized by the engineer with perfect scientific efficiency; *A Modern Utopia* (1905), an imaginary realization of the socialistic state, governed by a sort of beneficent Samurai; and *First and Last Things* (1908), a general statement of the foundations of Wells's socialistic creed. But it is likely that Wells will be longer remembered as a novelist than as a popular writer of romances or as a social thinker. Among the novelists of his generation he held a foremost place, thanks to his skill in characterization, his story-teller's gift, his whimsical humor, his interesting presentation in the form of fiction of advanced social and moral ideas, and his studies of contemporary English life and manners. Representative, if widely different, novels of his are: *Tono Bungay* (1909); *Ann Veronica* (1909); *The New Machiavelli* (1911); *The Passionate Friends* (1913); *The Wife of Sir Isaac Harman* (1914); and *The Research Magnificent* (1915), which was hailed as one of his most notable achievements. His writings include also: *The Island of Dr. Moreau* (1896); *The Invisible Man* (1897); *Tales of Space and Time* (1899); *Love and Mr. Lewisham* (1900); *Mankind in the Making* (1903); *The Future of America* (1906), a result of the author's visit to the United States in the year preceding publication; *War in the Air* (1908); *New Worlds for Old* (1908); *The History of Mr. Polly* (1910), one of the most engaging of impossible chronicles; *Social Forces in England and America* (1914); *The World Set Free* (1914); *Bealby* (1915), in quizzical gayety resembling *Mr. Polly*; and *What is Coming?* (1916). In 1897 a volume of Wells's essays entitled *Certain Personal Matters* made its appearance, and, in 1911, a collection of his best short stories—*The Country of the Blind. Boon: the Mind of the Race*, etc. (1915), a group of satires, though not published under his name, was undoubtedly from his pen. In 1915 a Russian edition of his novels was brought out. Consult: G. K. Chesterton, *Heretics* (New York, 1905); Victor Brooks, *The World of H. G. Wells* (ib., 1914); J. D. Beresford, *H. G. Wells* (ib., 1915).

WELLS, HORACE (1815–48). An American dentist, born in Hartford, Vt. He studied dentistry in Boston, and practiced it for a time there till 1836, when he removed to Hartford, Conn. He had already conceived the idea that

some anæsthetic might be used in dentistry to prevent pain, and had thought of the employment of nitrous oxide gas as early as 1840 In 1844 he used it successfully in several cases. Early in 1845 he communicated his discovery to Drs. J. C. Warren, W T. G. Morton, C. T. Jackson (qq.v.), and others in Boston. In 1846 Morton and Jackson obtained a patent for anæsthetics against the remonstrance of Wells. After a visit to Paris, where he communicated his discovery to the French medical societies, and on his return to America, he published *A History of the Discovery of the Application of Nitrous Oxide Gas, Ether, and Other Vapors to Surgical Operations* (1847) The dispute as to his discovery and the constant experiments upon himself with chloroform affected his mind While in New York, where he was urging his claims before the medical profession, he committed suicide. See ANÆSTHETIC; MORTON, W. T. G. Consult *Dr. Wells, the Discoverer of Anæsthesia* (New York, 1860).

WELLS, HORACE LEMUEL (1835–1924). An American chemist. He was born in New Britain, Conn., and graduated at the Sheffield Scientific School (Yale) in 1877. After serving as chemist to the Connecticut Agricultural Experiment Station and the Colorado Coal and Iron Co., in 1884 he returned to Yale, where he remained, becoming in 1894 professor of analytical chemistry and metallurgy. In 1903 he was elected to the National Academy of Sciences Among his scientific researches the more important are concerned with the double halogen salts, and the double and triple salts, especially of the alkali elements. Besides translating Fresenius' *Qualitative Analysis*, he published: *Studies from the Chemical Laboratory of the Sheffield Scientific School* (1901); *Chemical Calculations* (1903); *Text Book of Chemical Arithmetic* (1905).

WELLS, THOMAS See WELDE, THOMAS.

WELLS, SIR THOMAS SPENCER (1818–97). An English surgeon, born at St. Albans (Hertfordshire), and educated at Trinity College, Dublin, and at St. Thomas's Hospital, London. In 1841 he was admitted to the Royal College of Surgeons. After serving in the Naval Hospital at Malta (the Crimean War was then in progress), he studied under Magendie in Paris, and in 1853 established himself as an ophthalmic surgeon in London. He was chosen surgeon at the Samaritan Free Hospital for Women and Children (1854). There he began the work in abdominal surgery which made his name famous. In 1858 he first performed the operation of ovariotomy. In 1882 he became president of the College of Surgeons and in the following year was created Baronet. He was one of the first advocates of cremation in England. He published: *Practical Observations on Gout and its Complications* (1854); *Cancer Cures and Cancer Curers* (1860); *Diseases of the Ovaries: Their Diagnosis and Treatment* (1865–72; also Leipzig, 1866–74); *On Ovarian and Uterine Tumors: Their Diagnosis and Treatment* (1882; also Milan, 1882); *Diagnosis and Surgical Treatment of Abdominal Tumours* (1885; also Paris, 1886).

WELLS, WEBSTER (1851–1916). An American mathematician, born in Boston. He graduated in 1873 at the Massachusetts Institute of Technology, where he taught thereafter, being professor of mathematics from 1893 to 1911. His publications include: *Plane and Spherical Trigonometry* (1884); *Plane and Solid Geometry* (1887); *Higher Algebra* (1889); *College Algebra* (1890), *Academic Arithmetic* (1893), *Complete Trigonometry* (1900); *Advanced Course in Algebra* (1904); *A First Course in Algebra* (1908); *A Second Course in Algebra* (1909); *Plane Geometry* (1915).

WELLS, WILLIAM CHARLES (1757–1817). An American scientist, born in Charleston, S. C. He graduated at Edinburgh in 1780, and subsequently at Charleston was printer, bookseller, and merchant. In 1782 he accompanied the Loyalist troops to St. Augustine, Fla., where he was editor of the first weekly newspaper in the province. In 1784 he went to London, and in 1800 became a physician of St. Thomas's Hospital His scientific reputation is based upon his *Essay on Dew* (1814; new ed., 1866). In a paper read by him in 1813 before the Royal Society he recognized, according to the statement of Charles Darwin, the principle of natural selection. He also published *Single Vision with Two Eyes* (1792). His essays were published with an autobiography in 1818

WELLSBORO, wĕlz'bŭr-ō. A borough and the county seat of Tioga Co., Pa., 80 miles by rail north by west of Williamsport, on the New York Central Railroad (Map: Pennsylvania, G 2) It contains the Green Free Library, Woodland Park, and the Wellsboro Conservatorium of Music. Wellsboro is the shipping point and trade centre for a large area, and has fruit evaporators, flour and woolen mills, a milk-condensing plant, marble works, saw mills, foundry and machine shops, and manufactories of cut glass, chemicals, rugs, bolts, cigars, carriages, and furniture. Pop., 1900, 2945; 1910, 3183.

WELLSBURG. A city and the county seat of Brooke Co., W. Va., 16 miles north of Wheeling, on the Ohio River, and on the Pittsburgh, Cincinnati, Chicago, and St Louis and the Wabash Pittsburgh Terminal railroads (Map: West Virginia, D 1). The manufactures include glass and glassware, cigars, coal, paper, oil cans, paper bags, tin plate, and foundry products. Bethany College is situated near here. The river at this point is spanned by a large cantilever railroad bridge. Pop., 1900, 2588; 1910, 4189.

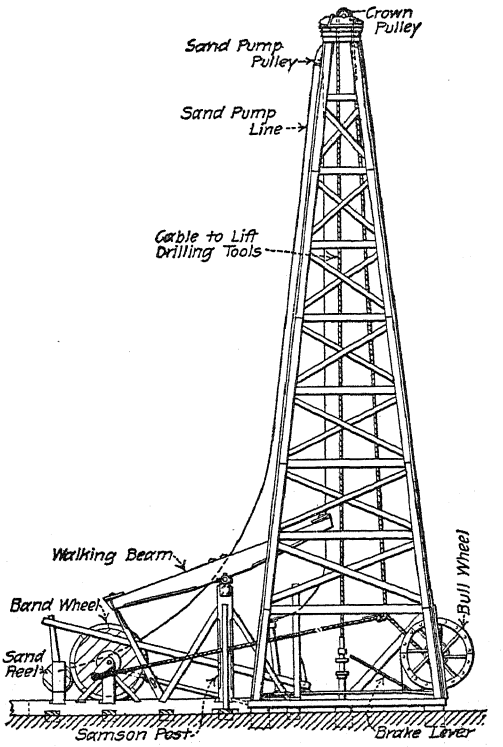
WELLS COLLEGE. An undenominational academic institution for women at Aurora, N. Y., founded in 1868 by Henry Wells. The courses of instruction are partially elective and lead to the degree of bachelor and master of arts and bachelor of music. There were, in 1915, 200 students and 33 instructors. The library contained 26,000 volumes The grounds and buildings were valued at $400,000, the total value of the college assets being $975,000, the endowment $360,000, and the income $130,000. The president in 1916 was Kerr Duncan MacMillen.

WELL SINKING (AS. *well, wel,* well, spring, OHG. *wella,* Ger. *Welle,* wave, billow, from AS. *weallan,* to boil up). The digging, boring, or drilling of holes in the earth for the development of supplies of water, petroleum, natural gas, or salt. The process is generally accompanied or followed by the curbing or casing of the well to prevent choking by the material penetrated, or to shut out liquids except the yield of the stratum which the well is designed to tap. Besides the development of subterranean liquids, wells or their equivalent in construction are also used in prospecting for solid minerals and in determining the character of soil and rock, foundations, and other engineering structures. Wells vary in diameter from 1 inch to

100 feet and in depth from 5 feet to 6000 feet. The methods of sinking depend upon the character and depth of the material penetrated, rather than the object for which they are sunk. Wells are classified according to methods of sinking, as dug, drilled, bored, driven, and jetted; by the lining employed, as curb, tube, and case; as open, in the case of large, shallow wells; as shallow or deep; and as artesian, flowing, nonflowing, or pumping.

Wells from a few feet to a hundred or so in diameter and depth are generally sunk by means of picks and shovels, or by digging. The sides frequently require to be supported while the sinking is under way, particularly if quicksand or large quantities of water are encountered. Sheet piling or planks driven into the ground at the outer edge of the excavation may be employed, with proper cross bracing where necessary, or a wooden or metal crib or caisson provided with a shoe or cutting edge may be used. The latter generally sinks of its own weight as the material within the well is removed. The sinking process may be and generally is aided by building the curb or lining wall directly on the shoe, the increasing weight gradually forcing the shoe and curb downward. More or less water is likely to be encountered. It may be removed by a centrifugal pump, a pulsometer, or a direct-acting steam pump. Small wells of no great depth, provided with a metal tubing or casing, are often driven by hammer blows, whence the name "driven" or "tubular" wells. The tubes thus driven may have solid, pointed ends or drive points, or their lower ends may be open. In any case the lower sections must be perforated. Both round holes and slotted holes are employed, and where very fine material is encountered gauze wire strainers may be necessary. If the well casing is open at the bottom the material pierced must be removed by sand pumps or buckets, or by a hydraulic or steam jet. Artesian wells and most other deep wells penetrate more or less rock. Some shallow wells also go through or into rock, particularly in prospecting for coal and the like, or in exploring for foundations. In all such cases resort is had to drilling. For relatively small and shallow holes ordinary hand drills and diamond drills may be used. (See DRILL.) But in most operations for water, gas, and oil wells a regular drilling rig is necessary after rock is struck. So long as the sinking is through sand or other easily worked material, wrought iron or steel tubing may be driven down with mauls, either by hand, horse, or steam power; by means of a jet; or by the sand pump or bucket method, combined with rotation of the tube or casing. The hydraulic jet is simply a stream of water under pressure introduced at the bottom of the well through a supply pipe, or through a hollow drill. The force of the water aids in loosening the material and also brings it to the surface. The sand pump or bucket is a simple form of pump, lowered into the well hole, filled, raised, and emptied.

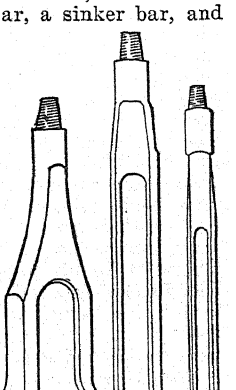
In drilling deep wells for gas, oil, or water the most common outfit employed is a portable derrick rig combined with a boiler, engine, drill, and accessories, and the necessary hoisting apparatus for raising and lowering the drills and the sand pumps. For oil wells of over 3000 feet depth the old timber tower rig is the best equipment; the tower and power plant may be left in place to operate a pump, the latter being substituted for the drill. Derricks for drilling wells are some 20 feet square at the base, 70 feet to 110 feet high, built up of either timber or steel. The engine drives a band wheel to which



STANDARD OIL-FIELD RIG FOR DRILLING DEEP WELLS.

(The band wheel is driven by an engine. The pitman has been disconnected from the band-wheel crank pin and the drill rope from the walking beam. A short "jerk line" is run from the crank to the rope near the bull wheel; this gives a short quick stroke for "spudding"—sinking through clay, etc., before rock is struck.)

a pitman is attached. The pitman works a walking beam, supported by a Samson post. To the other end of the beam the string of tools is attached. The tools include a drill, above which there are an auger stem, jar, a sinker bar, and cable for suspending the string of tools as the hole is deepened. The drill and accessories are lifted by the walking beam. The jar is a device acting on the principle of two loose links of a chain and designed to loosen the drill by giving a jarring, upward blow. A temper screw is provided for minor adjustment of the drill as to depth. As the work progresses it is necessary to lift out the drill and accessories and substitute a new one, at the same time using the sand pump to remove the material loosened by the drill. A bull wheel at the base of the derrick and a crown pulley at its top, together with a cable, are used to lift



SPUDDING BIT FOR USE IN EARTH. DRILLING BITS FOR USE IN ROCK.

the tools, by means of the engine. A sand reel at the base of the derrick, a sand-pump pulley at its top, and a sand-pump line perform a like service for the pump. Besides the tools named there are special tools for use in sinking the well, and an almost endless variety of fishing tools for recovering lost or broken drilling tools. The casing generally follows closely after the drilling. Packing rings of corrugated rubber and other devices are used to shut out any foreign fluid from the casing. Deep wells are often begun with large casings When such a casing has been sunk as far as practicable a smaller one is inserted within it

There are various modifications of this rig, suited to the special peculiar conditions of a location. For instance, in California, the strata generally required a separate reel for handling the casing and led to the so-called calf wheel, or California rig The casing reel is driven by a tug rope running over a cast-iron rim bolted on the band wheel.

The cost of a full-sized artesian well outfit, such as is commonly used in the oil wells and for deep artesian wells, is about $6000. Much simpler and cheaper rigs are used for smaller wells, horse power sometimes being substituted for steam or gas engine. Effective work is often done by a spring pole operated by two or more men The tools are suspended from the free end of a pole or beam, which is rigidly secured at or near the other end. The men pull down the pole, then slack the ropes, whereupon the pole flies back into a horizontal position, lifting the drill with it

Well sinking is older than history. Large wells naturally preceded the bored and drilled ones by many centuries. Some of these, even in early times, were 100 or more feet deep. A laborious method of drilling was employed centuries ago by the Chinese and Hindus. The drill was raised a few feet at a time by means of a rope attached to a lever, then it was let fall by its own weight. Modern deep-well sinking methods had a rude beginning early in the nineteenth century. In 1818 an impulse to the movement for better methods was given by the French Society for the Encouragement of Agriculture. The Grenelle and Passy wells for the supply of Paris were ten and six years in the sinking. The Grenelle well is 1780 feet deep, 8 inches in diameter, and was completed in 1842. The Passy well is 1913 feet in depth, yields 5,500,000 gallons a day, and was completed in 1861. The well was started with a diameter of 40 inches. The wrought-iron drills were lifted by means of wooden poles eight inches square. Jars similar in principle to those already described were used. Subsequently a well 47 inches in diameter and 2900 feet deep was drilled at Butte-aux-Cailles, the drill being worked by a walking beam and steam engine. The first well sunk exclusively for oil was put down near Titusville, Pa., in 1859, by Col. E. L. Drake. It was sunk by a small derrick rig Since then the American system of well drilling, as already described, has been adopted for putting down water, oil, and gas wells all over the world. It is notable for the comparative simplicity and effectiveness of the machinery employed and for the ingenuity displayed in overcoming all difficulties. In 1872 what was at least one of the earliest natural gas wells was sunk at Newton, Pa. The gas from it was piped through a 2-inch main and a 3¼-inch pipe line, 5½ miles long, to Titusville, Pa.

Among the deepest wells that have been put down the accompanying table shows the most important

DEEP WELLS OF THE WORLD

LOCALITY	Depth	Manner of sinking	Object
	Feet		
Sperenberg, near Berlin, Germany	4170	Rotary diamond drill	Salt
Wheeling, W Va	4500		
Peter's Creek, Pittsburgh, Pa	5580	Oil-well outfit	Gas or oil
Slaughter Creek, W. Va	5590	" "	" "
Schladabach, near Leipzig, Germany	5740	" "	Oil
Derrick City, Pa	5820	Rotary diamond drill	Salt
Paruschowitz, near Reibnik, Silesia.	6600	Oil-well outfit	Oil
Donald, Pa.	7181 (in 1916 ultimately 8000)	Rotary diamond drill	Salt
		Oil-well outfit, welded casing	Gas

Consult C. Isler, *Well Boring for Water, Brine, and Oil* (2d ed., New York, 1911). See ARTESIAN WELLS; GAS, NATURAL, PETROLEUM; PIPE LINES; WATER SUPPLY.

WELLS'TON. A city in Jackson Co., Ohio, 85 miles south by east of Columbus, on the Baltimore and Ohio Southwestern, the Cincinnati, Hamilton, and Dayton, the Detroit, Toledo, and Ironton, and the Hocking Valley railroads (Map: Ohio, E 7). It is in the midst of a coal and iron mining district, and manufactures cement There are also blast furnaces, foundries, a barrel factory, etc. Pop., 1900, 8045; 1910, 6875.

WELLSTON. A city in St. Louis Co., Mo., adjoining the city of St. Louis, on the Missouri River. Noteworthy features include Eden College, Eden Seminary, McKinley Seminary, Valhalla Cemetery, and Maxwellton Park. Wellston is an important industrial community, having several large plants, among which are stock yards, lumber yards, and manufactories of electrical goods, saws, edged tools, wire rope and cable, steel ranges, and creamery products. It has also a large electric power plant. Pop., 1910, 7312.

WELLS'VILLE. A town, including Wellsville village, in Allegany Co., N. Y., 90 miles by rail southeast of Buffalo, on Genesee River, and on the Erie and the Wellsville and Buffalo railroads (Map: New York, C 6). It has a public library, a fine park, a hospital and a sanitarium. The manufactured products include furniture, steam turbines, aluminium ware, gas engines, oil-well tools, boiler engines, pumps, blowers, mill machinery, and petroleum products. Pop., 1900, 4981; 1910, 5663; 1915 (State census), 4595.

WELLSVILLE. A city in Columbiana Co., Ohio, 20 miles north of Steubenville, on the Ohio River, and on the Pennsylvania Railroad (Map: Ohio, J 4). It is chiefly an industrial centre, and is especially known for its important iron, steel, and terra-cotta interests. There are railroad machine shops and roundhouse, and manufactories of pottery, boilers, machinery, nails, brick, and foundry and machine-shop products. Pop., 1900, 6146; 1910, 7769.

WELS, vĕls. A town in Upper Austria, 17 miles southwest of Linz, on the Traun River (Map: Austria, D 2). The chief features are the ninth-century Gothic church, the old castle town hall, and park. There are manufactures

of machinery, paper, copper, brass, oil, leather, flour, etc. Pop., 1900, 12,187; 1910, 15,481.

WELSBACH, vĕls'bäĸ; *Anglicized* wĕlz'bak, KARL AUER, BARON VON (1858–) An Austrian inventor. He was born in Vienna, where he attended the university, and he also studied at Heidelberg (1880–82) under Bunsen. In 1885 he discovered two new elements, praseodymium and neodymium, and his investigations of rare elements led to his invention in the same year of the incandescent gas burner, known by his name, and of the osmium incandescent electric lamp in 1898. In 1907 he discovered another new element known as lutecium, Georges Urbain (q.v.) making the same discovery simultaneously. He built a large experiment station for scientific and technical investigation at Treibach, Karnten. Welsbach published: *Ueber die Erden des Gadolinits von Ytterby* (2 parts, 1883); *Ueber die seltenen Erden* (1884); *Die Zerlegung des Didyms in seine Elemente* (2 parts, 1885–1903).

WELSBACH, RITTER VON. See AUER, A., RITTER VON WELSBACH.

WELSBY, WILLIAM NEWLAND (c.1802–64). An English legal writer, born in Cheshire. He graduated at St. John's College, Cambridge, in 1823, and was called to the bar in 1826. It is as a writer and editor of legal works rather than as a practitioner that he is remembered. He edited, in collaboration with various other lawyers, 26 volumes of *Exchequer Reports* (1837–56); *Reports of Mercantile Cases* (1829–30); *Chitty's Collection of Statutes* (1851–54); a set of Blackstone's *Commentaries* (1847), and several other works of smaller proportions.

WELSER, vĕl'zĕr. The name of a famous burgher family of Augsburg, Germany. Its history can be traced back to the thirteenth century. Later its members became widely known as prominent merchants. BARTHOLOMÄUS WELSER (1488–1561) lent the Emperor Charles V a great sum of money for which in 1528 he received as security the Province of Venezuela, but in consequence of their rapacious acts the Welsers were deprived of their rule before the Emperor's reign was over. Bartholomäus' niece, PHILIPPINE (1527–80), daughter of Franz Welser, renowned for her learning and beauty, secretly married the Archduke Ferdinand, second son of the Emperor Ferdinand I. Her children were debarred from inheriting their father's rank, but one of them became a cardinal and the other distinguished himself as a soldier and was created Margrave of Burgau. Another member of the Welser family, MARKUS (1558–1614), became famous for his learning. Branches of the family settled at Nuremberg and at Ulm respectively, while the original stock at Augsburg became extinct in 1797.

WELSH, JOHN (1805–86) An American merchant, born in Philadelphia. He was educated in that city and became prominent in business there. For many years he had an active interest in municipal and educational affairs. During the Civil War he promoted measures of relief and in 1864 became president of the Philadelphia Sanitary Fair, which raised $1,080,000 for army hospitals and ambulances. In 1873 Welsh was elected president of the board of finance of the Centennial Exposition and was chosen at each subsequent election. To his executive ability the success of the Exposition was largely due, and his services were recognized by the city in a subscription of $50,000. With this he endowed the John Welsh chair of English literature at the University of Pennsylvania. He was appointed Minister to Great Britain in 1878, but resigned in the following year.

WELSH, ROBERT E. (1857–). A Canadian Presbyterian clergyman and theologian. He was born at New Cumnock, Scotland, and was educated at Glasgow and Edinburgh Universities Ordained in 1880, he was a missionary in Japan (1880–81): rector of St. Paul's, Harrowgate, Yorkshire (1882–87); rector of St. George's, Brondesbury, London, England (1887–1904). From 1905 to 1907 he was general secretary of the Canada Bible Society, and was then appointed professor of apologetics and Church history in the Montreal Presbyterian College. He published: *In Relief of Doubt* (1895); *The People and the Priest* (1898); *God's Gentlemen* (1898); *Romance of Psalter and Hymnal* (1887); *The Challenge to Christian Missions* (1902); *Man to Man* (1905).

WELSH CALVINISTIC METHODISTS. See PRESBYTERIANISM AND THE PRESBYTERIAN CHURCHES.

WELSH LANGUAGE AND LITERATURE (AS. *Wealh*, Welshman, OHG. *Walah*, Frenchman, adulteration of *Volca*, a Celtic tribe in Italy; OHG. *walhisc*, Ger. *welsch*, foreign). The literature of Wales is more ancient and far more extensive than that of either Cornwall or Brittany, and is to be compared rather with that of Ireland Irish is richer than Welsh as regards the quantity and interest of its ancient monuments, but modern Welsh has held its place as a literary language more successfully than modern Irish. In the history of Welsh, as in that of all the Celtic languages (q.v.), three periods are regularly recognized· Old Welsh, extending from the time of the earliest monuments through the tenth century; Middle Welsh, from the eleventh to the sixteenth century; and Modern Welsh, from the sixteenth century to the present time.

Old Welsh. The monuments of the earliest period are of the same sort in Wales as in Ireland, though much more scanty. The very oldest material is found in funeral inscriptions, some of which probably date back to the fifth century. These are written in Latin, but the proper names furnish valuable evidence with regard to the character of primitive Welsh. A considerable number of Old Welsh glosses have been preserved in manuscripts ranging from the eighth to the tenth century, but no literary texts have come down from this period. Whether any of the pieces preserved in later manuscripts, but traditionally ascribed to ancient poets, really belong to the times of their reputed authors, is still doubtful. The heroic age of Welsh history falls in the sixth century, and several great bards are supposed to have lived at that time. The most famous are the so-called *cynferdd:* Aneurin (q.v.), Llywarch Hen, Merlin (q.v.), and Taliesin; and many poems bearing their names exist in manuscripts of the twelfth and succeeding centuries. Only a few poems have come down to us which purport to have been written in this period.

Middle Welsh. The earliest texts of assured date appear in the *Book of Llandaff* (*Liber Landavensis*), a manuscript of the twelfth century. To the early Middle Welsh period belongs also the collection of ancient laws ascribed to Howel Dda and probably compiled in their substance in his time. The oldest manuscript of the laws belongs also to the twelfth century. These monu-

ments of course possess historical rather than literary interest. The Middle Welsh literature, properly speaking, falls into two main divisions —bardic poetry and prose romance.

During the ages of struggle between Saxons and Welshmen, the bards were an important class in society, and a considerable quantity of their poetry has been preserved. Their most flourishing period extends from the time of Gruffudd ab Cynan's return from Ireland in 1080 to the death of Llewelyn ab Gruffudd (see LLEWELLYN AP GRIFFITH) in 1282. Among the foremost of these Middle Welsh poets were Meilyr, Gwalchmai his son, Owain Kyveiliog and Howel ab Owain Gwynedd (both royal princes), Einion and Meilyr (sons of Gwalchmai), Dafydd Benvras, Llywarch ap Llewelyn, Cynddelw, Elidir Sais, and Phylip Brydydd. After the reign of Llewelyn ab Iorwerth in the first half of the thirteenth century, a decline began in the work of the poets. But the elegy on Llewelyn ab Gruffudd by Gruffudd ab yr Ynad Goch ranks with the best productions of the earlier bards. The poetry of this whole period lacks variety and broad human interest. The greater number of pieces are eulogistic addresses to living princes or elegies on the dead, and they contain little sustained description and almost no narration. The metrical form is usually very conventional, and the language is often obscure. But the style has much elevation and gives expression to strong national spirit. Not infrequently, too, there is revealed a genuine feeling for nature, as the poems of Gwalchmai, or fine romantic sentiment, as in the love poems of Howel ab Owain. To these centuries belong also some religious pieces, and certain mythological poems that are very difficult of interpretation.

In the fourteenth century literature received a new impulse, and the poetry of this revival, touched by the influence of the dawning Renaissance, has more general and abiding interest than most of that of the earlier bards. War songs and elegies now give place in large measure to poems of nature and romantic love. Rhys Goch and Dafydd ab Gwilym are the most conspicuous representatives of the new style. The latter, known as the Cambrian Petrarch, combines such charm of fancy and beauty of expression as to stand in the first rank of mediæval lyric poets. The fourteenth century is sometimes called the Golden Age of Welsh poetry, the main characteristic of which is the adoption of the severe principles of versification known as the *cynghanedd*. Among the bards who lived in the fifteenth century were Rhys Goch Eryri, Iolo Goch, Llywelyn Goch, Gruffudd Llwyd, Sion Cent, Dafydd ap Edmwnd, Lewis Glyn Cothi, and Gutyn Owain.

The prose literature of the Middle Welsh period consists chiefly of chronicles and romantic tales. The first do not differ in character from the annals of the surrounding nations. The prose romances, on the other hand, form perhaps the most interesting—and are the most widely known—of all Welsh writings. They have been treated in a separate article on the *Mabinogion* (q.v.). The Welsh of course possessed translations and redactions of the common stock of religious and didactic literature of the Middle Ages.

Modern Welsh. Welsh literature since the sixteenth century has relatively less interest than in the earlier periods of its history. With the decline of the bardic institution, poetry ceased to be cultivated as of old, and the prose of the modern period has been too largely confined to theological subjects to be of permanent interest. A few authors, however, deserve special mention. Huw Morus stands out among the poets in the seventeenth century and Goronwy Owen in the eighteenth. The publication of Evans's *De Bardis Dissertatio* in 1764 was an event of importance in the early history of the Romantic movement in England and one of the first signs among Welshmen of a revival of interest in their own national antiquities. The book was divided into three parts, the first containing English translations, the second a Latin treatise on the ancient bards, and the third specimens of Welsh poetry in the Middle Ages. At the beginning of the nineteenth century the *eisteddfod* was resumed once more as an important national institution, and a new enthusiasm was stimulated among both poets and prose writers.

One of the first monuments of modern Welsh prose was William Morgan's translation of the Bible, published in 1588. This version, revised in 1620 by Bishop Parry, is still in use. In the seventeenth century the most important prose writers were Morgan Llwyd and Charles Edwards. At the beginning of the eighteenth century stands Elis Wynn, whose *Gweledigætheu y Bardd Cwsc* (*Visions of the Sleeping Bard*) is generally recognized as the masterpiece of Welsh prose since the *Mabinogion*. A little later lived Theophilus Evans, whose *Drych y Prif Oesoedd* still ranks as a favorite Welsh classic. In the nineteenth century the principal prose writers have been David Owen (Brutus), Thomas Price (Carnhuanawc), Gweirdd ap Rhys, Gwallter Mechain, Lewis Edwards, and recently Daniel Owen, whose novels furnish the best pictures of Welsh life in the present day. Throughout the century a thriving periodical literature has been maintained, and in 1899 at least 29 newspapers and 39 magazines (secular and religious) were printed in Welsh. The Welsh, like all their Celtic neighbors, have been possessed of a rich and interesting folk lore, but their tales are not as well preserved as those of the Gaelic peoples. Active efforts have been made in recent years to save what is left of these popular traditions; and an extensive collection of material has been published by Rhys under the title *Celtic Folk-Lore* (Oxford, 1901). See BARD; BRETON LITERATURE, CORNISH LANGUAGE AND LITERATURE, IRISH LITERATURE; MANX LITERATURE; SCOTTISH GAELIC LITERATURE.

Bibliography. The sources for Old Welsh have never been collected. They may be found by consulting Hübner, *Inscriptiones Britanniæ Christianæ* (Berlin, 1876); Zeuss, *Grammatica Celtica* (2d ed., ib., 1871); Kuhn and Schleicher, editors, *Beitrage zur vergleichenden Sprachforschung*, vols. iv and vii (ib., 1865–73); and *Archæologia Cambrensis*, 4th series, vol. iv, published by the Cambrian Archæological Association (London, 1873). The *Liber Landavensis* was edited by Rhys and Evans (Oxford, 1893). The laws are accessible in Aneurin Owen's *Ancient Laws and Institutions of Wales* (English Record Commission, London, 1851). For discussion of the material, see Rhys and Jones, *The Welsh People*, ch. vi (4th ed., London, 1909). The most extensive collection of Middle Welsh poets is *The Myvyrian Archæology of Wales*, edited by Owen Jones, Edward Williams, and W. Owen Pughe (1801; 2d ed., 1870). For the oldest

poems see W F. Skene, *The Four Ancient Books of Wales* (Edinburgh, 1868); *Facsimile of the Black Book of Carmarthen*, edited by J. G. Evans (Oxford, 1888); Owen Jones, *The Poetry of the Gogynfeirdd*, with an introduction by E Anwyl (Denbigh, 1909). W. Lewis Jones, *Caniadau Cymru* (Bangor, 1898; 2d ed, 1907), is a good anthology of Welsh verse since Huw Morus. For prose see Rhys and Evans's editions of *The Mabinogion* (Oxford, 1887) and *The Bruts* (ib., 1890), from the Red Book of Hergest; J. G. Moelwyn-Hughes, *Die cymrischen Triaden; ihr Ursprung und ihr Verhaltnis zu den Mabinogion* (Leipzig, 1903); Robert Williams, *Selections from the Hengwrt Manuscripts* (1876–92); Edward Edwards, *Glasuron rhyddiaith cymru* (Bangor, 1908); also the publications of the Welsh Manuscripts Society and of the Society of Cymmrodorion For modern Welsh see *The Cambrian Bibliography* (*Llyfryddiæth y Cymry*) of Rowlands and Evans (Llanidloes, 1869), containing a catalogue of Welsh books printed up to 1800; *Catalogue of the Cardiff Free Libraries* (Cardiff, 1898), and *National Library of Wales, Bibliotheca Celtica* (ib., 1912). The best treatises on the literary history of Wales are Thomas Stephens, *Literature of the Kymry* (Clandovery, 1849; 2d ed., London, 1876); Magnus Maclean, *The Literature of the Celts* (Glasgow, 1906); J. C. Morrice, *Manual of Welsh Literature* (Bangor, 1909), L C. Stern, "Die kymrische (walisische) Literatur" in *Die romanischen Literaturen und Sprachen* (Berlin, 1909). A commendable work on the modern period is the *Hanes Llenyddiæth Gymreig o 1650 i 1850*, by Charles Ashton (1891). Critical comments of value were made in Matthew Arnold's essay *On the Study of Celtic Literature*.

WELSH MORTGAGE. A form of mortgage formerly used in Wales and Ireland, under which a mortgagee was authorized to enter into possession, collect the rents and profits of the land, and apply the net income to the payment of the interest on the debt. Such a mortgagee could not foreclose his mortgage, or compel payment of the principal. However, the mortgagor could not exercise any acts of ownership over the land until he paid the principal. This form of mortgage is not now used. See MORTGAGE; FORECLOSURE.

WELSH MUSIC. See CELTIC MUSIC.

WELSH ONION, or CIBOL (*Allium fistulosum*). A perennial herb, a native of central Asia. Its fistular garlic-flavored leaves, which appear very early in spring, are used in soups and salads. The seed is sown in spring or summer, leaves fit for use are produced in the following spring, and the bed continues to be productive for a number of years. The small bulbous roots are not eaten.

WELSH TERRIER. See TERRIER.

WELTE, vĕl'te, MICHAEL (1807–80). A German inventor and builder of mechanical musical instruments, born at Unterkirnach (Black Forest). Having served a five-year apprenticeship with Joseph Blessing, a maker of musical clocks, he established himself, in 1832, at Voehrenbach. In 1849 he exhibited at Karlsruhe his first "Orchestrion" (q.v.), the perfection of which occupied him till his death. Instruments sent to the great expositions at London (1862), Paris (1867), Chicago (1893), etc., received the first prize. In 1872 the factory was moved to larger quarters in Freiburg.—His oldest son, EMIL, came to the United States in 1865 to establish a branch It was he who, in 1884, first applied to a pneumatic action the then newly invented perforated paper roll, which made the present perfection of the player piano possible Michael's grandson, Edwin, applied his uncle's (Emil) invention to the pianoforte, and in 1904 exhibited the "Welte-Mignon," an autograph piano reproducing the performances of the great pianists with photographic accuracy. The application of the same principle to the organ resulted, in 1912, in the invention of the Philharmonic Organ. See ORGAN; PIANOFORTE, *Player-pianos*.

WÉLY, LOUIS JAMES ALFRED LEFÉBURE-. See LEFÉBURE-WÉLY, L J. A.

WELWITSCH, vĕl'vĭch, FRIEDRICH (1806–72). A German botanist, born at Klagenfurt, Carinthia He studied at the University of Vienna, and in 1839 was sent on a journey of botanical exploration to the Cape Verde Islands and Azores by the Reiseverein of Württemberg. Having been detained in Lisbon, he took up his residence in Portugal, became director of the botanical gardens of Lisbon and Coimbra, and collected 56,000 specimens in Portugal for the Reiseverein. In 1853–61 he traveled in Africa, particularly Angola and Benguela, whence he brought important botanical and zoölogical collections. The genus *Welwitschia*, a unique African genus of gymnosperms, was named in his honor. After 1863 he lived in London. He published *Synopse explicativa das amostras de Madeiras e drogas medicinaes de collegidas na provincia de Angola* (1862), and other writings.

WELWITSCHIA, wĕl-wĭch'ĭ-a A West African gymnospermous plant. See GNETALES.

WEMYSS, wēms, FRANCIS RICHARD WEMYSS-CHARTERIS-DOUGLAS, ninth EARL OF, and EARL OF MARCH (1818–1914). A British statesman who, while Lord Elcho, acquired great popularity as a founder of the British volunteer movement. He was born in Edinburgh, and was educated at Christ Church, Oxford. He was member of Parliament for East Gloucestershire in 1841–46, and sat for Haddingtonshire from 1847 until 1883, when he succeeded to the Earldom of Wemyss at the death of his father. As a Liberal Conservative, he supported Sir Robert Peel in the repeal of the Corn Laws, and was Lord of the Treasury in the Earl of Aberdeen's coalition Ministry (1852–55). In 1859 the menacing attitude of France and the periodical alarms of invasion, owing to the unprotected state of the English shores, led to the organization of the volunteer army of Great Britain, in which he took the earliest and most prominent part. When the government of Earl Russell brought in the Reform Bill of 1866, Lord Elcho organized a secession from the Whig party, under the leadership of Earl Grosvenor, which was nicknamed the Cave of Adullam, but which succeeded in defeating the bill and displacing the government. Lord Derby, on his accession to the premiership, offered a post in his government to Lord Elcho, but the offer was declined. He published *The New War Office* (1899).

WEN (AS. *wen, wœn*, dialectic Ger. *Wenne, Wehne, Wahne*, wen, wart), or SEBACEOUS CYST. An encysted tumor, much more common on the scalp than in any other situation, though occasionally observed on the face or shoulders, and consisting of an obstructed sebaceous gland, which enlarges by the internal pressure of its accumulated secretion. The closed orifice may be often noticed in the form of a small dark point, and in that case the duct may sometimes

be gradually enlarged by the gentle introduction of a probe or director, and its contents pressed out. After this treatment it will sometimes shrivel up and disappear It, however, will in all probability fill up again. If this treatment fails, and the patient finds the tumor annoying, it must be exterminated by excision, which consists in exposure and cutting out of the cystic sac, containing its cheesy contents intact Or it may be cut into halves, evacuating the contents, after which the sac must be pulled out with forceps Careful antisepsis must be practiced, especially upon the scalp.

WENATCHEE, wē-năch'ē A city and the county seat of Chelan Co, Wash, 174 miles by rail west by south of Spokane, on the Columbia River, and on the Great Northern Railroad (Map: Washington, E 3) Lake Chelan and Lake Wenatchee are of great scenic beauty The city is the shipping point and distributing centre for the fertile Columbia valley, which has considerable horticultural, farming, and fruit-growing interests. Pop., 1900, 451; 1910, 4050.

WENCESLAUS, wĕn'sĕs-lăs, Ger **WENZEL,** vĕn'tsĕl (1361–1419). Holy Roman Emperor from 1378 to 1400 and King of Bohemia (as such Wenceslaus IV) from 1378 to 1419 He was the son and successor of the Emperor Charles IV. At first he tried to restore order in Germany and to check the growth of the power of the nobles, but, proving unsuccessful, gave himself up to the pleasures of the chase and of wine. In 1393 he caused the priest John Nepomuk (see JOHN OF NEPOMUK) to be tortured to death for refusing to betray the secrets of the confessional In 1394 the Bohemian nobles organized a conspiracy, arrested him, and confined him at Prague, but he was released by the influence of the German princes. In 1395 Wenceslaus sold to Gian Galeazzo Visconti the title of Duke of Milan for 100,000 gold florins He joined with France in the attempt to put an end to the great Schism by demanding the resignation of the rival popes Boniface IX and Benedict XIII. This resulted in arousing the enmity of the powerful Archbishop of Mainz, through whose influence Wenceslaus in 1400 was deposed as Emperor by a majority of the Imperial electors, Rupert of the Palatinate being chosen to succeed him. In Bohemia, meanwhile, fresh strife had arisen, and in 1402 his brother Sigismund arrested Wenceslaus and imprisoned him for 19 months in Vienna. Wenceslaus favored Huss and his party, and his decree of Jan. 18, 1409, brought about the secession of the Germans from the University of Prague, and thus greatly weakened the German ascendency in Bohemia. Not long after this he resigned the reins of government in Bohemia to Sigismund. Consult Thomas Lindner, *Deutsche Geschichte unter den Habsburgern und Luxemburgern*, vol. ii (Stuttgart, 1893), and F. Palacky, *Geschichte von Böhmen*, vol. iii–iv (Prague, 1857–1896).

WĔNCHOW, or **WENCHAU,** wĕn'chou'. A departmental city of Chekiang, China, opened as a treaty port in 1877. It stands on the right bank of the Ow River about 20 miles from the sea (Map: China, M 6). Its walls are 35 feet high, have a circuit of 6 miles, and are pierced with 7 gates, the east and west walls passing over low hills which they partly inclose. It stands in a well-watered plain and is intersected by numerous tidal canals. The streets are unusually clean and the shops good. In the middle of the river is a small island covered with the buildings of a Buddhist monastery, flanked by two pagodas, dating from the ninth and tenth centuries respectively. The town has little trade, even though an open port Pop, about 85,000

WEN'DELL, BARRETT (1855–1921) An American scholar, born in Boston. He graduated from Harvard in 1877, studied at Harvard Law School, and for two years practiced law. Appointed instructor in English at Harvard in 1880, he became assistant professor in 1888 and professor in 1898 In 1904–05 he was American lecturer at the Sorbonne and other French universities, and in 1914 was exchange professor from Harvard to the University of Berlin He was elected to the National Institute of Arts and Letters. His writings include: *The Duchess Emilia* (1885) and *Ranlell's Remains* (1886), both novels, *English Composition* (1891), *Cotton Mather* (1891); *Stelligeri, and Other Essays Concerning America* (1893); *William Shakspere* (1894); *Raleigh in Guiana* (1894); *A Literary History of America* (1900); *The Temper of the Seventeenth Century in English Literature* (1904), Clark lectures at Trinity College, Cambridge; *History of Literature in America* (1904), with C. M. Greenough; *Liberty, Union, and Democracy* (1906); *The France of To-day* (1907), *The Privileged Classes* (1908); *The Mystery of Education* (1909).

WEND'ISH LANGUAGE. A Slavic tongue now spoken by about 150,000 persons within the German Empire. (See WENDS.) Wendish was in ancient chronicles the generic name for Slavic. Little by little German began to oust Wendish, and by the fifteenth century the process was completed in the north, while in the south the struggle is still going on. The last religious service in Wendish in the north was performed at Lüneburg in 1751, and in 1826 old men were still living who could speak Wendish; but at present there is not a single person to be found in the region who knows the language Hemmed in by the Germans, the South Wendish, at present called simply Wendish, Lusatian, Lusatian-Serbian, Sorbian, or Sorabian, has survived in Lusatia. Since about 1830 a considerable national literature has been developed in the Sorbian dialects of Bautzen and Cottbus. Consult Pypin and Spasovich, *Geschichte der Slavischen Literaturen* (Ger trans., Leipzig, 1880 et seq.), and the current and retrospective literature published in *Časopis Macice* (Bautzen). There are Sorbian grammars and dictionaries by Pfuhl, Mucke (Muka), and others.

WENDOVER, ROGER OF. See ROGER OF WENDOVER.

WENDS. The name given by the Germans to the Slavic tribes of the western group, whose migrations early in the Middle Ages carried them from their primitive seats into the heart of modern Germany. At the time of the rise of the German Kingdom we find them under the names of Obotritians, Lutitians, and Sorabs, occupying the country between the Elbe and Saale on the west and the Bober on the east, and between the parallel of Berlin on the north and the Erzgebirge on the south. The cities of Leipzig, Dresden, and Meissen were once Slavic settlements. The early kings of Germany waged bloody wars against these Slavs and they were gradually forced eastward and finally subdued.

A fragment of the Wends has survived to the present day in Lusatia (part of the Prussian provinces of Brandenburg and Silesia and the eastern part of the Kingdom of Saxony). They call themselves Serbs (Serbjo), whence the German name Sorben (Sorbs), or Sorabs, which is applied by historians to the mediæval Wends. The Wends or Sorbs number about 150,000. They are a peasant people, mostly Protestants. There are, however, some 15,000 Catholics living in the neighborhood of Bautzen (Budyšin). In 1854 about 400 Sorbs settled in the State of Texas. Consult: Andree, *Wendische Wanderstudien* (Stuttgart, 1874); E. Müller, *Das Wendenthum in der Niederlausitz* (Cottbus, 1893); Tetzner, *Slaven in Deutschland* (Brunswick, 1902); Pogodin, *The Slavic World* (in Russian, Moscow, 1915). See WENDISH LANGUAGE.

WENDT, HANS HINRICH (1853–). A German Evangelical theologian. Born at Hamburg, he was educated at Leipzig, Tübingen, and Gottingen. He held professorships in theology successively at Kiel (1883–85), at Heidelberg (1885–93), and at Jena. One of the most distinguished theologians of his time, Wendt published: *Die Begriffe Fleisch und Geist im biblischen Sprachgebrauch* (1878); *Die christliche Lehre von der menschlichen Vollkommenheit* (1882); *Die Lehre Jesu* (2 vols., 1886–90; 2d ed., 1901; Eng. trans., 1892); *Die Norm des echten Christentums* (1893); *Der Erfahrungsbeweis fur die Wahrheit des Christentums* (1897); *Das Johannesevangelium* (1900; Eng. trans., 1902); *The Idea and Reality of Revelation* (1904); *System der christlichen Lehre* (1906); *Die Schichten im vierten Evangelium* (1911).

WENER, vā'nĕr, LAKE See VÄNER.

WENIGER, vā'nī-gĕr, LUDWIG (1841–). A German classical scholar, born at Neumarkt. He studied at the University of Berlin (1861–63), and at Bonn (1863–65), taught at various Gymnasia, and was director of the Gymnasium at Weimar (1881–1908). He published a large number of papers, especially on matters relating to Olympia (q.v.), and contributed many articles to W. Roscher's *Lexikon der griechischen und romischen Mythologie*. Mention may be made of *Gottesdienst in Olympia* (1884); *Das Hochfest des Zeus in Olympia* (1904–05); *Olympische Forschungen* (1906–07); *Das Schild des Achilles* (1912).

WENLEY, ROBERT MARK (1861–). A philosophical scholar, born in Edinburgh, Scotland. He graduated at the University of Glasgow in 1884, and studied in Italy, France, and Germany. From 1886 to 1894 he was assistant professor of logic at Glasgow; from 1888 to 1895 was head of the philosophical department in Queen Margaret College, Glasgow University; and in 1896 became head of the department of philosophy in the University of Michigan. He was associate editor of the *Dictionary of Philosophy*, and published: *Socrates and Christ* (1889); *Aspects of Pessimism* (1894); *Contemporary Theology and Theism* (1897); *Introduction to Kant* (1897); *Preparation for Christianity in the Ancient World* (1898); *Modern Thought and the Crisis in Belief* (1909); *Kant and his Philosophical Revolution* (1910); *The Anarchist Ideal* (1913); *Robert Flint* (1914).

WENLOCK. A municipal borough in Shropshire, England, 12 miles southeast of Shrewsbury (Map: England, D 4). The principal buildings are the church, bearing traces of Saxon and Norman architecture, the town hall, an interesting structure, decorated internally with elaborate oak carvings of the time of Charles II, and the extensive ruins of a Cluniac abbey, founded in 680. Wenlock has manufactures of bricks and tiles, and large ironworks. Pop., 1901, 15,866; 1911, 15,244.

WENNERBERG, vĕn'er-bĕr'y', GUNNAR (1817–1901). A Swedish poet, composer, and statesman, born at Lidköping. He won fame by a collection of poems, *Gluntarne*, describing the life of students at Upsala, and for these he himself composed melodies. The same success met his trios, his patriotic hymns, as *Hor os, Svea, O, Gud, som styrer folkens oden, Stå stark du ljusets riddarvakt*, and the oratory *Jesu fodelse*. He was Minister of Education (1870–75 and 1888–91), Governor (1875), and Senator. His *Samlade Skrifter* were published in four volumes in 1881–85.

WENSLEYDALE, wĕnz'lĭ-dāl, JAMES PARKE, BARON (1782–1868). An English jurist, born at Highfield, Lancashire. He was educated at Trinity College, Cambridge, was a fellow of the college in 1804–17, was called to the bar at the Inner Temple in 1813, was very successful in common-law practice, and in 1828 became a justice of the Court of King's Bench. In 1834 he was transferred to the Court of Exchequer, from which he resigned in 1856. As a jurist he was thoroughly versed in the common law. Consult Manson, *Builders of Our Law* (London, 1895).

WENTLETRAP' (from Ger. *Wendeltreppe*, wentletrap, winding stair; from *wenden*, to turn + *Treppe*, stair). A small prosobranch gastropod of the family Scalariidæ, also called staircase shell and ladder shell. The shell is spiral with many whorls, the whorls deeply divided, and crossed by remarkably elevated ribs. The aperture is round and rather small. The animal is furnished with a proboscis, and has the eyes placed on an external convexity, the foot short and oval. About 200 species are known, some found in northern seas, as *Scala* (*Scalaria*) *communis* on the coasts of Europe, and *Scala grœnlandica* on those of North America. The best known is probably the precious wentletrap, *Scala pretiosa*, from the coasts of China and Australia, at one time highly valued by collectors who paid as much as $200 for a single shell.

WENTWORTH, BENNING (1696–1770). An American Colonial governor. He was born at Portsmouth, N. H., graduated at Harvard in 1715, and settled in Portsmouth, where he became a leading merchant. He represented the town in the Assembly, and became a king's councilor in 1734. When New Hampshire was made a separate province in 1741, Wentworth was appointed its first Governor, remaining in office until 1767. It was during this period that the famous controversy over the New Hampshire Grants arose. Patents for land granted by Governor Wentworth in what is now southern Vermont were disputed by the Governor of New York. Wentworth raised troops in New Hampshire in 1745 for Shirley's Louisburg expedition He gave Dartmouth College the land upon which its buildings were erected. His second wife was the subject of Longfellow's poem, "Lady Wentworth." Bennington, Vt., was named in his honor.

WENTWORTH, CHARLES WATSON. See ROCKINGHAM, MARQUIS OF.

WENTWORTH, GEORGE (1868–). An American mathematician, the son of George A. Wentworth. He was educated at Exeter Academy and at Harvard University, and began in 1894 to assist his father in the writing of textbooks On his father's death he joined with David Eugene Smith (q.v.) in the publication of the Wentworth-Smith mathematical series.

WENTWORTH, GEORGE ALBERT (1835–1906). An American mathematician, born at Wakefield, N. H. He was educated at the Wakefield and Exeter academies and at Harvard College After graduation in 1858 he became instructor of ancient languages in Exeter Academy, and in 1859 he was appointed to the chair of mathematics in the same institution, a position which he retained till 1891, when he was elected president of the Exeter Banking Company. He wrote: *Elements of Geometry* (1878, and several subsequent editions), a work which had a marked influence on the teaching of geometry in the United States, *Elements of Algebra* (1881, and several later editions); *Plane and Spherical Trigonometry* (1882); *Surveying and Navigation* (1882); *Five Place Tables of Logarithms* (1882); *Elements of Analytic Geometry* (1886); *School Algebra* (1887); *College Algebra* (1888); *Higher Algebra* (1891), and a large number of other textbooks He was joint author with Hill of a textbook on *Physics* (1898), and also wrote works on arithmetic. After his death the series was revised and carried on by his son George Wentworth (q.v.) and David Eugene Smith (q.v.).

WENTWORTH, SIR JOHN (1737–1820). An American Loyalist, born at Portsmouth, N. H. He graduated at Harvard in 1755, in 1765 acted as an agent of New Hampshire in England, and in the following year was made Governor of New Hampshire and Surveyor of the King's Woods for all North America. In his administration, although he opposed the arbitrary taxation imposed upon the Colonies, he attempted to preserve the loyalty of the colonists to England. For a time he was very popular, but, by dissolving the New Hampshire Assembly because it had nominated a Committee of Correspondence, and by attempting to assist General Gage at Boston, he destroyed all his influence, and after a bitter controversy with the Assembly retired to Fort William and Mary and then to a British warship. A monument of his administration remains in Dartmouth College, which he helped to found in 1770. In 1783 he received a new commission as Surveyor-General of the King's Woods, and went to Nova Scotia, of which he was acting Governor from 1792 until 1808. In 1795 he was created Baronet.

WENTWORTH, THOMAS, first EARL OF STRAFFORD. See STRAFFORD, THOMAS WENTWORTH, first EARL OF.

WENTWORTH, WILLIAM CHARLES (1793–1872). An Australian statesman, born on Norfolk Island, at that time a penal station of New South Wales, where his father was a government surgeon. From 1816 to 1824 he was in England studying at Peterhouse, Cambridge, and at the Middle Temple in London He was admitted to the English bar in 1822 and to the Australian in 1824. On his return to his native country he gave himself up to the cause of Australian self-government, advocating his views through a newspaper, the *Australian*, which he established at Sydney. In 1842, after a struggle of nearly 20 years, Lord Stanley (afterward Earl of Derby) procured legislation conferring partial self-government on New South Wales Wentworth was a member of the first partially elective Legislative Council and became the head of the so-called Squatter party He was the founder of the University of Sydney (1852), was the leading spirit in the movement which carried the new constitution through the Council in 1854, and was president of the upper chamber of the new House in 1861–62 At the end of 1862 he returned to England and settled there. Wentworth was a man of force and aggressiveness, of restless mind, and great eloquence He was accused in his later years of being influenced by personal considerations in his political views, yet there is little doubt that to him as much as to any other one man New South Wales owed her prosperity and Australia her autonomy. His publications include *A Statistical Account of the British Settlements in Australasia* (1819). Consult Barton, *The Poets and Prose Writers of New South Wales* (Sydney, 1866), and Rusden, *History of Australia* (London, 1883).

WEN WANG, wŭn wang (1231–1135 B.C.). One of the most noted names in Chinese history. It was posthumously conferred on Ch'ang, the Duke of Chow, by his fourth son, the noted Chow Kung. He was hereditary chieftain of a small principality in what is now the Province of Shensi, was commonly known as Si-Peh, Chief of the West, and was honored by everybody, except the infamous tyrant Chow-sin (then on the throne of China), as a pattern of every princely virtue Denounced to Chow-sin in 1144 by the Marquis Ch'ung as a menace to the dynasty, he was imprisoned for two years. Yielding at last to the entreaties of the people, Chow-sin released him, and gave him a commission to make war on the frontier tribes He died at the age of 96, bequeathing his army to his son Fa, who, in 1123, overthrew Chow-sin and became the first ruler of the new dynasty of Chow (1122–255 B.C.) under the title of Wu Wang, his younger brother, Chow-kung, becoming his wisest and most trusted counselor. Consult Friedrich Hirth, *Ancient History of China* (New York, 1911).

WENZEL, vĕn'tsel. See WENCESLAUS.

WEPT OF WISH-TON-WISH, THE. An historical novel by James Fenimore Cooper (1827).

WERDAU, vĕr'dou. A town of the Kingdom of Saxony, Germany, on the river Pleisse, 40 miles south of Leipzig (Map: Germany, E 3). It has important industries, including manufactures of woolen fabrics, chemicals, machinery, shoes, paper, playing cards, motors, wagons, and upholstery goods. Pop., 1900, 19,352; 1910, 20,830.

WERDEN, vĕr'den. A town of Rhenish Prussia, Germany, on the Ruhr, 17 miles northeast of Düsseldorf. It has manufactures of cloth, linen, and silk. There are coal mines in the vicinity. Pop., 1910, 11,741.

WERDER, vĕr'dĕr, AUGUST, COUNT VON (1808–87) A Prussian general, born at Schlossberg, East Prussia. He entered the Prussian army in 1825, took part in the Russian campaign in the Caucasus in 1842–43, and as lieutenant general commanded the Third Division at Gitschin and Sadowa in the Seven Weeks' War with Austria. In the Franco-Prussian War he led the army corps of Baden and Württemberg at the battle of Wörth, was then placed in

command of a siege corps before Strassburg, after the capitulation of that city was put in command of the new Fourteenth Army Corps, and defeated Garibaldi in the southeast of France. When Bourbaki, with about 150,000 men, threatened the communications of the German army besieging Paris, Werder with a much smaller force delayed the French march by an attack at Villersexel on Jan. 9, 1871, and then took up his famous defensive position southwest of Belfort. Here on January 15–17 he repulsed all the French assaults. After the war closed he was given a grant of 200,000 thalers, and a statue was erected in his honor at Freiburg. Consult Conrady, *Leben des Grafen August von Werder* (Berlin, 1889), and Varnhagen, *Werder gegen Bourbaki* (ib., 1897).

WERDT, JOHANN VON. See WERTH.

WERENSKIOLD, vĕr'*e*n-shôld, ERIK THEODOR (1855–). A Norwegian illustrator and painter. He was born at Vinger, studied at the University of Christiania, then sculpture with Middelthun in Christiania and painting under Löfftz and Lindenschmit (1876–80) at Munich and under Bonnat and Roll in Paris (1881–83). He is chiefly known for his illustrations of Norwegian folk and fairy tales, in which field he ranks as the most poetic and creative of Norwegian artists; as in Asbjornsen and Moe's *Norske Folke-og Huldreeventyr* and *Eventyrbog for Born* (3 vols.), Snorri Sturluson's *Norske Kongesagaer* and Jonas Lie's *Familien paa Gilje*. The same poetic sentiment characterizes his paintings of Norwegian folk life, rendered with strong realism and modern plein-air methods, of which the best known is his "Peasant Burial" (Museum of Christiania). His powerful portraits include those of Ibsen and Björnstjerne Bjornson, Professor Helland, Erika Nissen, Björn Björnson, Edvard Grieg, Christian Michelsen, Professors J. E. Sars, Sophus Lie, and Schönberg, Mrs. Jonas Lie, and Hans Mustad.

WEREWOLF, wēr'wụlf *or* wĕr-, or **WERWOLF,** wĕr'wụlf (AS. *werwulf*, man-wolf, from *wer*, man + *wulf*, wolf). According to a widespread superstition, a man who either periodically or at any time is transformed or transforms himself into a wolf, becoming possessed of all the powers and appetites of a wolf in addition to his own, and being especially remarkable for his appetite for human flesh. The belief is not yet extinct, even in Europe, although its details vary. The animal whose shape is taken is usually a wolf.

Occasional notices of lycanthropia are found in classical writers; and lycanthropia, as there described, was the change of a human being into a wolf, or, more rarely, into a dog or bull, so as to enable the person to gratify an appetite for human flesh, either by magical means or through the judgment of the gods, as a punishment for some dire offense. According to Herodotus, the Neuri were believed to be sorcerers who had the power of taking once a year, for several days, the shape of wolves. One of the earliest werewolf stories of the modern type is found in the *Satyricon* of Petronius, in which a friend of the hero removes his clothing and immediately becomes a wolf. In this form he is wounded, runs away, and is later found in human form with a knife stab where he had been wounded as a wolf.

In Norway and Ireland it used to be believed that there were men who were "not of one skin." Such men could take upon themselves other shapes than that of man, their natures then corresponding to the shapes which they assumed, and they also had the strength and other powers of the animal whose shape they bore, as well as their own. It was believed that the change of shape might be effected in one of three ways: simply by putting on a skin of the animal; by the soul of the man deserting the human body for a time and entering into a body borrowed or created for the purpose; or, without any actual change of the form, by means of a charm, which made all beholders see the man under the shape of the animal whose part he was sustaining. Nothing of the man remained unchanged except his eyes; by these only could he be recognized. Perhaps the best stories of werewolves which are to be found are contained in the northern sagas Scarcely anywhere did the belief in them go so deep into the minds of the people as among the northern races, although the Lithuanians and Livonians also shared in this belief. For the story in Petronius consult L. Friedlander, in *Cena Trimalchionis* (2d ed., Leipzig, 1906).

Instances of persons being changed into wolves by way of punishment were freely believed in the Middle Ages: e.g., St. Patrick was believed to have changed Vereticus, King of Wales, into a wolf; and there was an illustrious Irish family which had incurred the curse of St Natalis, every member of which, male and female, according to the popular belief, had to take the shape of a wolf and live the life of a wolf for seven years. The werewolves, like the witches, were now regarded as servants of the devil, from whom they got the power—often exercised by anointing with salve—of assuming the wolf's form; and it was believed that great numbers of them trooped together to the Devil's Sabbath. The stories of mutilations and other mishaps befalling them in the wolf state, by which, when they resumed the human form, they were identified as werewolves, are exactly like the stories told of witches. In September, 1573, we find a court of Parliament sitting at Dôle, in Franche-Comté, authorizing the country people to take weapons and beat the woods for a werewolf, who had already—thus went the recital—"carried off several little children, so that they had not since been heard of, and done injury to some horsemen, who kept them off only with great difficulty and danger." Throughout Europe the judicial cognizance of witchcraft and of lycanthropy ceased at the same time. In Great Britain, where wolves had early been exterminated, the werewolf was only known by rumors coming from abroad. The belief, however, that witches could transform themselves into cats and hares, which did prevail, was analogous to the belief in werewolves, especially in its later forms. Consult: Wilhelm Hertz, *Der Werwolf* (Stuttgart, 1862); Sabine Baring-Gould, *The Book of Werewolves* (London, 1865); K. F. Smith, "The Werewolf in Latin Literature," in *Johns Hopkins University Circular*, vol. xii (Baltimore, 1893); id., "An Historical Study of the Werewolf in Literature," in *Modern Language Association of America, Publications*, vol. ii (Cambridge, Mass., 1894); Elliott O'Donell, *Werwolves* (London, 1912). See JUPITER, *Greek;* LYCAON.

WERFF, vĕrf, ADRIAEN VAN DER (1659–1722). A Dutch historical and genre painter, born at Kralingen. He was a pupil of Cornelis Picolet and of Eglon van der Neer. He resided in Rot-

terdam, where in 1696 he became known to the Elector Palatine John William, by whom he was appointed court painter, and ennobled (1703). His minute, correctly drawn, and elegantly composed biblical, mythological, and genre paintings, with their porcelain-like finish, pallid color, and conventionally academic style, typical of the decadence of Dutch art, were in great demand. Thirty were until recently in the Munich Pinakothek and 12 are in the Dresden Gallery, besides the famous copy of Correggio's "Repentant Magdalen," formerly attributed to that master Many others are to be found in the principal European galleries. Werff is said to have designed the Exchange at Rotterdam.

WERGELAND, vĕr'ge-land, HENRIK ARNOLD (1808–45). A Norwegian poet, born in Christianssand. He studied theology in Christiania but withdrew from the ministry in 1834 to study medicine. He was given a post in the state library in 1836 and was made Keeper of the Archives in 1840. In poetry he used his great enthusiasm and genius as a prophet of national independence and personal individualism, to which many considered him unfaithful when in 1838 he accepted a small pension from King Karl Johan. His verse was at first erratic, exuberant in imagination, but lacking alike taste and knowledge. Of Wergeland's work up to 1831 *Skabelsen, Mennesket, og Messias* (1830), a formless epic of 720 pages, is sufficiently characteristic. From 1831 to 1835 Wergeland's style improved and his thought matured. By 1840 he had outgrown his audience and in becoming a great poet had sacrificed his political hold on the masses as a liberal patriot. His dramas are negligible and his *Norges Constitutions Historie* (1841–43) is forgotten, but his lyric narratives, *Jan van Huysums Blomsterstykke* (1840), *Svalen* (1841), *Jöden* (1842), *Jodinden* (1842), and *Den Engelske Lods* (1844), are the best of their kind in the Norwegian language. Among the poems of his last years are lyrics of great beauty, forming part of the permanent treasure of Norwegian poetry. A statue was erected to his memory in Christiania (1881) and at Fargo, N D. (1908), and grateful Hebrews in 1849 had placed a fine monument on his grave in Christiania (he had worked hard to have the Jews admitted to the country and after his death the ban against them was raised). There is a good selection of Wergeland's *Works* in seven volumes (Christiania, 1896–97). Consult the biographies by Lassen (1866; 2d ed., ib., 1877); Schwahenflügel (Copenhagen, 1877); Vullum (Christiania, 1881; new ed., 1908); Skavlan (ib., 1892); Koht (ib., 1908); also Halvorsen, *Norsk Forfatter-Lexikon* (6 vols., ib., 1885–1908).

WERGILD, wĕr'gĭld, **WEREGILD**, or **WERGELD** (AS., compensation for a man). A composition by which, according to the custom of the Anglo-Saxons, Franks, and other Teutonic peoples, homicide and other heinous crimes against the person were expiated. There was an established, progressive rate of wergild, varying from that of the peasant to that of the King. The sum paid to the relatives in case of homicide, also known as the *man-wyrth*, seems to have been looked on as the equivalent of the dead man's value. As the power of the community or King increased, the exaction of retribution for the death of its members was considered to be the duty of the state, as well as of the relatives, and the principle of division was applied to homicide as well as minor crimes; each payment being a separate full equivalent for the value of the deceased, the one to appease the feud, the other to make atonement to the state. By the Mercian law the King's wergild was 7200 shillings payable to his relatives, and at the same time an equal sum, the *cynebot*, was due to his people. In general it does not appear that, among the nations who recognized the principle of wergild, the relatives were bound to accept a compensation for their kinsman's slaughter, in place of appeasing the death feud by blood; the latter practice was often resorted to instead A similar principle seems to have been recognized by Celtic nations, and there are traces of it in the Mosaic code. Consult E. W. Robertson. *Scotland under her Early Kings*, vol. ii (Edinburgh, 1862), where the wergilds of the different Germanic races are given

WERMELSKIRCHEN, vĕr'mĕls-kĭrK'en. A town of Prussia, 19 miles southeast of Düsseldorf, with important manufactures of cotton, silk, and woolen goods, and upholstery plush. Pop., 1900, 15,469, 1910, 16,380.

WER'NER. A five-act poetical drama by Lord Byron (1822), produced by Macready, who played the title rôle in 1830.

WERNER, vĕr'nĕr, ABRAHAM GOTTLOB (1749–1817). A German geologist and mineralogist, born at Wehrau, Prussia. He studied at the Mining Academy of Freiberg, and afterward at Leipzig. His first original work, *Ueber die äussern Kennzeichen der Fossilien* (1764), won him a position as instructor in the Mining Academy of Freiberg, where he labored for more than 40 years, attracting students from all parts of Europe and establishing a high reputation for the school, which it still enjoys His principal service to geology consisted in arranging data collected from all sources into a systematic discipline. He divided the various geological formations into five groups, which, being largely founded upon his observations in Saxony and Bohemia, proved defective in the light of more extended research In his mineralogical system Werner had to depend largely upon the criteria of external characters, as the methods of chemistry at that time had not attained to any degree of perfection. The other published works of Werner include *Kurze Klassifikation und Beschreibung der Gebirgsarten* (1787) and *Neue Theorie uber die Entstehung der Gänge* (1771), besides short articles on mineralogical and petrographical subjects. The *Life* of Werner has been written by Frisch (Leipzig, 1825).

WERNER, ALFRED (1866–). A Swiss chemist. He was born in Mühlhausen, Alsace, and was educated in the Karlsruhe Technical School and in the Zurich Polytechnic, where he took up stereochemistry, and where in 1889 he was appointed laboratory assistant to Prof. Georg Lunge (q.v.). In 1890 he took his Ph.D. with honors at the University of Zurich. Later he worked under Berthelot in the Collège de France, but by 1895 had become professor in the University of Zurich, where in 1902 he was placed in charge of the lectures on inorganic chemistry. His important publications include: *Ueber die raumliche Anordnung der Atome in stickstoffhaltigen Molekülen* (1891), with Hautzsch; *Beitrage zur Theorie der Affinität und Valenz* (1891); *Beitrag zur Konstitution anorganischer Verbindungen* (1893); *Lehr-*

buch der Stereochemie (1904), *Neuere Anschauungen auf dem Gebiete der anorganischen Chemie* (1905, 3d ed, 1913; Eng. trans., 1911); *Ueber die Konstitution und Konfiguration von Verbindungen höherer Ordnung* (1914). Werner's views on valence and coordination in complex compounds have led to the most important advances in our theories of chemical constitution, and his brilliant generalization concerning the probability of optical rotatory power existing in complexes in which, according to his views, an asymmetric metal atom must be present, has been abundantly confirmed by the discovery of this phenomenon in compounds of cobalt, chromium, and other metals. Werner's eminence was fittingly recognized by the award to him of the Nobel prize for chemistry in 1913.

WERNER, ANTON ALEXANDER VON (1843–1915). A German historical and portrait painter and illustrator. He was born at Frankfort-on-the-Oder, and studied at the Berlin and Karlsruhe academies under Lessing and Schrödter, and then in Paris and Italy. His earliest, and perhaps his best, work was in illustration, particularly for *Der Trompeter von Sackingen* and other poems of Victor Scheffel. The first of his historical and genre paintings appeared in 1865. During the Franco-Prussian War he accompanied the Third Army Corps and became practically the official German painter of the war and of the new Empire. In 1875 he was appointed director of the Berlin Academy. His art is soberly realistic and typically Prussian, and his draftsmanship is excellent. Among his numerous patriotic paintings are "The Negotiations for Surrender at Sedan"; "Meeting of Bismarck and Napoleon III at Donchery"; "In Quarters before Paris, 1871" (Berlin Gallery); "The Proclamation at Versailles of William I as Emperor," in the Royal Palace, Berlin (same subject, as a mural painting, in the Berlin arsenal); "Close of the Congress of Berlin" (Rathaus, ib., 1881); "Opening of the Reichstag by Emperor William II, 1889" (1894); and "Unveiling of the Wagner Monument, Berlin" (1908). His portraits include several of Emperor William II. Consult the monograph by Rosenberg (Bielefeld, 1895).

WERNER, KARL (1808–94). A German water-color painter. He was born at Weimar, and after studying at Leipzig under Selinorr spent almost 20 years in Italy. On a visit to England in 1851 he was made member of the Society of Painters in Water Colors. Extensive travels in Italy, Spain, and the Orient furnished subjects, mostly architectural, for his drawings, some of which have been published as *The Holy Places* (1866) and *Nilbilder*. He is considered one of the best German aquarellists of the nineteenth century, and his work is distinguished for careful execution, brilliancy of color, and poetic conception. Among his easel pictures are to be noted: "Partenkirchen" (1833), and "Cathedral of Cefalù" (1838), in the National Gallery, Berlin; "Interior of House at Granada" (1856) and "View of Spalato," in the Leipzig Museum.

WERNER, REINHOLD VON (1825–1909). A German admiral and writer. He was born at Weferlingen, Prussia, and after a number of years' experience in the merchant marine, in the course of which he made numerous voyages to the East Indies, he became, in 1849, an officer in the newly organized fleet of the German nation. In 1852 he entered the Prussian service, became lieutenant captain in 1856, took part in the East Asia expedition of 1859–62, and as commander of a corvette during the war with Denmark in 1864 fought at Jasmund. During the Seven Weeks' War Werner seized the Hanoverian ports on the North Sea. He became rear admiral in 1875, but was retired three years later. In 1898 he was nominated to be vice admiral, and in 1901 was ennobled. He wrote: *Die preussische Expedition nach China, Japan, und Siam* (1863; 2d ed, 1873); *Die Schule des Seewesens* (1866); *Das Buch von der deutschen Flotte* (1868; 8th ed, 1902); *Seebilder* (1876); *Erinnerungen und Bilder aus dem Seeleben* (1881; 7th ed., 1898); *Berühmte Seeleute* (2 vols., 1882–84); *Drei Monate an der Sklavenküste* (1885); *Dirk Mallinga* (1888); *Bilder aus der deutschen Seekriegsgeschichte von Germanicus bis Kaiser Wilhelm II.* (1898).

WERNER, ZACHARIAS (1768–1823). A German romantic dramatist, born in Königsberg, Prussia. He studied law at Königsberg, entered (1793) the Prussian civil service, and after sojourns in Warsaw and Berlin went to Rome, where he joined the Catholic church. He had earlier made the acquaintance of Goethe. He became a priest in 1814 and thereafter resided mainly in Vienna, where he became noted for the sensational eloquence of his preaching. Werner owes his place in literature to four dramas, *Die Solme des Thals* (1803), *Das Kreuz an der Ostsee* (1806), *Martin Luther* (1807), and especially *Der 24 Februar* (1809). His *Works* (13 vols., 1841) contain four other dramas and many poems, hymns, and sermons. The dramas are typical of the luridly romantic "Fate Tragedy." Consult: Minor, *Die Schicksalstragodie* (Frankfurt, 1883); Lives of Werner by Hitzig (Berlin, 1823), Schütz (Grimma. 1841), and Düntzer (*Zwei Bekehrte*, Leipzig, 1873); also Thomas Carlyle, *Miscellanies* (4th ed., London, 1857), and Madame de Staël, *L'Allemagne* (ib, 1813).

WERNERITE, wĕr'nĕr-īt (named in honor of Abraham Gottlob Werner, q.v.). A mineral calcium-sodium-aluminum silicate of the scapolite group (q.v.), crystallized in the tetragonal system. It has a vitreous or pearly lustre, and is light gray, blue, green, or red in color. It occurs in crystalline rocks, in granular limestone, frequently near granite contacts. This mineral includes a brown variety called nuttallite, from Bolton, Mass., and a massive pale violet-blue to indigo-blue variety called glaucolite, from Siberia. Wernerite is included in the scapolite group of minerals, and is frequently referred to by that name.

WERNER VON HEIDENSTAM, KARL GUSTAF. See HEIDENSTAM, K. G. WERNER VON.

WERNHER, vĕrn'hĕr, SIR JULIUS (CHARLES) (1850–1912). A British capitalist, born at Darmstadt, Hesse, Germany. He went to London in 1870 as clerk of an Anglo-German firm, but returned to Germany to participate in the Franco-German War. He engaged in business in Paris for a short time, and then went to South Africa, where he was the representative of a great French diamond house. In 1880 he settled in London as English partner in the firm of Porges and Wernher, but in 1884 was again at Kimberley. There he formed a connection with Alfred Beit, became life governor of the De Beers corporation in 1888 when Cecil

Rhodes (q.v.) and Alfred Beit amalgamated the Kimberley diamond mines, and when Porges retired from business formed the firm of Wernher, Beit, and Company. Wernher possessed other important mining interests. In 1905 he was created a baronet. With Beit he gave large sums to the new South African University.

WERNIGERODE, vĕr'nĕ-ge-rō'de. A town of Prussia, in the Province of Saxony, 43 miles southwest of Magdeburg, at the northern base of the Brocken. In the castle, the residence of the former counts, now princes, of Stolberg-Wernigerode, is an extensive library of over 118,000 volumes, including a famous biblical and hymnological collection of 8500 volumes, and 10,000 maps. The town manufactures chocolate, machinery, cigars, and dyestuffs. Pop., 1900, 11,581; 1910, 18,359.

WERNLE, vĕrn'le, PAUL (1872–). A Swiss Protestant theologian, born at Zurich. He was educated at the universities of Göttingen, Berlin, and Basel, where by 1905 he had become professor of modern Church history. Wernle took a high place among the theologians of his time. His publications include *Der Christ und die Sunde bei Paulus* (1897); *Paulus als Heidenmissionar* (1899; 2d ed., 1910); *Die Anfange unserer Religion* (1901; 2d ed., 1904; Eng. trans., *The Beginnings of Christianity*, 2 vols., 1903–04); *Was haben wir heute an Paulus?* (1903); *Die Quellen des Lebens Jesu* (1904, Eng. trans., *Sources of our Knowledge of the Life of Jesus*, 1907); *Einfuhrung in das theologische Studium* (1908; 2d ed., 1911); *Renaissance und Reformation* (1912); *Evangelisches Christentum in der Gegenwart* (1914).

WERNZ, vĕrnts, FRANZ XAVER (1842–1914). A German Jesuit, born at Rottweil, Württemberg. Entering the Society of Jesus at the age of 15, he was ordained a priest in 1871. When Bismarck banished the Jesuits from Germany, Wernz was sent to England, where in 1876–83 he taught canon law at Ditton Hall, Liverpool. In the latter year he was called to the chair of canon law in the Gregorian University, Rome, of which he became rector in 1904. In 1906 he was elected the twenty-ninth General of the Society of Jesus. He published *Jus decretalium ad usum prælectionum* (4 vols., 1898–1904; 2d ed., 1905).

WERRA, vĕr'rä. A river of Germany, rising in Saxe-Meiningen in the southeastern part of the Thuringian Forest (Map: Germany, C 3). It flows in a generally northwesterly direction, passing Meiningen and at Münden uniting with the Fulda to form the Weser. It is 181 miles long and is navigable from Wanfried, 42 miles.

WERTH, vĕrt (or **WERDT**), JOHANN VON (c 1600–52). A German soldier, born at Büttgen, near Julich. He entered the Imperial army, and then the Bavarian army, and fought in the Thirty Years' War. Although not able to read or write, he was a cavalry leader of ability, and rose to high rank. By a spirited charge at Nördlingen in 1634 he turned the day against the Swedes and was made Baron and lieutenant marshal. In 1635 he took Speyer; and in 1636 he invaded France, caused alarm at Paris, and finally retreated with immense booty. Two years afterward he was defeated by Bernhard of Saxe-Weimar at Rheinfelden, and was taken prisoner, but in 1642 was exchanged for the Swedish General Horn. In 1643 he helped the Imperialists to win the great victory of Tuttlingen. He shared in the defeat at Jankau in 1645. In the same year his cavalry decided the battle of Mergentheim against Turenne and he conducted the retreat of the Imperialists after the death of General Mercy at Allersheim. When the Elector of Bavaria made peace with France and Sweden in 1647, Werth attempted to transfer a part of the Bavarian army into the service of the Emperor, but his plan was discovered, and he escaped with only a few followers. When the Elector again declared war, he was restored to command, but the Peace of Westphalia soon afterward brought an end to the long struggle. Consult Teicher, *Johann Freiherr von Werth* (Augsburg, 1876).

WERTHER, vĕr'tĕr. An opera by Massenet (q.v.), first produced in Vienna, Feb. 16, 1892; in the United States, March 29, 1894 (Chicago).

WERTHER. See SORROWS OF WERTHER.

WERWOLF. See WEREWOLF.

WESEL, vā'zel, or UNTERWESEL. A fortified town of Prussia on the Rhine, 32 miles north-northwest of Düsseldorf (Map: Germany, B 3). Of its churches, the Willibroed Kirche, consecrated in 1181, is one of the finest Gothic edifices on the Lower Rhine. Wesel has sugar refineries, brick kilns, wire and lead works, soap factories, flour and saw mills, and shipyards. Pop., 1910, 24,441.

WESEL, JOHANN RUTHRATH VON (?–1481). A German Reformer, born at Oberwesel. Between 1445 and 1456 he taught at the University of Erfurt, where he was rector in 1456–57. He then became a preacher at Mainz in 1460, and at Worms in 1462. Summoned before a Dominican inquisitor in 1479, he was sentenced to life imprisonment for his theological views, and he died in prison at Mainz. Wesel opposed the sale of indulgences, and denied the infallibility of the Pope. Consult C. Ullmann, *Reformatoren vor den Reformation* (Gotha, 2d ed., 1866).

WESEL, JOHN OF. See JOHN OF WESEL.

WESER, vā'zĕr. A river of Germany, formed by the junction of the Werra, which rises in the Thuringerwald, and the Fulda, rising in the Rhongebirge, at Munden, near the south extremity of the Prussian Province of Hanover. After passing the Westphalian Gate the Weser flows north, mainly watering Prussian territory, till, passing Bremen, it forms for about 40 miles the boundary between Oldenburg and Hanover, and enters the North Sea by a wide estuary, so much interrupted by sand flats that the entrance by boats is extremely difficult (Map: Germany, C 2). Its length from the confluence of the head streams is 280 miles and from the source of the Werra 447 miles. It is navigable at high water to Münden and small vessels proceed some distance up the Werra, while the Fulda has been canalized as far as Cassel. A canal connects the estuary with that of the Elbe. The principal affluent of the Weser is the Aller, which has a large tributary in the Leine.

WESLEY, CHARLES (1707–88). An English clergyman, brother of John Wesley, with whom he was closely associated. He was born at Epworth, the eighteenth child of Samuel Wesley. At nine years of age he entered Westminster School, from which he went to Christ Church, Oxford, in 1726. Here, with some friends, he began the observance of a strict system of life, persuading them "to observe the method of study prescribed by the statutes of the university." "This gained me," he says, "the harm-

less nickname of methodist"—which seems at first not to have had a religious significance. After taking his degree, he had pupils for a while, whom he influenced in the spiritual life, though at this time he had not decided to take orders. He was, however, ordained in 1735, just before joining his brother John in the Georgia mission. His sojourn in America was even shorter than John's, it was marked by unpopularity arising from what was considered excessive strictness in life and doctrine. Returning to England, he became curate of St. Mary's, Islington, and threw himself vigorously into evangelistic work. In 1739, after some unfriendliness and censure from the constituted authorities of the church, he entered definitely on the itinerant ministry, which he pursued with great earnestness for the next 17 years. He was of a more cautious and conservative temperament than John, and looked with distrust upon the gradual development of a tendency in the Methodist societies to separate from the Church of England, and upon his brother's views of perfection which he thought must be attained by a gradual process. He died in London, after a period of failing health, and was buried in Marylebone churchyard. He is known chiefly for his hymns, of which he wrote over 6000, many of them still in constant use The poetical works of the brothers were published in 13 volumes by the Rev. G. Osborn (London, 1868–72). Consult: the *Journal* of Charles Wesley (2 vols, London, 1879); the first section (1736–39) was republished with additions by Nehemiah Curnock from the shorthand journals recently deciphered (ib., 1909), also Thomas Jackson, *Life of Charles Wesley* (2 vols., New York, 1842); Telford, *Life of the Rev. Charles Wesley* (ib., 1900); R. Green, *Works of John and Charles Wesley: A Bibliography* (2d ed., ib., 1906); also references under METHODISM; WESLEY, JOHN.

WESLEY, JOHN (1703–91). An English clergyman, generally known as the founder of Methodism. He was born at Epworth, in Lincolnshire, the fifteenth child of the Rev. Samuel Wesley, and of a family which had been known as Nonconformists, though Samuel had taken orders in the Church of England. At 10 he was sent to Charterhouse School, where for a time he suffered from persecution by older boys, but finally won the esteem of all. In 1720 he matriculated at Christ Church, Oxford. He took his degree in 1724, and not long after began to think about following his father's profession. He was ordained deacon in 1725, and next year elected a fellow of Lincoln College. Ordained priest in 1728, for a while he acted as curate to his father at Epworth, but was recalled to Oxford by college regulations. Finding his brother Charles and some other undergraduates associated in what was called by unsympathetic outsiders the Holy Club, he naturally saw much of them, and became their director. On his father's death he was urged to accept the living of Epworth, but thought his place was at Oxford.

It was not long before he changed his mind, and was persuaded to go with General Oglethorpe as a missionary to Georgia. His mission was not altogether a success; he was regarded as too strict, and some points on which he insisted were not thought to be in harmony with Protestantism. His sojourn in Georgia was not without good, and his departure was regarded as a real loss to the Colony. On his voyage to Savannah, he met some of the Moravian Brethren, whose simple evangelical piety made a deep impression on him On his return to London, he sought them out, and from Peter Bohler, one of their preachers, imbibed the doctrine of saving faith, and broke away from the influence of William Law, strong in his earlier life.

In the summer of 1738 he went abroad to visit their leaders, and stayed at Herrnhut and with Zinzendorf at Marienborn He corresponded with Zinzendorf for some time, and his letters are still preserved at Herrnhut. His new experiences made a vital difference in him. He associated with Moravians in England, and with other societies interested in the growth of the spiritual life.

Early in 1739 he took more definite steps in the direction he was afterward to follow. His friend George Whitefield invited him to Bristol. When he saw Whitefield preaching in the open air, his High Church principles were at first offended, but on April 2 he preached his first open-air sermon, and thus began his real life work. His success in the neighborhood of Bristol was so great that a special place had to be built to care for converts. An important step was taken on July 20, 1740, when he formed the first society under his direction. They met in a building called the Foundry, formerly government property, but long disused, near Finsbury Square in London, which for many years was the headquarters of Methodism.

Wesley's preaching success soon called him so much away that he was unable to give his societies proper care. In 1742 one of his followers proposed that the members should be divided into bands of 12, with a leader over each. The plan worked well. The leaders reported to Wesley the conduct of the members and the receipt of money. The class meetings thus originated contributed greatly to the success of the movement. Wesley now preached frequently all about London and Bristol. But the fervor and enthusiasm of his converts were looked upon with suspicion by the clergy in general, accustomed to an orderly conduct of religious matters. He began to develop his organization by the appointment of lay preachers, who were to be communicants of the Church of England, and not to conflict in their preaching with the church services. Among the early preachers of this sort were John Cennick and Thomas Maxfield. In 1744 the first conference of his principal helpers was held.

As a result of the Arminian tendencies of Wesley and his friends, Whitefield and Cennick withdrew from relations with them and formed the Calvinistic Methodist Society, but the success of Wesley's work was unabated. In five years from the preaching of the Bristol sermon 45 preachers were laboring with him, and there were 2000 members in London alone. There is no question that the religious life of England was in need of stirring and vivifying influence, which the burning words and ardent faith of Wesley brought. His evangelistic labors extended to all parts of the British Isles. He preached twice to four times daily, and traveled (on horseback until age compelled him to use a carriage) about 4500 miles a year. He met societies, classes, and boards, and inquired minutely into their affairs. He saw to the erection of chapels, and collected money for the

expense. He found time for an amazing variety of literary work, selecting, condensing, abridging, and writing on all kinds of subjects what he thought would be most useful for his followers. He joined in every movement for the improvement of humanity. Sunday schools, the abolition of slavery, education, the circulation of tracts, and charitable associations of all kinds interested him and enlisted his coöperation.

By 1790 he found himself at the head of 511 preachers and 120,000 members, while at least four times that number were in attendance with the Methodist Congregations He died March 2, 1791, in the house attached to the City Road Chapel in London, and was buried there He was of less than the average height, but well proportioned, and of attractive appearance. In social life he was a charming man, a good talker, and never ill at ease. He numbered many of all classes among his friends. The obedience which he exacted, for the good of the cause, from his followers was readily given It is not too much to say that in eighteenth-century England "no single figure influenced so many minds, no single voice touched so many hearts"

Bibliography. Wesley's *Prose Works* were first published by himself (32 vols., Bristol, 1771–74), the religious writings, edited by Thomas Jackson (London, 1829–31; 11th ed., 1856–62), an American edition in seven volumes (New York, 1831). The *Poetical Works* by John and Charles Wesley were edited by G. Osborn (13 vols, London, 1868–72). The sources for the study of Wesley are: his *Journal*, extending from 1735 to 1790, published in 20 parts (London, 1740–89), with many subsequent editions, among them being one in Everyman's Library (4 vols., New York, 1908), and the edition by Nehemiah Curnock, from original manuscripts, with notes from unpublished diaries (6 vols., ib., 1910–15); also *John Wesley's Letters*, edited by George Eayres (ib., 1914). Consult also: Julia Wedgwood, *John Wesley and the Evangelical Reaction of the Eighteenth Century* (London, 1870); Luke Tyerman, *Life and Times of Rev. John Wesley* (2d ed., 3 vols, ib., 1872–75); J. H. Rigg, *The Churchmanship of John Wesley* (ib., 1887); Robert Southey, *Life of Wesley and the Rise of Methodism* (new ed., ib., 1890); J. H. Rigg, *The Living Wesley* (2d ed., ib., 1891); J H. Overton, *John Wesley* (ib., 1891); W. E. H. Lecky, *History of England in the Eighteenth Century* (new ed, 7 vols., New York, 1892–93); J. H. Overton, *Evangelical Revival in the Eighteenth Century* (ib., 1900); F. J. Snell, *Wesley and Methodism*, in "World's Epoch Makers" (Edinburgh, 1900); Leslie Stephen, *History of English Thought in the Eighteenth Century*, vol. i (3d ed., New York, 1902); P. Livingston (ed.), *Heart of John Wesley's Journal* (ib., 1903); C. T. Winchester, *Life of John Wesley* (ib., 1906); John Telford, *John Wesley* (new ed., London, 1906); W. H. Fitchett, *Wesley and his Century. A Study in Spiritual Forces* (Toronto, 1906); Augustin Leger, *La jeunesse de Wesley* (Paris, 1910), S. P. Cadman, "John Wesley and the Eighteenth Century," in *Three Religious Leaders of Oxford and their Movements* (New York, 1916), containing bibliography.

WESLEY, SAMUEL (1662–1735). An English clergyman, father of John Wesley. He was born at Winterborn-Whitchurch, Dorsetshire, and educated first at Dorchester Grammar School and then at Stepney and Newington, in London, with a view to the Independent ministry Some severe invectives having appeared against the Dissenters, he was asked to reply to them, but while doing the necessary reading he changed his opinions, and decided to conform to the Established church He entered Exeter College, Oxford, and graduated in 1688 He was ordained deacon almost immediately, and priest in 1690. After two curacies and a year as chaplain on board a man-of-war, he obtained the living of South Ormsby in Lincolnshire in 1690, and in 1695 that of Epworth, which is closely associated with the later history of his family, and which he held until the year before his death He was a prolific author, especially in verse, in which he published a *Life of Christ* (1693), *Maggots, or Poems on Several Subjects* (1695); *Elegies on the Queen and Archbishop* (1695), *The History of the Old and New Testaments in Verse* (3 vols, 1701–04), *Marlborough, or the Fate of Europe* (1705), *The Battle of the Sexes* (1723); *Poems on Several Occasions* (2d ed with additions, Cambridge, 1743), and in prose several works of a theological nature. Consult his *Life* by Luke Tyerman (London, 1866), and references under WESLEY, JOHN.

WESLEY, SAMUEL (1691–1739). An English poet and clergyman, elder brother of John and Charles Wesley and namesake of his father. He was born in London, and graduated at Christ Church, Oxford, in 1715 He was ordained not long after, and for the next twenty years was a master in Westminster School. In 1732 he became head master of Blundell's School at Tiverton, where he remained until his death At Westminster he became acquainted with Pope, Swift, Prior, Harley, and other Tory poets and statesmen, who thought highly of his abilities in satiric and humorous verse. The first edition of his poems appeared in 1736; a second, with additions, in 1743; and a third, with biography by Nichols, in 1862. Some of his hymns are still in common use.

WES'LEYAN FEMALE COLLEGE. An institution for the higher education of women, founded at Macon, Ga., in 1836. The first degrees were conferred in 1840. The total enrollment in 1915–16 was 467, and the officers and teachers numbered 43. The endowment of the college was about $140,000, the grounds and buildings were valued at about $450,000, and the annual income was about $100,000. The library contained 5400 volumes The president in 1916 was C. R. Jenkins, D.D.

WESLEYAN METHODIST ASSOCIATION. See METHODISM.

WESLEYAN METHODIST CONNECTION. See METHODISM.

WESLEYAN UNIVERSITY. The college was founded in 1831, at Middletown, Conn. The campus and grounds include about 40 acres, situated on a terrace above the Connecticut River. The college offers two courses leading respectively to the degrees of Bachelor of Arts and Bachelor of Science. At least one year's study in college of Latin or Greek is required for the former degree, and courses in advance mathematics and in modern languages are required for the Science degree. The study of English is required of all, and the election of studies must conform to a major and a group requirement. The college gives the degrees of Master of Arts and Master of Science for graduate work, but not the degree of Doctor of Philosophy. From 1872 to 1912 the college was coeducational. In

1916 the attendance was 504, including 21 graduate students, and the faculty numbered about 45. The library contained 103,000 volumes The grounds and buildings were valued in 1916 at $1,176,315. The total value of property under control of the college was $3,591,083, with an endowment of $2,339,092, not including certain building funds of the value of $175,675. The gross income, excluding gifts, was $164,976. The total value of money gifts in 1914–15 was $283,778. The president in 1916 was William A. Shanklin, LL.D.

WESSEL, vĕs'sel, JOHAN HERMAN (1742–85). A Norwegian poet, born at Jonsrud, Akershus Stift. He was a grandnephew of Peter Wessel Tordenskjold (q.v.) Wessel was educated in Christiania and Copenhagen, where he lived from 1761 to 1785. With others he founded the *Norske Selskab* (1772), and in the same year wrote the classic *Kierlighed Uden Stromper* (Love Without Stockings), a parody of formal and linguistic elegance that is hardly to be matched. His stories, as *Gaffelen, Herremanden, Smeden og Bageren, Hundemordet,* and his witty verses are also notable. Few poets of the period have held their own so well as Wessel. The best edition of his *Samlede Skrifter* is by J. Levin (1862; 2d ed., 1878), with biography.

WESSEL, vĕs'sel, JOHANNES, surnamed GANSFORT (c.1420–89). A mystic of the Brothers of Common Life (q.v.) at Zwolle, and a friend of Thomas à Kempis. He was born at Groningen and studied at Cologne, Louvain, and Paris. He visited Rome and taught philosophy at Heidelberg and at Paris. Johann Reuchlin and Rodolphus Agricola (qq.v.) were among his scholars. His later years were spent in monastic retirement in Holland. Wessel's friends, among whom were the Bishop of Utrecht, David of Burgundy, brother to Charles the Bold, called him *lux mundi,* with reference to his evangelical views, but his critics called him master of contradictions, in allusion to his attitude to the Roman Catholic church and to his mind, which held scholastic, mystic, and classical culture together with scientific knowledge in one consciousness without feeling the contradiction. His friends saved his manuscripts and sent them to Luther, who published a farrago of them (1512), leaving out an essay on the Eucharist, because it advocated Zwingli's view and not his own. Consult: Muurling, *Commentatio Historica-Theologica de Wesseli* (Utrecht, 1831); id., *De Wesseli Principiis atque Virtutibus* (Amsterdam, 1840); Ullmann, *Reformers before the Reformation* (Edinburgh, 1877).

WES'SEX (AS. *Westseaxe,* West Saxons). An Anglo-Saxon kingdom. It was situated in Southern Britain, extending from Watling Street to the Channel. About 495 the West Saxons, or Gewissas, landed about where Southampton is now under the leadership of Cerdic and Cynric. After defeating the Britons in several battles, they became kings of the conquered territory in 519. Further progress was checked for a time by a victory of the Britons in 520. After Cerdic's death, Cynric became sole ruler, and in 552 again took up the work of conquest Under his son Ceawlin the kingdom was widely extended, but the King's own people finally rose against him, and he was defeated at Woddesbeorg or Wanborough in 592. For some time thereafter Wessex was of little importance. In the seventh century it became Christian and was often ruled by other kingdoms, notably Mercia. A new period began with Ine, who ruled from 688 to 726 He drove back the Mercians, and his laws are the earliest ones of the West Saxons we possess After his death war was renewed with Mercia, which again asserted its overlordship successfully. The great period of Wessex history begins with Egbert (q.v.) In time he became the ruler of the whole of England, and Wessex henceforth had no independent history. The word "Wessex" has been used by Thomas Hardy (q.v.) to cover the region which forms a background to his novels. Consult J. R. Green, *A Short History of the English People,* vol. i (new ed., New York, 1905) See ANGLO-SAXONS.

WEST, ANDREW FLEMING (1853–). An American Latinist, born at Allegheny, Pa. He obtained his collegiate education at Princeton, from which he received his A.B. in 1874. In 1883 he became professor of Latin, and in 1901 dean of the Graduate School, in Princeton University. He was for many years chairman of the Managing Committee of the American School of Classical Studies at Rome. Oxford University gave him the degree of D.Litt, and he was elected to the National Institute of Arts and Letters, and in 1901 served as president of the American Philological Association. He wrote many articles on university education; *A Life of Alcuin* (1902); and was editor of Terence's *Andria* and *Heautontimoroumenos* (1888), of *The Philobiblon of Richard de Bury* (1880), and of *A Latin Grammar* (1902).

WEST, BENJAMIN (1738–1820). An American historical painter. He was born at Springfield, Pa., Oct. 10, 1738, of Quaker parentage. After desultory study with an artist named Williams he set up as a portrait painter in Philadelphia at the age of 18. Later he spent a year in New York, and in 1760 went to Italy. There he remained three years and was very successful, being elected an honorary member of the academies of Florence, Bologna, and Parma. In 1763 he went to London, where he passed the rest of his life. He was well received and encouraged by Sir Joshua Reynolds, and his success was assured by the painting "Agrippa Landing with the Ashes of Germanicus," for Drummond, Archbishop of York, who obtained for him the royal patronage. In 1772 George III appointed him historical painter, and in his "Death of General Wolfe" (Grosvenor Gallery, London) he discarded the convention of painting figures in a modern battle clothed in the costumes of the Greeks and Romans, though Sir Joshua Reynolds and the Archbishop of York tried to dissuade him from his intentions. Sir Joshua subsequently retracted his objections and acknowledged West's success, proclaiming the change as an epoch-making innovation. West was one of the founders of the Royal Academy and succeeded Sir Joshua Reynolds as its president in 1792. He produced over 400 canvases of heroic size, but of rather commonplace merit. They are conceived in the impersonal eclectic spirit of the day, good in composition but flat and spiritless in color, and devoid of real imaginative power. His real importance consists in his activity as a teacher, adviser, and unfailing friend of the entire younger generation of American artists, who studied with him in London, and in the fact that he was instrumental in laying the foundation of the Royal Academy. His pictures may be seen in England at the National Gallery and at Hampton Court. In the Metropolitan Museum, New York, are nine ex-

amples, including "Hagar and Ishmael" and "Triumph of Love"; in the Pennsylvania Academy, Philadelphia, "Christ Healing the Sick," "Penn's Treaty with the Indians," and "Death on the Pale Horse"; and in the Boston Museum, "Kingdom." Consult his *Life* by Galt (London, 1820), and Samuel Isham, *History of American Painting* (new ed., New York, 1915).

WEST, EDWARD WILLIAM (1824–1905). An English Pahlavi scholar, born in London. In 1839 he entered King's College, London, from which he graduated as a civil engineer in 1842. In 1844 he went to India in connection with the railway system of the Bombay presidency. He visited the cave temples at Elephanta in 1846, and later those at Kanheri, and in 1848 began his studies of Pahlavi inscriptions and manuscript texts. In 1876 he retired from his engineer duties in India, returned to Europe, and devoted his time to editing and translating the most important works of Pahlavi literature. His publications include *The Book of the Mainyō-i-Khard* (1871), *The Book of Ardāvīrāf and a Glossary* (1872–74), *Shikandgūmānīk Vijār* (1887); five volumes of *Pahlavi Texts* translated in *Sacred Books of the East*, edited by F. Max Muller, v, xviii, xxiv, xxxvii, xlvii (Oxford, 1880–97); and "Pahlavi Literature," in Geiger and Kuhn, *Grundriss der iranischen Philologie*, vol. ii (Strassburg, 1904).

WEST, REBECCA. The principal female character in Ibsen's *Rosmersholm*.

WEST, THOMAS. See DE LA WARR, LORD.

WEST AFRICA, PORTUGUESE. See ANGOLA.

WEST ALLIS. A city in Milwaukee Co., Wis., 4 miles west of Milwaukee, of which it is an industrial suburb; on the Chicago, Milwaukee, and St. Paul and the Chicago and Northwestern railroads (Map: Wisconsin, E 6). It contains a National Soldiers' Home. There is a large automobile factory. Other manufactured products are mining and other machinery, tanks, castings, wheelbarrows, trucks, stamped metal goods, and sashes, doors, and blinds. Pop., 1900, 6645; 1920, 13,765.

WEST AUSTRALIA. See WESTERN AUSTRALIA.

WEST BEND. A city and the county seat of Washington Co., Wis., 33 miles north-northwest of Milwaukee, on the Milwaukee River, and on the Chicago and Northwestern Railroad (Map: Wisconsin, E 5). The manufactures are pocketbooks and purses, wagons and wagon wood stock, farm machines, aluminium ware, and foundry and machine-shop products. There also is a large creamery. West Bend contains several fine county buildings, a city hall, and a public library. Pop., 1900, 2119; 1910, 2462.

WEST BERWICK. A borough in Columbia Co., Pa., 28 miles southwest of Wilkes-Barre, on the Susquehanna River, and on the Delaware, Lackawanna, and Western Railroad (Map: Pennsylvania, J 4). It is the home of the American Car and Foundry Company. Pop., 1910, 5512.

WEST'BORO. A town in Worcester Co., Mass., 12 miles east of the city of Worcester, on the Boston and Albany Railroad (Map: Massachusetts, D 3). It has a public library, the Lyman School for Boys, and the Westboro State Hospital. The town is mainly interested in manufacturing, the most important products being straw goods, underwear, tape, and leather specialties. Westboro was settled about 1659, and was known as Chauncy until it was incorporated as a town in 1717. Pop., 1900, 5400; 1910, 5446; 1915 (State census), 5925.

WEST BROMWICH, brŭm'ĭch *or* ĭj. A manufacturing town in the south of Staffordshire, England, 5 miles northwest of Birmingham (Map: England, E 4). There are fine municipal buildings. The city has rich mines of coal and iron, blast furnaces, and slitting mills, and manufactures firearms, swords, cutlery, agricultural implements, and metal goods of every kind. Pop., 1901, 65,170; 1911, 68,345.

WEST'BROOK. A city in Cumberland Co., Me., 6 miles northwest of Portland, on the Boston and Maine and the Maine Central railroads (Map: Maine, B 5). Manufacturing is the most important industry, the chief establishments including paper mills, warp mills, brick works, and silk mills. Westbrook was part of Falmouth until incorporated as a separate town in 1814. It included Deering (now a part of Portland) until 1870. Pop., 1900, 7283, 1910, 8281; 1915 (U. S. est.), 8807.

WESTBURY, wĕst'bĕr-ĭ, First LORD. See BETHELL, RICHARD.

WEST'CAR PAPYRUS. See EGYPT, *Literature and Science*.

WEST CHES'TER. A borough and the county seat of Chester Co., Pa., 27 miles west of Philadelphia, on the Pennsylvania Railroad (Map: Pennsylvania, K 8). It has the West Chester State Normal School; Darlington Seminary for Young Ladies; the Chester County Hospital; the Homeopathic Hospital; and several libraries, including a public library. Marshall Square with its botanical gardens, Turk's Head Hotel, dating from pre-revolutionary times, the county courthouse, and the county jail are other noteworthy features. Dairy implements are the principal manufactured products. There are also a creamery, a large grain elevator, wheel works, a tag factory, planing mills, gasoline-engine works, etc. Pop., 1900, 9524; 1910, 11,767; 1915 (U. S. est.), 12,949; 1920, 11,717.

WEST'COTT, BROOKE FOSS (1825–1901). An English scholar and divine, born in Birmingham. He was educated at King Edward VI's School, Birmingham, and at Cambridge University. In 1852 he left Cambridge to become one of the masters of Harrow. His more public career began in 1869, when he became canon of Peterborough. This office he held until 1883. From 1870 he was also regius professor of divinity at Cambridge. In 1883 Gladstone appointed him a canon of Westminster, and in 1890 he was appointed Bishop of Durham. Westcott was an accurate and widely read scholar, a profound and spiritual theologian, and an influential adviser in social reform movements. His joint editorship of Westcott and Hort's Greek New Testament gave him a place among the first New Testament scholars of the last century. His more important writings are: *The History of the Canon* (1855), *Introduction to the Study of the Gospels* (1860), *The New Testament in the Original Greek* (with Dr. Hort, 1881), *Social Aspects of Christianity* (1887), *The Epistle to the Hebrews* (Greek text with notes and essays, 1889), *The Incarnation and Common Life* (1889). Consult Arthur Westcott, his son, *Life and Letters of Brooke Foss Westcott* (2 vols., London, 1903); H. S. Holland, *Brooke Foss Westcott* (ib., 1910); A. C. Benson, *The Leaves of the Tree* (New York, 1911).

WESTCOTT, EDWARD NOYES (1847–98). An American author. He was born in Syracuse,

N. Y., and spent most of his life there. Until ill health compelled his retirement, he was a banker and broker, senior member of the firm of Westcott and Abbott. He wrote a number of songs, both words and music, but it is for his one literary work, *David Harum: A Story of American Life*, that he is known. This book, written after Westcott's retirement, was published (1898) six months after his death. Although it had been rejected by six publishers, 400,000 copies were sold within about a year, a record which had been equalled in the United States only twice before. The quaint and mellow humor of the chief character of the story brought it a sustained as well as an early success.

WESTERÅS. See VESTERÅS.

WESTERGAARD, vĕs'tĕr-gōrd', NIELS LUDVIG (1815–78). A Danish Orientalist and philologist, born and educated in Copenhagen. In 1838 he went to Bonn, where he studied Sanskrit, and then visited Paris, London, and Oxford, finally returning to Denmark. In 1841 he made a journey to India and in 1843–44 to Persia and Russia. In 1844 he became lecturer and in 1845–78 was professor of Indian philology at the University of Copenhagen. Noteworthy among his publications are: *Radices Linguæ Sanskritæ* (1841), *Sanskrit Læsebog* (1846), and *Bundehesh, Liber Pehlvicus* (1851). His most important work was his edition of the *Zendavesta, or the Religious Books of the Zoroastrians* (1852–54).

WEST'ERLY. A town, including several villages, in Washington Co., R. I., 44 miles southwest of Providence, on the Pawcatuck River, and on the New York, New Haven, and Hartford Railroad (Map: Rhode Island, A 4). It manufactures cotton and woolen goods, thread, printing presses, elastic fabric, shirtings, etc. There is a handsome post-office building, a town hall, a courthouse, the Westerly Memorial Library, and Wilcox Park. Watch Hill, within the town limits, on the coast, is a popular summer resort, being known for its good bathing. Westerly was settled in 1661 and was known as Misquamicutt until 1669, when it was incorporated under its present name. Pop., 1900, 7541; 1910, 8696; 1915 (State census), 10,175. Consult Denison, *Westerly and its Witnesses for 250 Years* (Providence, 1878).

WESTERMARCK, wĕs'tĕr-märk, EDWARD ALEXANDER (1862–). A Finnish-British anthropologist, born at Helsingfors, where he became professor in the university (1894). In 1898–1902 he traveled in Morocco to study the moral conceptions of primitive races. In 1904 he became professor at the University of London, but lectured frequently at Helsingfors. His important works include: *The History of Human Marriage* (1891; 3d ed., 1901; Ger., Fr., Ital., Swed., Span., Russ., Jap., trans.), which earned for him an international name; *The Origin and Development of the Moral Ideas* (2 vols., 1906–08; 2d ed., 1912; Ger. trans., 1907–09), a standard work on the subject; *Marriage Ceremonies in Morocco* (1914).

WESTERN AUSTRALIA. A state of Australia, occupying the entire western third of the continent. It is bounded on the north, west, and south by the Indian Ocean, and on the east by South Australia. Western Australia is the largest of the Australian states, having an area placed at 975,920 square miles, or 624,588,800 acres.

Physical Features. The interior consists mainly of undulating sand or sandstone plateaus of no great elevation, their level surfaces being broken by isolated sandstone ranges, sand hills, and wind-blown ridges. The southeastern part of the state consists of a limestone plateau about 200 miles wide and ending in a line of steep cliffs running for several hundred miles along the south coast. Along the southwest coast is the most important mountain range, the Darling, rising to 1500 feet, and 40 miles inland is the Stirling Range, culminating in Bluff Knolls, 3640 feet, the highest elevation in the state The extreme northern part of the state, known as the Kimberley District, consists of elevated plains in the interior, falling toward the coast in several lines of precipitous and rugged escarpments broken by deep ravines. The coasts of Western Australia are very little indented and consequently natural harbors are wanting. The length of the coast line, following known indents, is approximately 5200 miles. On the west coast there are a number of rivers, some of considerable size, such as the Murchison, Gascoyne, Ashburton, and Fitzroy. Most of the smaller streams are little more than wet-weather channels. The lakes of the interior are filled to four or five feet after the rains but in the dry season are nothing but mud flats covered with incrustations of salt.

Climate and Vegetation. The climate is healthful and pleasant but varies in different parts of the state. The range of temperature is considerable, and frost may occur in winter. The annual rainfall is between 30 and 40 inches in the extreme southwestern and northeastern sections, between 10 and 20 inches along the western coast, and less than 10 inches in the great interior. The southeastern plateau is covered with rich grass during the wet season, and good grazing land is also found in the upper valleys of the western rivers. The southwestern section of the state is a great forest region, in which the eucalyptus grows to an immense height. The interior, however, consists mainly of sandy and stony desert, partly barren, partly covered with acacia scrub and spinifex, and almost destitute of surface water.

Geology. The state is largely built up of crystalline and schistose rocks; on the west coast are Tertiary formations and older deposits, carboniferous to cretaceous, occur in the north. Auriferous quartz occurs along the west coast from Coolgardie to the Kimberley Division, and gold forms the colony's richest source of wealth.

Mining. The chief source of income is the gold mines. Gold was discovered in the Kimberley District in 1882, and in the Yilgarn District in 1887. Progress in mining, however, was at first slow, and in 1891 the year's product was valued at only £115,182. The year following, however, the Coolgardie discoveries were made, and mining rapidly developed at that point. In 1896 water was obtained farther east at Kalgoorlie, and this became the most active gold-mining centre. Subsequently mining developed in the Mount Margaret and a number of other districts. The value of the gold obtained in 1914 was £5,237,351. The total output of the state since 1886, when gold mining first commenced, to the end of 1914 was 28,278,147 fine ounces, valued at £120,117,931. During 1913, 484 tons of tin ore and ingot were raised, valued at £72,142; coal 313,818 tons, value £153,614; lead ore 3169 tons, value £59,002. The copper ore

produced during the year amounted to 4339 tons, value £136,622.

The value of silver, obtained as a by-product, was £23,420 and 188,020 fine ounces were exported Ironstone and limestone are also produced. The total value of the mineral products in 1913 was £6,036,265.

Agriculture. Cultivation is carried on to a considerable extent south of latitude 28°. The wheat grown in the state, and the grain generally, is of a superior description. A large extent of land is available for cultivation The rainfall is copious and regular. The area of land under crop in 1914 was 1,537,922 acres. The area of the principal crops was: wheat, 1,097,193 acres, oats, 133,625 acres; hay, 246,640 acres; potatoes, 5229 acres; vineyards, 2864 acres; orchards, 20,574 acres. The yield of wheat in 1914 was 13,331,350 bushels The quantity of wine made during the same period was 208,738 gallons. At the end of June, 1914, of the entire acreage of the state, 7,795,319 acres of land had been alienated. The area leased or licensed at that date was 184,220,586 acres. In 1913 there were in the state 4,421,375 sheep, 834,265 cattle, 156,636 horses, 27,463 goats, and 47,966 swine. There were at the same date 4284 camels; these animals are used as beasts of burden. There were 3366 mules and donkeys.

Transportation. In June, 1914, there were 2967 miles of government railway in operation. There were several hundred miles of private railway, of which the Midland, 277 miles long, is the chief. The cost of construction and equipment of the state-owned railways to June 30, 1912, was £13,233,093. The gross receipts of the state railways for the year ending June 30, 1914, was £2,257,011, and the working expenses £1,572,008.

Government. The Governor is appointed by the British crown. The Parliament consists of a Legislative Council of 30 members elected for six years, and a Legislative Assembly of 50 members elected for three years. Electors must be 21 years of age, residents of the election district, or have certain property qualifications. The right of suffrage is conferred without distinction of sex. The capital is Perth.

Trade. The value of the imports in 1914 was £8,960,397. Of this amount nearly three-fourths of the trade was with Britain and the commonwealth, and the remainder with foreign countries The exports during the same year amounted to £8,406,182. The principal articles of export were gold and gold specie, £3,825,714; wool, £614,894; timber, £1,022,622; hides and skins, £173,363; pearls and shell, £210,672.

Finance. In 1913–14 the total revenue amounted to £5,205,343 and the expenditures to £5,340,754. The participation of the government in the construction of railways and other public enterprises has created a heavy public debt, which amounted in 1914 to £30,728,078.

Population. Western Australia is one of the most sparsely settled regions in the world. Most of it is wholly uninhabited, the population being confined mainly to portions of the coast region and the gold-mining settlements in the interior. The first reports of gold at Kimberley and Yilgarn did not result in any marked immigration, and in 1890 the total population was only 49,200. The remarkable discoveries of gold at Coolgardie in 1892 caused a rush of miners into the region which has not yet ceased. In 1895 the population had increased to 101,238, in 1911 to 280,310, and on Dec. 31, 1914, the official estimate of the population was 323,952. The aborigines (exclusive of wild tribes) number about 6000. As is common in a mining region, a large percentage of the population is centred in the towns In 1911 Perth contained, with suburbs, 85,945 inhabitants, Fremantle, 20,847; Kalgoorlie, 8781; Boulder, 10,824.

Religion. In 1911 the adherents of the Church of England numbered 109,435; Roman Catholics, 56,616; Methodists, 34,348; Presbyterians, 26,678, Congregationalists, 6203; Baptists, 4801.

Education. School attendance is compulsory between the ages of 6 and 14. The teaching is free Of the total white population of 15 years and upward in 1911, 1.70 per cent were unable to read. Public instruction is secular, but religious instruction may be given by clergymen of the same denomination with the child's parents. In 1913 there were 42,081 pupils enrolled in 583 state schools and 10,335 in 119 private schools For the year ended June 30, 1914, £318,721 was expended on education. Only those private schools are given aid which had enjoyed that advantage prior to 1895. The Perth Technical School is affiliated with Adelaide University. There is also a technical school at Fremantle. There are numerous high schools, and in several places other than Perth and Fremantle provision is made for manual or technical training. Trinity College was opened in 1902.

History. The coast was probably visited by Spanish and Portuguese navigators in the sixteenth century. In the following century the Dutch explored the shores, and Tasman surveyed the north coast. The west coast was only surveyed after numerous later explorations. The earliest settlement—English—was made in 1825. The British took formal official possession of the land in 1827. The colonization of Western Australia was definitely commenced in 1829 by a British organization to which the government gave large land grants. Several thousand convicts from Sydney were numbered among the early settlers. It was not until 1870, however, that great efforts began to be made by the British to facilitate the development of the colony. On Jan. 1, 1901, Western Australia became a state of the Australian Commonwealth. See AUSTRALIA.

Consult: Sir John Forrest, *Explorations in Australia* (London, 1875); A F. Calvert, *Western Australia, its History and Progress* (ib., 1894); id., *Mineral Resources of Western Australia* (ib., 1894); T. Chambers, *Western Australia* (Perth, 1897); May Vivienne, *Travels in Western Australia* (London, 1901); *Western Australian Official Year Book, Geological Survey Bulletins*, and other periodical government publications issued at Perth.

WESTERN COLLEGE, now LEANDER CLARK COLLEGE. A coeducational institution founded at Western, Iowa, in 1855, and in 1881 removed to Toledo, Iowa. The college is under the control of the United Brethren of Christians, but is nonsectarian in its teaching. There are two courses, classical and scientific, which lead to the degrees of B.A and B.S There are also a preparatory department, a conservatory of music, a school of elocution, and a department of art. The total enrollment in all departments in 1916 was 250. The faculty numbered 23. The productive funds amount to about $200,000, and the total annual income to about $27,000.

The library contains about 8000 volumes. The president in 1916 was Marion E. Druary, D.D.

WESTERN EMPIRE. See ROME.

WESTERN ISLES. See HEBRIDES.

WESTERN PORT. A town in Allegany Co., Md, about 175 miles by rail west by north of Washington, D. C, on the Potomac River, and on the Western Maryland Railroad (Map: Maryland, B 2). Coal mining and the manufacture of paper constitute the chief industries. Pop., 1900, 1998; 1910, 2702.

WESTERN RESERVE. In American history the name given to a section of northern Ohio, reserved by Connecticut when that State ceded to the general government in September, 1786, her claim to the western lands. By her charter of 1662 Connecticut was made to extend from sea to sea. Her claim to considerable tracts of land in the West, however, was disputed by both New York and Pennsylvania. In September, 1786, Connecticut yielded all claim except that to the territory between 41° and 42° 2′, extending westward 120 miles from the western boundary of Pennsylvania Out of this tract she kept a half-million acres in the West, later known as the Fire Lands The remainder was sold in 1795–96 for $1,200,000 to 48 men who with others afterward formed the Connecticut Land Company, and in 1796 began a survey. (See PHELPS, OLIVER) Settlement was slow at first, as there was doubt concerning the title. After 1812 settlement was rapid, largely from Connecticut and other New England States, and 13 counties have been formed wholly or in part from the territory. Consult Mathews, *Ohio and her Western Reserve* (New York, 1902).

WESTERN RESERVE UNIVERSITY. An institution for higher education at Cleveland, Ohio. It was founded in 1826 as the Western Reserve College. The campus, occupying 36 acres, is situated in the midst of the city's park system. The university consists of 11 departments: Adelbert College, the original institution, which was removed from Hudson to Cleveland in 1882, and was renamed in honor of the son of a benefactor, Amasa Stone, who gave the institution $600,000; Men's College Department of the University; the College for Women, established in 1888; the Department of Graduate Instruction, established in 1892; the School of Medicine, formerly the Cleveland Medical College, founded in 1844, the Franklin Backus Law School, opened in 1892; the Dental School, established in 1892; the Library School, opened in 1904; the School of Pharmacy, founded in 1882; the School of Education, summer session opened in 1915, the School of Applied Social Sciences, founded in 1915 and opened in September, 1916. The schools of medicine and of law are graduate schools. The university confers the degrees of B.A, B S., LL.B., M.A., Ph.D., M.D., Ph.G., and Ph.C. In 1916 the students in all departments numbered 1970 and the faculty and official staff 275. The library had 117,700 volumes. The total resources amounted to about $7,000,000. The president in 1916 was Charles F. Thwing, D D.

WESTERN SCHISM. See SCHISM, WESTERN.

WEST FARNHAM, färn′am. See FARNHAM.

WEST′FIELD. A town, including several villages, in Hampden Co, Mass., nine miles west of Springfield, on the Westfield River, and on the Boston and Albany and the New York, New Haven, and Hartford railroads (Map: Massachusetts, B 4). It is the seat of a State normal school, and has the Westfield Athenæum, the Westfield State Sanitarium, Noble Hospital, and Woronoco Park. The town is chiefly engaged in manufacturing and is especially known for its extensive whip-making establishments and cigar, bicycle, and motorcycle factories. There are also paper mills, machine shops, and manufactories of thread, boxes, brick, steam-heating apparatus, organs, etc. Settled as a trading post, probably as early as 1642, Westfield was known as Woronoco until incorporated under its present name in 1669. Pop , 1900, 12,310, 1910, 16,044; 1915 (State census), 18,411; 1920, 18,604. Consult Holland, *History of Western Massachusetts* (Springfield, 1855).

WESTFIELD. A town in Union Co., N. J., 18 miles southwest of New York City, on the Central Railroad of New Jersey (Map: New Jersey, D 2). As a residential suburb of New York City it contains many fine homes. Pop., 1910, 6420, 1915 (State census), 8147.

WESTFIELD. A village in Chautauqua Co , N. Y., 60 miles southwest of Buffalo, on Chatauqua Creek, and on the New York Central, the New York, Chicago, and St. Louis, the Jamestown, Westfield, and Northwestern and the Chautauqua Traction railroads (Map: New York, A 6). It has large grape-juice factories, grist mills, a canning factory, lumber yards, wine cellars, and grape-basket works. Pop., 1900, 2430; 1910, 2985.

WEST FLANDERS. See FLANDERS, WEST.

WEST′FORD. A town in Middlesex Co., Mass., 8 miles southwest of Lowell, on the Boston and Maine Railroad (Map: Massachusetts, E 2). Interesting features are the First Parish Meeting House, built in 1794, Westford Academy, the town hall, and the J. V. Fletcher Library. There are large ice houses and manufactories of machinery, worsted and carpet yarns, etc. Granite is quarried here and shipped in large quantities. Pop., 1900, 2624; 1910, 2851.

WEST GRIQUALAND. See GRIQUALAND WEST.

WEST HAM. See HAM, EAST AND WEST.

WEST HAMMOND. A city in Cook Co., Ill., 21 miles south by east of Chicago, on Calumet River, and on Indiana Harbor Belt Railroad (Map: Illinois, J 2). Noteworthy features are St. Margaret's Hospital, the high school, and the city hall. There are manufactories of glue and beer. Pop., 1900, 2935; 1910, 4948.

WEST HARTFORD. A town in Hartford Co., Conn., adjoining the city of Hartford (Map: Connecticut, E 2). It contains Mount Joseph Seminary, for young ladies; St. Mary's Home, for aged people; St. Augustine Normal School; St. Agnes Home, for orphans; a high school; the Noah Webster Memorial Library (public); and Elizabeth and Reservoir parks. The chief industries are tobacco growing and shipping, dairying and market gardening. Pop., 1900, 3186; 1910, 4808. West Hartford is the birthplace of Noah Webster (q.v.).

WEST HARTLEPOOL, här′t'l-pōōl′. A municipal borough of Durham County, England, an extension of Hartlepool (q.v.), forming with that town the Parliamentary borough and port of The Hartlepools (Map: England, E 2). It carries on an important trade with Baltic ports, exporting coke, cement, etc. Its harbors and docks cover 300 acres. The town has fine parks and public buildings. Pop., 1901, 62,600; 1911, 63,923.

WEST HAVEN. Formerly a borough in

New Haven Co., Conn., consolidated in 1911 with Allington and Orange Centre, to form the town of Orange (Map: Connecticut, D 4). It is chiefly residential, and has a fine town hall, the Union High School, a Carnegie library, the Florence Crittenton Home, the county orphan asylum, two sanitariums, a home for inebriates, and a county hospital. Manufacturing is the leading industry of the community, the most important products being munitions, automobiles, buckles, safes, fertilizers, and hack saws. Savin Rock, near here, on Long Island Sound, is a noted summer resort. Pop., 1910, 8543.

WEST HAZLETON. A borough in Luzerne Co., Pa., 31 miles south of Wilkes-Barre, on the Wilkes-Barre and Hazelton Electric Railroad (Map: Pennsylvania, K 4). It has a foundry. Hazle Park is of great beauty. Pop., 1900, 2516; 1910, 4715.

WEST HO'BOKEN. A town in Hudson Co., N. J., adjoining Jersey City and Hoboken (Map: New Jersey, E 2). It occupies an elevated site and commands an extended view. The Monastery church, town park, and boulevard, St. Joseph's Auditorium, and Carnegie library are notable. West Hoboken is primarily noted for the manufacture of silk, silk goods, and embroideries. Other products include braid, artificial flowers, feathers, cloaks, and suits, pipes, chemicals, sashes, doors, blinds, etc. West Hoboken was originally a part of Bergen, and was separately incorporated in 1861. Pop., 1900, 23,094; 1910, 35,403; 1915 (State census), 38,776; 1920, 40,068.

WEST HOMESTEAD. A borough in Allegheny Co., Pa., 8 miles southeast of Pittsburgh, on the Monongahela River, and on the Baltimore and Ohio Railroad (Map: Pennsylvania, A 6). It has a Carnegie library. There are important industrial interests, represented by steel mills, axle works, brickworks, and manufactories of machinery, car wheels, etc. Pop., 1910, 3009.

WESTHOUGHTON, wĕst'hou't'n *or* -hō't'n. A town in Lancashire, England, 5 miles southwest of Bolton. Coal mining and the manufacture of silk and cotton goods and nails constitute the principal industries. Pop., 1901, 14,377; 1911, 15,046.

WEST INDIAN BOXWOOD. A yellow wood of great density and hardness that is chiefly used for turning. This wood has been known to the trade for many years, the principal commercial supply coming through Maracaibo, Venezuela, but the botanical identity of the tree has only recently been established. It is the wood of *Casearia præcox*, a small tree, about a foot in diameter, belonging to the family Flacourtiaceæ. In addition to northern South America the tree is found in Cuba and other West Indian islands.

WEST INDIES, ĭn'dĭz. A large archipelago in the Atlantic Ocean between the North and South American continents. It consists of the Bahama Islands, a somewhat irregular group, lying to the southeast of the peninsula of Florida and the Greater and Lesser Antilles (see ANTILLES), a long chain of islands stretching in a great curve from the entrance to the Gulf of Mexico eastward and southward to the mouths of the Orinoco, and inclosing the Caribbean Sea between it and the mainland. The total area of the archipelago is about 92,000 square miles, of which the Greater Antilles alone take up over 82,000. With the exception of the Bahamas, which are low, of coral formation, the islands are nearly all mountainous. The Antilles are, in fact, the projecting remnants of a former mountain range which was similar in formation to the Central American Cordillera, and formed a continuous or nearly continuous bridge between the northern and southern continents. The range consists of a core of crystalline rocks flanked by Cretaceous and Tertiary deposits, and these formations make up the larger portion of the Greater Antilles, but appear only sporadically in the Lesser Antilles, chiefly in the Virgin Islands, in the eastern half of Guadeloupe, and in Barbados and Trinidad. The other members of the Lesser Antilles owe their origin to a line of volcanic activity, and consist of recent, and generally still active, volcanic cones. The West Indian cordillera culminates in Haiti at an altitude of over 10,000 feet, while in the Lesser Antilles the maximum elevation is about 5000 feet. The climate of the West Indies is tropical, with an average mean temperature of 72° for the coldest and 80° for the warmest month, and average extremes of 54° and 100°. The annual rainfall varies between 40 and 66 inches. Most of the rain is brought by the northeast trade wind, which is the prevailing wind in summer. Hence the summer is the wet season, the winter months being comparatively dry, as the winds then are generally southeast. A peculiar feature of the climate is the extremely violent hurricanes which from time to time, generally between July and November, cause serious destruction of life and property. The flora is related to that of tropical South America, though less rich in distinctively tropical species. The fauna is characterized chiefly by a paucity of large mammals as compared with the fauna of the mainland, though the other divisions of the animal kingdom are well represented. For details of the flora and fauna of the principal islands see the separate articles.

The industries are mainly agricultural, and sugar, tobacco, and coffee are the principal economic plants. The importance of cane sugar has declined in recent years, but fruit, cocoa, and cotton culture is developing. The population of the whole archipelago is a little more than 6,000,000. Two-thirds of the inhabitants are negroes or of African blood, though in Cuba and Porto Rico the whites are in the majority. The Europeans are chiefly descendants of Spanish, French, and English settlers. The principal remaining element of the population is the imported Chinese and Indian coolies, the aboriginal Indian population being almost wholly extinct. Politically the West Indies are much divided. Of the Greater Antilles, Porto Rico belongs to the United States and Jamaica to Great Britain, while Cuba and Haiti represent independent republics, the latter containing two—Haiti and Santo Domingo. The other islands are colonial possessions of Great Britain, France, the Netherlands, and Denmark, the British possessions being by far the largest.

The West Indies were so called because they were at first believed to be a part of India. They were the earliest parts of the New World to be discovered and settled, and served as a base for the Spanish expeditions of conquest and exploration on the mainland. For details of history, see articles on the separate islands.

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WEST INDIES, DANISH. A group of three West Indian islands, situated east of Porto Rico, belonging geographically to the Virgin Islands and constituting a colony of Denmark. It consists of Saint Croix, Saint Thomas (q.v.), and Saint John, with a total area of 139 square miles (Map: West Indies, F 3). The chief industry is the cultivation of sugar. The trade is chiefly with the United States and Denmark, the exports consisting almost entirely of sugar and rum. The executive power is in the hands of the Governor, appointed by the crown. The revenue is derived principally from customs and is insufficient to cover the expenditures. Pop., 1901, 30,527; 1911, 27,086; St. Croix (84 square miles), 15,467; St. Thomas (33 square miles), 10,678; St. John (21 square miles), 941. The inhabitants are mostly negroes, the Danish element being represented almost exclusively by the officials and their families. The chief language is a Spanish dialect, but English is generally spoken in the ports. The seat of government is Christiansted (pop., 4592 in 1911), in St. Croix. The largest town is Charlotte Amalie (pop., 8247) in St. Thomas. Negotiations for the sale of the islands to the United States have been in progress for a number of years.

WEST INDIES, DUTCH. See CURAÇAO; GUIANA, *Dutch Guiana;* NETHERLANDS, *Colonies.*

WEST'INGHOUSE', GEORGE (1846–1914). An American inventor and engineer, famous for his invention of the air brake. He was born Oct. 6, 1846, at Central Bridge, Schoharie Co., N. Y., but removed when a young boy to Schenectady, where he was educated in the public schools. His father was a large manufacturer of agricultural machinery, and George Westinghouse showed inventive and mechanical genius at an early age. In the Civil War he served with the Twelfth New York Regiment and the Sixteenth New York Cavalry until the latter part of 1864, when he became assistant engineer in the United States navy. On his return to Schenectady in 1865 he matriculated at Union College and studied until the end of the sophomore year, being occupied in the meantime with mechanical investigations. His first invention of note was a railway frog, and from this and other railway appliances his attention was turned to brakes. In 1868 he invented the air brake (q.v.), which was successfully used in that year and soon came to be employed universally throughout the United States and gradually in Europe, constantly receiving important and extensive improvements at the hands of Westinghouse. Railway signaling also attracted his attention, and many inventions and improvements in safety devices followed. Becoming interested in electricity, Westinghouse acquired patents for alternating current machinery and immediately devoted himself to the development of this branch. Through his efforts the alternating current for power and lighting was used on a large scale, notably at the Chicago Exposition of 1893, and despite the opposition of the direct-current advocates, came rapidly into widespread use. The induction motor of Tesla (q.v.) and other inventions that were developed under his direction made possible long-distance transmission of power. To construct air brakes, and electrical and other machines, large works were erected at Pittsburgh, which were constantly added to and maintained at a high degree of efficiency, especially as regards equipment and organization. From these works were supplied the generators for the great power plants at Niagara Falls, and for the elevated and rapid-transit systems of New York, while in their different departments were constructed steam and gas engines, steam turbines, and electrical and other machinery, which in nearly all cases was of improved form, invented or developed in the Westinghouse shops and laboratories. The electrical equipment for the Metropolitan Railway in London was also from the Westinghouse works. In addition to being the head of a number of corporations in America, representing an investment of many millions, Westinghouse established large factories and works in Europe. In 1907 the Westinghouse Electric and Manufacturing Company was compelled to pass into the hands of a receiver, but the various interests were later reorganized according to Westinghouse's own ideas. He served as president of the American Society of Mechanical Engineers in 1910, received the John Fritz medal, and was decorated with the French Legion of Honor, the Royal Crown of Italy, and the Order of Leopold. Westinghouse's work in mechanical engineering was always typical of the best American practice both in the field of invention and in the organization and operation of manufacturing plants, and he was considered one of a small number of men responsible for establishing the industrial preëminence of the United States. Few works have been operated on a larger scale or more efficiently than those under his control. He died March 12, 1914, in New York.

WEST LAFAYETTE. A town in Tippecanoe Co., Ind., 1 mile northwest of Lafayette (Map: Indiana, D 4). It is the seat of Purdue University (q.v.). Pop., 1900, 2302; 1910, 3867.

WEST'LAKE, JOHN (1828–1913). An English legal scholar, born at Lostwithiel, Cornwall. He graduated at Trinity College, Cambridge, in 1850, was fellow of the college in 1851–60, was called to the bar at Lincoln's Inn in 1854, and became a bencher of the Inn in 1874. In 1885 he was elected to Parliament as Liberal member for the Romford Division of Essex, from 1888 to 1908 was professor of international law in the University of Cambridge, and in 1900–06 was a member for Great Britain of the International Court of Arbitration at The Hague. His works, of the highest importance in their field, include: *A Treatise on Private International Law* (1858; 2d ed., rewritten, 1880; 5th ed., 1912); *Chapters on the Principles of International Law* (1894); *International Law* (2 vols., 1904–07; 2d ed., 1910–13). His *Collected Papers on Public International Law* were edited by L. Oppenheim in 1914.

WEST LOTHIAN, lō'*th*ĭ-an *or* lō'thĭ-*a*n. A county of Scotland. See LINLITHGOW.

WEST'MACOTT, SIR RICHARD. (1775–1856). An English sculptor. He was born in London,

and studied with his father In 1793 he went to Rome, where he studied with Canova, carrying off the gold medal of the Academy of St Luke with his bas-relief of "Joseph and his Brethren." In the same year (1795) he was made a member of the Florentine Academy Returning to London in 1797, he was in 1811 elected Academician, in 1827 he succeeded Flaxman as professor of sculpture at the Royal Academy and in 1831 he was knighted A large number of public works in England, India, and the colonies were executed by him, including the statues of Addison, Pitt, Fox, and Percival in Westminster; the monuments to Abercromby, Collingwood, Captain Cook, and General Pakenham in St. Paul's; a colossal bronze statue of Achilles in Hyde Park, after the original on Monte Cavallo at Rome; the statue of the Duke of York on the column in Waterloo Place, and the pediment groups representing the 'Progress of Civilization," executed for the British Museum (1847).

WESTMACOTT, RICHARD (1799–1872). An English sculptor, son of Sir Richard Westmacott. He was born in London, and studied under his father, then at the Royal Academy and in Italy (1820–26). His earliest works, exhibited at the Royal Academy, were ideal figures, but from 1840 until 1855, when he retired from his profession, he was principally engaged in executing monumental sculptures and portrait busts, like those of John Henry Newman, Lord Russell, Sir Roderick Murchison. From 1857 to 1867 he was professor of sculpture at the Royal Academy, succeeding his father. He was the author of *Handbook of Ancient and Modern Sculpture* (1864).

WESTMEATH, wĕst'mēth'. An inland county of the Province of Leinster, Ireland (Map. Ireland, D 4, 5). Area, 708 square miles, largely devoted to pasturage. Chief towns, Athlone and Mullingar, the capital. Pop., 1901, 61,629; 1911, 59,812.

WEST MINNEAPOLIS. A village in Hennepin Co., Minn., 5 miles southwest of Minneapolis. Threshing machines, sewer pipe, and steel springs are the leading manufactured products. Pop., 1900, 1648; 1910, 3022.

WEST'MINSTER. A metropolitan borough of London, England, on the left bank of the Thames, southwest of the city so called. In this borough the laws and fashions of Great Britain are made, and the government officials and aristocracy dwell. It contains the Houses of Parliament, the government offices, Westminster Abbey, St. James's Palace, Buckingham Palace, Belgrave Square, the eastern end of Hyde Park, Green Park, Trafalgar Square, the Mall, Pall Mall, Piccadilly, Whitehall, and Charing Cross and Victoria stations. Pop., 1901, 182,977; 1911, 160,261.

WESTMINSTER. A city and the county seat of Carroll Co., Md., 34 miles by rail northwest of Baltimore, on the Patapsco River, and on the Western Maryland Railroad (Map: Maryland, F 1). It is the seat of the Western Maryland College (Methodist Protestant), opened in 1868, and of the Westminster Theological Seminary (Methodist Protestant), opened in 1882. The city manufactures flour, canned goods, shirts, etc Pop., 1900, 3199; 1910, 3295.

WESTMINSTER, HUGH LUPUS GROSVENOR, DUKE OF (1825–99). An English nobleman. He was born in London and was the son of Richard, second Marquis of Westminster. He was educated at Eton and at Balliol College, Oxford; was member of Parliament for Chester from 1847 to 1869 when he succeeded to the Marquisate; was created Duke in 1874, and held several high official positions, including that of Lord Lieutenant of the County of London in 1888. His vast landed estates won for him the reputation of the wealthiest of English nobles He was an active and steadfast supporter of Gladstone during that statesman's crusade against the Turkish atrocities in Bulgaria.

WESTMINSTER, MATTHEW OF. See MATTHEW OF WESTMINSTER

WESTMINSTER, PROVISIONS OF. In English history, a number of ordinances enacted in October, 1259, supplementary to the well-known Provisions of Oxford (q v) and designed by the barons for the redress of the grievances of the younger nobility. See ENGLAND; MONTFORT, SIMON DE.

WESTMINSTER ABBEY. One of the principal churches, and, in a peculiar sense, the national sanctuary, of England. It was originally the abbey church of a monastery founded in the reign of King Offar of Mercia, and reorganized by Dunstan in 971. The first church is said to have been built by King Sebert of Essex (616) on Thorney Isle, in the Thames. The foundation did not, however, achieve importance until the reign of Edward the Confessor, who had a palace at Westminster, and in 1049–65 built a church on the present site, dedicated to St. Peter, whence the present official name of Westminster Abbey, the Collegiate Church of St. Peter. In the later thirteenth century Henry III undertook the reconstruction of the church. The choir and transepts were built between 1245 and 1258, and, with the eastern half of the nave, consecrated in 1269. The work was continued by his successors, but haltingly, with long interruptions, and the nave was not wholly completed till the end of the fifteenth century. In spite of this, its unity of style is remarkable. The chapel of Henry VII was added in 1502–20 under Henry VIII, the two west towers by Sir Christopher Wren and Hawkesmoor (1722–40), and the north transept was restored in 1890. The abbey was heavily endowed and under the special protection of the kings of England, whose palace was at Westminster. It was disendowed during the Reformation as a cathedral (1540–50), but restored by Queen Mary, and received its present organization, under a dean and 12 prebendaries, from Elizabeth.

Westminster Abbey is one of the largest and best examples of the early English style. More than any other it shows the French influence, in its polygonal apse and chapels, the loftiness of the nave, and heavy flying buttresses. Its proportions are grandiose. The total exterior length, including Henry VII's chapel, is 423 feet 6 inches; the breadth is 71 feet 9 inches, for nave and aisles, and 203 feet 2 inches across the transepts. The nave is the loftiest in England (101 feet 8 inches); the towers measure 225 feet 4 inches. The imposing effect of the interior, with its beautiful stone and fine glass windows, is somewhat marred by restorations and the monuments. The chapel of Henry VII, begun by him as a Lady chapel, but completed as his mausoleum chapel by his successor, is a very remarkable structure in the Perpendicular style (q.v.), having a ceiling vaulted with fan tracery of the most elegant character imaginable. The beautiful oak choir stalls are appropriated



WESTMINSTER ABBEY
FROM A PHOTOGRAPH

by the Knights of the Bath, each seat bearing the armorial bearings of the occupant, whose sword and banner hang overhead.

Of all English churches none is so intimately connected with the national life and history. English kings since William the Conqueror have been crowned there, and there the ancient regalia were kept till their destruction under the Commonwealth. The coronation chair, containing the ancient Stone of Scone, brought by Edward I from Scotland, still stands in the chapel of Edward the Confessor. In Westminster Abbey lie buried 13 kings including Edward the Confessor, and others from Henry III to George II, five sovereign queens, besides the consorts and descendants of kings. Among the most celebrated tombs are the Shrine of Edward the Confessor, erected by Henry III in that saint's chapel, and the tombs of Henry VII and his consort, Elizabeth of York, beautiful marble effigies, by the Florentine sculptor Torrigiano. The practice of interring courtiers, statesmen, and soldiers in the abbey began under Richard II, and continues to be practised. The two Pitts, Fox, Palmerston, Warren Hastings, Gladstone, and other modern statesmen too numerous to mention have been accoided this honor. In the Poets' Corner (South Transept) repose some of England's greatest poets, Chaucer, Spenser, Dryden, Gray, Browning, Tennyson, and others, and near by rest the men of letters. There are places for theologians, actors, musicians, artists, and scientists. Wordsworth, Bulwer Lytton, and Charles Darwin are all buried here. By no means all of England's great men have been offered or accepted the honor of interment in the abbey; but for such special statues, busts, or tablets frequently are erected there. With a few exceptions, all these monuments are disappointing from the artistic standpoint. On the east side of the abbey is the Chapter House, a beautiful octagonal Gothic hall, in which from 1282 till 1547 the House of Commons assembled. The Jerusalem Chamber, to the southwest of the abbey, and so called because of its former decorations, is celebrated as the death chamber of Henry IV. Westminster School, founded by Queen Elizabeth in 1560 from revenues of the abbey, occupies the ancient dormitory of the abbey as a schoolroom and its refectory as a dining room. The latter contains some ancient tapestry and stained glass.

Bibliography. E. W. Brayley, *History and Antiquities of the Abbey Church of St. Peter, Westminster* (2 vols., London, 1818–23); Gilbert Scott, *Gleanings from Westminster Abbey* (2d ed., ib., 1862); A. P. Stanley, *Historical Memorials of Westminster Abbey* (6th ed., ib., 1886); W. R. Lethaby, *Westminster Abbey and the King's Craftsmen* (New York, 1906); Francis Bond, *Westminster Abbey* (Oxford, 1909); J. A. Robinson, *Notes and Documents of Westminster Abbey* (3 vols., New York, 1909-11); W. J. Loftie, *Westminster Abbey* (Philadephia, 1913); H. M. Pratt, *Westminster Abbey* (2 vols., New York, 1914).

WESTMINSTER ASSEMBLY. A convocation appointed by the Long Parliament for settling the doctrine, liturgy, and government of the Church of England meeting at Westminster. It consisted of 121 clergymen and 30 laymen—10 of whom were lords and 20 commoners—together with 4 clerical and 2 lay commissioners from the Church of Scotland. It held its first meeting on July 1, 1643, and continued to sit until Feb. 22, 1649, during which time it had met 1163 times. The Presbyterians formed a large majority in the Assembly, and exercised a corresponding influence on its decisions. In doctrine, the members were almost unanimous; but on the subject of church government, opinions extremely opposite were maintained with keenness, especially on the question touching the sphere and limits of the civil power in matters ecclesiastical. The principal fruits of these deliberations were the *Directory of Public Worship*, submitted to Parliament April 20, 1644; the *Confession of Faith*, October and November, 1646, the *Shorter Catechism*, Nov. 5, 1647; and the *Larger Catechism*, Sept. 15, 1648. These several formularies, which contain a clear and rigid embodiment of Calvinistic theology and Presbyterian church government, constitute to this day the authorized standards of the Presbyterian churches of Scotland, Ireland, and England. The *Directory of Public Worship* was ratified by both Houses of Parliament, Oct. 2, 1644, and the doctrinal part of the *Confession of Faith* in March, 1648. An order of the House of Commons, Oct. 13, 1647, ordained that the Presbyterian form of church government should be tried for a year, but no further legislation followed.

Consult: W. M. Hetherington, *History of the Westminster Assembly* (5th ed., Edinburgh, 1890); A. F. Mitchell, *The Westminster Assembly: Its History and Standards* (new ed., Philadelphia, 1897), *Cambridge Modern History*, vol. iv (New York, 1906); and David Masson, *Life of Milton*, vol. ii (new ed., London, 1877–96), where a list of the members, with brief biographic notices, is given. See CREEDS AND CONFESSIONS.

WESTMINSTER HALL. The great hall of the ancient palace of Westminster, which was built by Edward the Confessor upon the site of the present Houses of Parliament (q.v.). The hall, begun by William Rufus in 1097, was destroyed by fire in 1291, later rebuilt and enlarged, and in 1397–98 reconstructed by Richard II and covered with a superb open-timber hammer-beam roof of oak. It fortunately escaped the fire which destroyed the palace in 1834. The ceiling, covering a hall 290 long, 68 feet broad, and 92 feet high, is [illegible] most remarkable pieces of timber [illegible] existence, both as to beauty and [illegible] skill. No other hall in England [illegible] historical associations. Here the [illegible] surrounded by his chaplains, heard legal [illegible] administered justice. A year after its [illegible] on its builder, Richard II, was deposed in it, as was Edward II before him; Charles I received in it the death sentence, and a few years later Cromwell was installed here. Among the great men condemned here were Sir William Wallace, Sir John Oldcastle, Sir Thomas More, and the Earl of Strafford. Here the seven bishops who opposed James II were acquitted, as was Warren Hastings. The hall was used for important trials and for great public festivals, as during the coronation ceremonies, or when the Lord Mayor was sworn into office, for the last time in 1882.

WESTMINSTER PALACE. The ancient palace by this name was built by Edward the Confessor, perhaps on the site of an earlier structure. It was improved and altered from time to time by succeeding sovereigns, especially by Henry III. It was not a homogeneous building, but a complex of separate apartments. In

1834 the entire complex, except the great hall, was destroyed by fire See PARLIAMENT, HOUSES OF: WESTMINSTER HALL.

WESTMINSTER SCHOOL. One of the oldest of English public schools, established by Henry VIII, refounded in 1560 by Queen Elizabeth, and reorganized in 1868 as one of the nine great public schools There are 60 foundationers, about 20 vacancies occurring every year. The school is particularly famous for the Westminster Play, an annual representation of a Latin comedy, produced by the scholars. Consult W. T. Shore, *Westminster* (London, 1910)

WESTMINSTER STANDARDS. A set of books drawn up by the Westminster Assembly, comprising: (1) the Confession, (2) the Larger and Smaller Catechisms, (3) the Directory of Public Worship; and (4) the Directory for Church Polity and Discipline. The name is often used for the first two alone. For their history and contents, see CREEDS AND CONFESSIONS; PRESBYTERIANISM. For the text, consult Philip Schaff, *Creeds of Christendom* (New York, 1884); the Edinburgh edition (University Press, 1855); and the various editions of the American Presbyterian Board of Publication (Philadelphia); also: A F Mitchell and Struthers, *Minutes and Sessions of the Westminster Assembly* (London, 1874), A. F. Mitchell, *The Westminster Assembly: Its History and Standards* (new ed., Philadelphia, 1897); B. B. Warfield, *Significance of the Westminster Standards as a Creed* (New York, 1898).

WEST'MORELAND or **WESTMORLAND.** A county of northwest England (Map: England, D 2). In the southwest it has a short coast line on Morecambe Bay, separating Lancashire into two detached portions. Area, 783 square miles. Its surface is mountainous, rising in Helvellyn, on the Cumberland boundary, to a height of 3118 feet. The western part belongs to the Lake District; Lake Windermere lies on the western boundary. Large areas are wooded. Only one-half of the county is improved, and of this by far the greater part is pasture. Cattle and sheep raising are the chief occupation. Pop., 1911, 63,575 County town, Appleby Consult: Thornley, *History of Westmorland* (London), [illegible] *History of Westmorland* [illegible]

WEST MONT. A [illegible] in Hochelaga County, Quebec, Canada, and a residential suburb of Montreal. Pop., 1901, 873; 1911, 14,579

WEST NEWTON. A borough in Westmoreland Co., Pa., 33 miles by rail southeast of Pittsburgh, on the Pittsburgh and Lake Erie, and the Baltimore and Ohio railroads (Map: Pennsylvania, B 7). The manufacture of radiators and boilers are the chief industries. Pop., 1900, 2467; 1910, 2880.

WEST NEW YORK. A town in Hudson Co., N. J., on the Hudson River, adjoining Weehawken on the north, and connected with New York City by ferry to Forty-second Street. Silk, rubber goods, cottonseed oil, embroidered goods, pianos, braids, buttons, textiles, electric bulbs, sugar, and powder are manufactured. The first settlement here probably was made about 1612 Pop., 1900, 5267; 1910, 13,560; 1915 (State census), 22,943; 1920, 29,926.

WESTON, AGNES (?–). An English philanthropist She was born in London, and became known as the founder of Royal Sailors' Rests at Portsmouth (where she resided) and Devonport. She also had tracts sent in her name to every ship touching at a port in the United Kingdom The degree of LL.D was conferred on her by Glasgow University. Miss Weston published *My Life among the Bluejackets* (1910; 9th ed, 1912). She received the honorary degree of LL.D from Glasgow University.

WESTON, EDWARD (1850–) An American electrician, born in London, England. He studied medicine in England, but in 1870 came to the United States, and there became chemist to a nickel-plating company He improved the process of nickel plating, made investigations in electricity, and in 1875 established at Newark, N. J, the first factory in the United States exclusively for the manufacture of dynamo-electric machines. This was consolidated in 1881 with another company, and he was electrician of the new organization until 1888, when he formed the Weston Electric Instrument Company, Newark, N. J., of which he became president in 1905. He made particular study of incandescent and arc electric lighting, and patented many devices in both systems Among his inventions are a series of improved meters for electric measurements, which have attained international repute for accuracy and general efficiency, a standard cell (see VOLTAIC CELL OR BATTERY), an improved carbon filament for incandescent lamps, and a system of high-power incandescent lamps. He was a founder of the American Institute of Electrical Engineers, and its president in 1888.

WESTON, EDWARD PAYSON (1839–). An American pedestrian, born at Providence, R. I., and educated in Boston. During most of his life he was engaged in newspaper work. His first notable pedestrian trip was in 1861, when he walked from Boston to Washington (443 miles) in 205 hours. In 1867 he walked from Portland, Me., to Chicago (1326 miles) in 26 days, and 40 years later accomplished the same feat in 29 hours' less time Weston attracted most attention by crossing the continent on foot when 70 years old (3895 miles in 104 days, 7 hours; returned, 1910, 3500 miles in 76 days, 23 hours). In 1913 it took him 51 days to get from New York to Minneapolis (1546 miles), where he laid the corner stone of the Athletic Club House. At various times he also appeared in England; in 1913–[illegible] covered 5000 miles in [illegible] days, and delivered each evening a temperance lecture under the auspices of the Church of England.

WESTON NORMAL CELL. See VOLTAIC CELL OR BATTERY.

WESTON-SUPER-MARE, -sū'pĕr-mā'rē. A watering place in Somerset, England, on the Bristol Channel, 20 miles southwest of Bristol (Map: England, C 5). Pop., 1901, 19,047; 1911, 23,225.

WEST ORANGE. A town in Essex Co., N. J., 5 miles northwest of Newark, and 12 miles west of New York City; on the Erie Railroad (Map: New Jersey, D 2). It is finely situated at the base and along the slope of Orange Mountain. Eagle Rock (elevation over 600 feet) commands a magnificent view. The town has two public parks owned and maintained by the county. Llewellyn Park, of 750 acres, studded with handsome dwellings, is one of the most beautiful residence parks in the country Manufacturing is the leading industry, the principal establishments being the Edison Phonograph and Electrical Works and hat, box, and carriage factories. Pop., 1900, 6889; 1910, 10980; 1915 (U. S. est.), 13,610; 1920, 15,573.

WEST PALM BEACH. See PALM BEACH.

WEST PARK. A village in Cuyahoga Co., Ohio, adjoining the city of Cleveland, of which it is a residential suburb, on the Lake Shore and Michigan Southern, and the Cleveland, Cincinnati, Chicago, and St. Louis railroads. Pop., 1900, 2038; 1910, 3179.

WESTPHAL, vĕst'fâl, JOACHIM (1510–74). A German theologian, born at Hamburg. He studied theology at Wittenberg under the guidance of Luther, and then at the universities of Heidelberg, Strassburg, and Basel. In 1541 he was appointed preacher in his native city. He became specially known through his polemical activity on the Lutheran side in the controversy between the Swiss and German reformers concerning the Lord's Supper. Among the pamphlets Westphal published on this contest are: *Recta Fides de Cœna Domini* (1553); *Collectanea Sententiarum Aurelii Augustini de Cœna Domini* (1555), *Confutatio Aliquot Enormium Mendiorum I. Calvini* (1558).

WESTPHAL, KARL FRIEDRICH OTTO (1833–90). A German alienist, born in Berlin. He studied medicine at Berlin, Heidelberg, and Zurich (M.D., 1856), and settled in his native city, where he held several hospital positions and where he was professor of psychiatrics in the university from 1874 until his death. In 1868 he became editor of the *Archiv fur Psychiatrie und Nervenkrankheiten.* He was a voluminous writer. In 1875 he pointed out the importance of the knee jerk in diagnosis and he described several new forms of insanity.

WESTPHAL, RUDOLF (1826–92). A German classical scholar, born at Obernkirchen, Schaumburg. He studied at Marburg, was professor extraordinary at Breslau in 1858–60, and professor of philology at Moscow in 1875–79. His works, most of which deal with Greek music and versification, include: *Metrik der griechischen Dramatiker und Lyriker* (1854–65; rewritten in the third edition, under the title of *Theorie der musischen Künste der Hellenen,* 1885–86); *Prolegomena zu Æschylus' Tragödien* (1869); *Theorie der neuhochdeutschen Metrik* (1870); *Elemente des musikalischen Rhythmus mit Rucksicht auf unsere Opernmusik* (1872); *Vergleichende Grammatik der indogermanischen Sprachen* (of which only the volume on the verb appeared, 1873); and *Die Musik des griechischen Altertums* (1883).

WESTPHALIA, wĕst-fā'lĭ-à. A province of Prussia (Map: Germany, B 3). Area, 7803 square miles. It is nearly altogether mountainous and hilly, the highest point being about 2700 feet above the sea. The region belongs to the basins of the Rhine, Ems, and Weser.

Westphalia is rich in iron and coal. The output of coal in 1913 was 53,075,640 tons. Dortmund is the chief coal centre. In iron the province leads all the others in Prussia, the output of iron ore in 1913 having been 1,563,752 tons. Westphalia also ranks among the first Prussian provinces in the production of zinc and copper. Lead and other ores are also mined. The stone output is heavy and the salt industry considerable. The supply of coal and iron has lent great impetus to manufacturing interests. There are numerous ironworks, and machinery and all varieties of metal wares are largely manufactured. The region between the Weser and the Lippe has for centuries been the seat of important linen industries. Woolen cloths, hosiery, and cottons are among the conspicuous manufactures. Paper, sugar, leather, and wood carvings also figure extensively in the shipments.

About 40 per cent of the total area of Westphalia is in farms, gardens, and vineyards, about 28 per cent in woodland, and about 25 per cent in meadows. Rye and oats lead in importance among the cereals. Potatoes and wheat are produced in considerable quantities, and the province is noted for excellent flax. Dairying and gardening thrive, and the cattle and swine industries are prominent.

The province embraces the administrative districts of Munster, Minden, and Arnsberg. Capital, Munster. It sends 17 members to the Reichstag and 31 to the Prussian Landtag. Pop., 1900, 3,187,777; 1910, 4,125,904—about evenly divided between Protestants and Roman Catholics. At the head of the excellent provincial education system stands the Academy of Münster.

History. The ancient duchy of the Saxons was divided into Westfalen (Westphalia) in the west, Ostfalen (Eastphalia) in the east, and Engern, between the two. With the dissolution of the Saxon duchy at the close of the twelfth century the name Westphalia came to designate a duchy ruled by the archbishops of Cologne. Its territory lay in the southeastern part of what is now the Province of Westphalia. The archbishops held sway till 1803. The district then passed to Hesse-Darmstadt, which in 1815 transferred it to Prussia. This duchy was one of many sovereignties which arose in the Middle Ages in the present Province of Westphalia. In the seventeenth century Brandenburg acquired dominion in the region by obtaining possession of the counties of Mark and Ravensberg and the see of Minden. The Congress of Vienna (1814–15) assigned to Prussia the whole of Westphalia within its present limits. One of the circles into which the Holy Roman Empire was divided was called the Westphalian Circle. It embraced an extensive region between the Rhine and Weser, extending northward to the North Sea and a large territory west of the Rhine, comprising part of the modern Netherlands and Belgium. See WESTPHALIA, KINGDOM OF.

Consult: Otto Weddigen, *Westfalen, Land und Leute* (Paderborn, 1896); Schücking and Freiligrath, *Das malerische und romantische Westfalen* (ib., 1898); G. Schulze, *Die Provinz Westfalen* (Minden, 1900); *Cambridge Modern History,* vols. ix, x (New York, 1906–07).

WESTPHALIA, KINGDOM OF. A kingdom created by Napoleon in August, 1807, for his brother Jerome Bonaparte. It was constituted out of part of the territories given up by Prussia in the Treaty of Tilsit and of the dominions of the Elector of Hesse-Cassel and the Duke of Brunswick. It had an area of about 15,000 square miles and a population of about 2,000,000. The Kingdom came to an end in 1813, after the defeat of Napoleon at Leipzig.

WESTPHALIA, PEACE OF. The treaty which closed the Thirty Years' War (q.v.) in 1648 and gave a new adjustment to the religio-political affairs of Europe. It is so called from the fact that the envoys met in the cities of Münster and Osnabrück, in the Circle of Westphalia. It is sometimes spoken of as the Treaty of Münster. The minor German states had long sought relief from the devastations of war, and in 1641, at a convention held at Hamburg, preliminaries regarding the conduct of negotiations for peace were agreed upon. In 1644 a

congress which had been called to meet in March, 1642, opened. The representatives of France, the Empire, Spain, and the German Catholics met at Munster, and those of Sweden, the Empire, and the German Protestants at Osnabruck. Portugal, the United Provinces, Savoy, Tuscany, Lorraine, Mantua, and Switzerland were also represented. The negotiations were long drawn out, but Torstenson's decisive campaign in 1644–45 and the successes of Turenne and Wrangel in southern Germany, together with the capture of part of Prague by Königsmark in July, 1648, forced the Emperor Ferdinand III to give up his dilatory tactics. After the signing of treaties at Osnabruck and Munster the Osnabruck diplomats went to Munster in October, 1648, and the general Peace of Westphalia was signed there on the 24th. Its terms, as regards the German Empire, were as follows: The sovereignty and independence of the different states of the Empire were fully recognized, and liberty was given them to contract any alliances with each other, or with foreign powers, if these were not against the Emperor or the Empire. All religious persecution in Germany was interdicted. The Treaty of Passau of 1552 and the religious Peace of Augsburg of 1555 were confirmed. With respect to the secularization of ecclesiastical benefices, everything was to remain in Austria as it was in 1624, and in the Palatinate, Baden, and Wurttemberg as it was in 1618. The power of putting under the ban of the Empire was only to be exercised with the consent of the Diet. The Reformed or Calvinist Protestants were put on a footing of equality as to privileges with the Lutherans. In every state the religion of the Prince might be made incumbent on his subjects, but the right of emigration for dissenters was guaranteed The territorial changes were as follows: The Lower Palatinate was restored to the eldest son of Frederick V, Elector Palatine, and an eighth electorate was created in his favor, but the Upper Palatinate was confirmed to Bavaria, on condition that, should the two states become united, one electorate was to be abolished. France was confirmed in the possession of the bishoprics of Metz, Toul, and Verdun, and obtained possession of the Austrian territories in Alsace with the suzerainty over the 10 Imperial cities of that region; Breisach, on the right bank of the Rhine, remained in French hands. Sweden obtained Hither Pomerania, with Stettin, the island of Rugen, Wismar, and the secularized sees of Bremen and Verden, with minor territories. These remained fiefs of the Empire, and Sweden was given three deliberative voices in the Diet. Brandenburg obtained, as compensation for its cessions in Pomerania, the secularized bishoprics of Halberstadt, Minden, and Cammin, together with the succession to the see of Magdeburg. Mecklenburg was enlarged by the secularized sees of Schwerin and Ratzeburg. Hesse-Cassell obtained the rich abbacy of Hirschfeld. The Elector of Saxony was allowed to retain Lusatia. The see of Osnabrück was to be alternately in the hands of a Catholic bishop and a Prince of the house of Brunswick-Lüneburg. The independence of the United Provinces was recognized by Spain, and they, together with Switzerland, were declared independent of the Holy Roman Empire. France and Sweden became guarantors for the execution of the provisions of the treaty. The Peace of Westphalia, by weakening the central authority of the Empire, destroyed its unity, and afforded France, as one of the guarantors, a pretext for continual interference with its internal affairs. France now became the chief power of the continent, taking the place formerly occupied by Spain The Peace of Westphalia marks the close of the period of religious wars Henceforth European contests were mainly for political ends.

Consult Von Meiern, *Acta Pacis Westphalicæ Publica* (6 vols, Göttingen, 1734–36), K. L. Woltmann, *Geschichte des westphalischen Friedens* (Leipzig, 1808), François Ogier, *Journal du congrès de Munster* (Paris, 1893), F. Philippi, *Der westphalische Friede* (Munster, 1898); *Cambridge Modern History*, vol. iv (New York, 1906), containing a bibliography; also references under THIRTY YEARS' WAR.

WEST PITTS'TON. A borough in Luzerne Co, Pa., on the Susquehanna River, opposite Pittston (q.v.), with which it is connected by two bridges, and on the Delaware, Lackawanna, and Western Railroad (Map: Pennsylvania, K 3) Mine screens, cut glass, crackers, knit and silk goods are manufactured, and there are machine shops and coal mines. Pop., 1900, 5846; 1910, 6848

WEST PLAINS. A city and the county seat of Howell Co, Mo., 112 miles east-southeast of Springfield, on the St. Louis and San Francisco Railroad (Map: Missouri, E 5) West Plains College is situated here. Farming and stock raising are the chief interests. There are iron and zinc mines, large orchards and vineyards, an overall factory, flour mills, and an oxide plant. West Plains has adopted the commission form of government Pop., 1900, 2902; 1910, 2914.

WEST POINT. A city and the county seat of Clay Co., Miss., 97 miles north of Meridian, on the Southern, the Illinois Central, and the Mobile and Ohio railroads (Map: Mississippi, H 3). It has a large cotton factory, carriage and wagon factories, lumber mills, electrical-apparatus works, and manufactories of brick, tiling, cottonseed oil, fertilizers, foundry and machine-shop products, axe handles, etc. The city contains the Southern Christian College and a Carnegie library. Pop., 1900, 3193; 1910, 4864.

WEST POINT. A military post on the right bank of the Hudson River, on the east edge of Orange Co., N. Y., 50 miles from the city of New York, with which it is connected by the West Shore and New York Central and Hudson River railroads and daily steamboats (Map: New York, A 1). Its site is one of remarkable picturesqueness, the Hudson here breaking through the Highlands in a winding gap. It is the seat of the United States Military Academy. The reservation comprises 3294 acres, not counting Constitution Island (280 acres), given to the United States by Mrs Russell Sage in 1908. During the American Revolution, the position of West Point was of the first importance to the rebel cause; its fall to the British would probably have caused the revolution to collapse. At various times (1775–80) some of the surrounding heights were fortified at a total cost of $3,000,000. The Polish patriot Kosciuszko served for some time here as chief engineer in charge of the works. His services are commemorated by a monument on the parapet of Fort Clinton. The defenses comprised a massive iron chain stretched across the channel from the Point to Constitution Island. In 1779 West Point was for a time headquarters of the commander in chief of the Continental Army. One year later (August, 1780) it was commanded by Major

General Benedict Arnold (q.v.) who tried to betray it to the British. On the disbandment of the army at the close of the Revolution, West Point was designated as one of the depots for the storage of military property; in 1794 it was garrisoned by the new Corps of Artillerists and Engineers; in 1802 the Corps of Engineers was created to be stationed at West Point and to constitute a military academy. Until 1866 the immediate supervision and command of West Point were vested in the Corps of Engineers, but since that time officers of the army at large have been eligible to this detail. In addition to the academic and military staff, an excellent band and detachments of engineers, artillery, and cavalry are stationed at the post for duty in connection with its police and security. There is besides an Army Service Corps, charged with construction and repair work. Officers' quarters follow the crest of the river terrace (about 160 feet above the river), north and south of the parade, which is, roughly speaking, surrounded on three sides by the cadet barracks, academic buildings, library, headquarters building and museum, mess hall, hospital, and riding hall. By bequest of a former superintendent, Brevet General G. W. Cullum, a handsome and spacious building—known as Memorial Hall—was erected in 1898. It contains relics and trophies [illegible] in which the United States [illegible] and portraits and busts of [illegible] duates. On the north side of the [illegible] is a marble shaft surmounted by a [illegible] ary, in memory of the officers and men [illegible] lar Army who fell in defense of [illegible] S. –65), the names of all of whom [illegible] on it. In 1915 a handsome equestrian [illegible] of George Washington was erected by [illegible] and private gift. Under acts of Congress, from 1902 to 1906, appropriating $7,000,000 additional cadet barracks, a new academic building, a new chapel, officers' quarters, a riding hall (300 × 150 feet), artillery and cavalry barracks, stables, a gymnasium, and a heating and lighting plant were built These improvements have greatly increased the capacity of the academy and the attraction of this famous military educational institution and picturesque military post. Consult: E. C. Boynton, *History of West Point and the Military Academy* (New York, 1863); E. S. Farrow, *West Point and the Military Academy* (2d ed., ib., 1881); *Centennial of the United States Military Academy at West Point, 1802–1902* (2 vols., Washington, 1904); M. W. Woodhull, *West Point in our Next War* (New York, 1915); and official documents, especially annual reports of the superintendent (Washington, 1854 et seq.). See MILITARY ACADEMY, UNITED STATES, and Plate of HUDSON RIVER.

WEST'PORT. A town in Fairfield Co., Conn., three miles northeast of Norwalk, on the Saugatuck River, and on the New York, New Haven and Hartford Railroad (Map: Connecticut, B 5). Westport has some importance as an industrial centre, the chief manufactured products being cotton, rope, twine, starch, paper, leather, embalming fluid, disinfectants, buttons, planes, and scales. Pop., 1900, 4017; 1910, 4259.

WESTPORT. A town in Bristol Co., Mass., seven miles south of Fall River (Map: Massachusetts, E 6). Cotton warp and twine and other cotton products are manufactured. Pop., 1900, 2890; 1910, 2928.

WEST PRUSSIA. See PRUSSIA, WEST.

WEST RIVER. See SI KIANG

WEST RUTLAND. A town in Rutland Co., Vt., four miles west of Rutland, on the Delaware and Hudson and the Clarendon and Pittsford railroads (Map: Vermont, B 6). Marble quarrying is the leading industry. Pop., 1900, 2914; 1910, 3427.

WEST SAINT PAUL. A city in Dakota Co., Minn, two miles west of St Paul, on the Chicago Great Western Railroad. The city is a residential suburb of St. Paul Pop, 1900, 1830; 1910, 2660

WEST SPRING'FIELD. A town, including several villages, in Hampden Co., Mass., on the Connecticut River, opposite Springfield, and on the Boston and Albany Railroad. It is the residence of many business people of Springfield. Of interest are the old Day House, the Old White Church on the Hill, the high school, and the public library. The community is chiefly interested in farming, market gardening, and the manufacture of paper and cigars The Boston and Albany Railroad maintains extensive repair shops here. West Springfield, originally a part of Springfield, was settled about 1655, and was incorporated in 1774. Pop., 1900, 7105; 1910, 9224; 1915 (State census), 11,339; 1920, 13,443.

WEST TAMPA. A city in Hillsboro Co, Fla., adjoining Tampa. It has a public library. There are many cigar factories, the city being considered one of the most important cigar manufacturing centres in the country. Pop, 1900, 2355; 1910, 8258; 1915 (U. S. est.), 11,370.

WEST TERRE HAUTE. A town in Vigo Co., Ind., one mile west of Terre Haute, on the Wabash River, and on the Cleveland, Cincinnati, Chicago and St. Louis Railroad. There are 14 coal mines, three large clay plants, sand and gravel works, and a paving brick plant. Pop., 1900, 651; 1910, 3083.

WEST'VILLE. A town in Pictou Co., Nova Scotia, Canada, on the Intercolonial Railway, 5 miles from New Glasgow (Map: Nova Scotia, H 5). Its industries include coal mining, lumbering, woodworking, and brick making. Pop., 1901, 3417; 1911, 4471.

WESTVILLE. A village in Vermilion Co., Ill., six miles south of Danville, on the Chicago and Eastern Illinois, the Cleveland, Cincinnati, Chicago and St. Louis, and the Illinois Traction railroads (Map: Illinois, J 5). Coal mining, corn growing, and the manufacture of steel are the leading industries. Pop., 1900, 1605; 1910, 2607.

WEST VIRGINIA. A South Atlantic State of the United States, sometimes called the Panhandle State. It lies between lat. 37° 13′ and 40° 38′ N., long. 77° 40′ and 82° 40′ W. Most of the boundaries are natural, i.e., formed by rivers or mountain ridges, whence the outlines of the State are irregular. The general shape is that of an oval, 210 miles long from southwest to northeast and 125 miles wide, but two narrow tongues known as panhandles extend northward between Pennsylvania and Ohio and eastward between Virginia and Maryland. The area of the State is 24,170 square miles, making it fortieth in size among the States.

Topography. The surface of West Virginia is, as a whole, uneven, and in the east mountainous. The main range of the Alleghanies crosses the northeastern section, and farther south forms the State boundary towards Virginia. The greater part of the mountain region,

occupying more than one-third of the State, belongs to the Alleghany Plateau, though the mountains in the extreme southern section may be considered as a northern extension of the Cumberland Plateau The mountains of the northeast are chiefly in the form of parallel ridges with a southwest and northeast trend, but the southern part of the plateau is irregularly dissected by river valleys, presenting broad domes with spurs running in all directions, and but few definite ridges The elevation of the valleys is about 2000 feet, and the elevation of the ridges is from 3000 to over 4000 feet. The highest point is Spruce Knob, with an altitude of 4860 feet. West of the mountains there is a belt of broad, flat hills from 1000 to 2000 feet in elevation, followed by a more gently rolling country which slopes towards the banks of the Ohio River, along which the altitude ranges between 500 and 650 feet

Hydrography. With the exception of the northeastern section, the whole State belongs to the Ohio basin, and is drained by a number of streams flowing from the mountain belt northwestward to the main river on the boundary. The largest of these tributaries are the Big Sandy, which forms the southwestern boundary of the State, the Guyandot, Great Kanawha, Little Kanawha, and Monongahela, the last flows northward into Pennsylvania, but its two main headstreams are within West Virginia. The Ohio forms the boundary on the Ohio side. The Potomac forms most of the boundary on the side of Maryland, and its largest headstream, the South Branch, drains most of the northeastern section of the State. All of these streams furnish abundant water power, and several of them are navigable.

Geology. The Carboniferous covers nearly the entire State, from the Alleghanies to the Ohio, but a large part of this contains no workable coal The oldest rocks in the State, viz., the Cambrian quartzites, form the Blue Ridge at the eastern line of Jefferson County, while the most of the outcropping strata from North Mountain westward to the Alleghanies belong in the Devonian system, except where Silurian beds come to the surface on the crests of the large anticlinal waves. A small area of Siluro-Cambrian limestone comes to the surface along the crest of a great arch in Pendleton County. The only dike of igneous rock which penetrates the overlying strata and reaches the surface is also in Pendleton County. It is only a foot or so in width, however, and is similar in lithological character to that in which diamonds are found in Arkansas, South Africa, and elsewhere. Sulphur and mineral springs abound, the most famous being in Greenbrier, Monroe, and Webster counties.

Climate. West Virginia enjoys an agreeable and healthful climate, with pure mountain air and freedom from violent extremes of heat or cold. The mean temperature for January ranges from 30° in the northeastern mountains to 32° and 35° in the west and southwest. For July the mean is between 75° and 76° in nearly all sections of the State. The average maximum is between 94° and 98°, though a temperature of 104° has been recorded; the average minimum is between 5° and 10° above zero, the extreme being 10° below. The average rainfall ranges from 33 inches in the northeast to 45 inches in the south, and is fairly evenly distributed through the year.

[illegible]tation. The soils are mostly [illegible]tegration of rocks in situ, ex[illegible]leys of streams where they [illegible]d of clays, sands, and or[illegible]orted during flood stages, an[illegible] a mixture of soils from the [illegible]ge basin of each stream. The [illegible] valley consist largely of dec[illegible]t material transported into th[illegible] early history of that river by [illegible]rom the north which flowed a[illegible] moraine in Ohio and Penns[illegible].

There is [illegible] the northeastern portions, and [illegible] counties are very fertile, while [illegible] red soil counties in the west, [illegible] limestone but sufficient limy [illegible] clays to constitute a very fe[illegible].

The soils in th[illegible] are thin and sandy, and agric[illegible] mostly confined to the narrow valleys [illegible] streams, the mountain slopes [illegible] of 30° to 40°, and thus render [illegible] difficult or impossible, except on [illegible] plateaus. Large areas, especially [illegible], are still covered with dec[illegible] of deciduous trees, such as [illegible] and chestnut oak, hickory, ches[illegible], maple, walnut, tulip trees [illegible] mountains, birch On the hi[illegible] are also extensive forests of [illegible] pine, and hemlock.

Mineral Products. In total [illegible] products West Virginia ranks [illegible] Pennsylvania. The bulk of the [illegible] production is contributed by coal [illegible] and petroleum. The State is [illegible] Union in quantity and value of coal [illegible]. The production in 1914, the greatest [illegible] tory of the State, was 71,707,626 [illegible], with a spot value of $71,391,408. As [illegible] gas producing State West Virginia has [illegible] first for six years. Although the nu[illegible] gas wells are scattered over 22 countie[illegible] most prolific fields are in Lewis, Harrison [illegible] Ritchie counties, where many large wells show little decline in pressure from year to year. The production of natural gas in 1914 amounted to 238,740,162,000 cubic feet valued at $35,515,329. In value of petroleum produced in 1914 West Virginia ranked fourth. Oil and gas fields constitute a belt from 40 to 60 miles in width lying to the west of the Appalachian range and reaching from Pennsylvania to Kentucky. The total production of oil in 1914 was 9,680,033 barrels valued at $18,468,540. West Virginia ranked ninth in 1914 in the value of the output of clay products with a production valued at $5,761,411. The total value of all mineral products in 1914 was $134,071,803.

Agriculture. Of the total land area of approximately 15,374,080 acres 10,026,442 acres were in farms in 1910, of which 5,521,757 were improved land. The total number of farms in that year was 96,685 and the average number of acres per farm was 103.7. The total value of all farm property including land, buildings, implements and machinery, domestic animals, poultry and bees, was $314,738,540, the average value of all farm property per farm $3255, and the average value of land per acre $20.65. Of the total number of farms 76,850 were operated by owners and managers, and 19,835 by tenants. The native white farmers numbered 95,138, the

foreign-born whites 839, and the negroes and other nonwhites 708. The larger part of the foreign-born farmers came from Germany, Ireland, Switzerland, and England in the order named.

The following table gives the acreage, production, and value of some of the more important crops as estimated by the United States Department of Agriculture for 1915.

CROPS	Acreage	Prod. in bu	Value
Corn	800,000	25,200,000	$18,648,000
Wheat	300,000	4,500,000	4,860,000
Oats	120,000	3,480,000	1,775,000
Rye	16,000	224,000	208,000
Potatoes	50,000	5,850,000	3,802,000
Hay	730,000	*1,095,000	16,425,000
Tobacco	11,300	†9,831,000	983,000
Buckwheat	38,000	836,000	669,000

* Tons. † Pounds.

The total value of all crops in 1909 was $40,374,776. The leading crops in order of importance were corn, hay and forage, wheat, potatoes, tobacco, and oats. In that year there was in corn an acreage of 676,311, a production of 17,119,097 bushels valued at $11,907,261, in hay and forage an acreage of 708,900, a production of 639,104 tons valued at $7,492,747; in wheat an acreage of 209,315, a production of 2,575,996 bushels valued at $2,697,141. The acreage devoted to potatoes in that year was 42,621 and the production amounted to 4,077,066 bushels valued at $2,278,638. Tobacco had an acreage of 17,928, the yield being 14,356,400 pounds valued at $1,923,180 The acreage of vegetables (other than potatoes, sweet potatoes, and yams) was 43,524 and their value $4,520,000.

The total quantity of orchard fruits produced was 4,709,959 bushels valued at $3,040,192. Apples contributed about nine-tenths of this amount, peaches most of the remainder. The acreage of small fruits was 2913 and the production 2,336,562 quarts valued at $191,902. Strawberries, raspberries, blackberries, and dewberries are the most important of the small fruits. The production of grapes amounted to 3,224,751 pounds valued at $92,834. The value of the maple sugar and sirup made in 1909 was $46,568. In the same year 48,094 tons of sorghum cane was grown, from which was made 604,201 gallons of sirup valued at $300,188.

Live Stock and Dairy Products—The total value of all live stock on farms in 1909 was $41,318,436. According to the estimates of the United States Department of Agriculture there were on the farms on Jan. 1, 1916, horses, 194,000 valued at $20,952,000, mules, 12,000 valued at $1,392,000; milch cows, 241,000 valued at $12,050,000, cattle other than milch cows, 362,000 valued at $13,141,000, sheep, 796,000 valued at $4,060,000; swine, 378,000 valued at $3,402,000. The total value of milk, cream, and butter fat sold and butter and cheese made was $5,000,158. The milk sold amounted to 4,050,471 gallons valued at $864,958, the butter made amounted to 18,969,699 pounds valued at $4,054,498. The total number of fowls of all kinds on the farms was 3,310,155 valued at $1,628,700.

Forest Products. This industry is one of the most important in the State. The total amount of rough lumber sawed in 1909 was 1,472,942 M feet B. M, valued at $26,148,157. The laths produced numbered 150,820 thousand, the shingles 6829 thousand. Of the total timber cut, 907,547 M feet was hardwood, which was composed of oak 456,424 M feet, yellow poplar 154,581 M feet, and chestnut 119,762 M feet The soft wood sawed amounted to 565,395 M feet of which hemlock contributed 279,832 M feet and spruce 242,897 M feet. West Virginia was first in the production of cherry and chestnut lumber and second in the output of oak and yellow poplar. The State took high rank also in the production of several other species of wood. In addition to the figures quoted above there were produced on the farms of the State forest products valued at $4,004,484.

Manufactures. With its vast deposits of coal, its abundance of petroleum and natural gas, its extensive timber areas, and its excellent water power facilities, the State is well adapted for manufacturing purposes. The manufactures as yet are practically in an early stage of development and in 1909 the total value of the manufactured products per capita was $133

The following table gives the most important figures relative to the manufactures for 1904 and 1909.

SUMMARY OF MANUFACTURES FOR 1909 AND 1904

THE STATE — FIVE LEADING INDUSTRIES

INDUSTRY	Census	Number of establishments	PERSONS ENGAGED IN INDUSTRY: Total	PERSONS ENGAGED IN INDUSTRY: Wage earners (average number)	Capital	Wages	Value of products	Value added by manufacture
					Expressed in thousands			
All industries	1909	2,586	71,463	63,893	$150,923	$33,000	$161,950	$89,072
	1904	2,109	48,880	43,758	86,821	21,153	99,041	44,622
Lumber and timber products	1909	1,016	20,799	18,643	30,333	8,632	28,758	20,082
	1904	765	13,257	11,619	14,663	5,390	18,697	12,495
Iron and steel, steel works and rolling mills	1909	16	5,445	5,060	16,276	3,887	22,435	6,539
	1904	12	4,516	4,409	8,716	2,813	13,455	4,713
Leather, tanned, curried, and finished	1909	20	1,688	1,571	18,164	775	12,451	2,068
	1904	33	1,043	946	8,751	434	6,062	1,293
Glass	1909	51	6,509	6,190	7,869	3,628	7,779	5,483
	1904	39	3,867	3,673	4,300	2,054	4,599	3,340
Flour-mill and gristmill products	1909	207	884	452	3,766	210	7,696	1,095
	1904	194	780	400	2,623	183	6,200	987

For details regarding the lumber and timber industry see paragraph on *Forest Products*. The most important of the steel and iron products is skelp with an output value of $6,[illegible]. There was produced in the same year [illegible] valued at $6,360,880 and terneplate valued at

$2,561,219. The large and convenient supply of oak and hemlock bark encourage the development and manufacture of leather. By far the most important product of this industry is sole leather the value of which in 1909 represented 82 5 per cent of the total. The most important of the glass products is pressed and blown glass, the total value of output being $1,685,863.

The average number of wage earners was 63,893 of whom 1053 were under 16 years of age. There were 4505 female wage earners 16 years old and over. For the majority of wage earners the prevailing hours of labor were from 54 to 60 per week, only 12 9 per cent working more than 60 per week.

The six cities with a population each of 10,000 or more gave employment to 24.3 per cent of the average number of wage earners and turned out 28.6 per cent of the total value of products. Wheeling gave employment to 7809 wage earners and manufactured products valued at $27,077,151. Huntington gave employment to 3156 wage earners and manufactured products valued at $6,511,260; other important manufacturing cities are Parkersburg, Charleston, Martinsburg, and Bluefields See articles on the cities.

Transportation. The Ohio River, forming the northwestern boundary and navigable for large boats throughout this entire distance, is the most important waterway. Its affluents, the Kanawha and Little Kanawha, are also important waterways though of much less value. Railroads tap all the mining and lumbering sections and the manufacturing districts have adequate facilities in this regard The total mileage of first track in 1915 was 3704. The most important roads and their mileage in that year are the Baltimore and Ohio, 1115; the Chesapeake and Ohio, 731; the Norfolk and Western, 445; and the Western Maryland, 198.

Banking. The condition of the banks in 1915 was as follows:

	National banks	State banks
Number	118	160
Capital.	$10,150,000	$8,058,977
Surplus	6,627,000	5,282,073
Cash, etc	3,411,000	2,208,036
Deposits	57,734,000	49,699,341
Loans, etc.	56,650,000	50,185,155

Government. The present constitution of the State was adopted in 1872 and has been amended in certain important details. Amendments to the constitution may be proposed in either House of the Legislature, and if agreed to by two-thirds of the members of each House are submitted to the voters at the next general election. If they are ratified they become a part of the constitution.

Legislative.—The legislative power is vested in the Senate and House of Delegates. The Senate is composed of 30 members, and the House of Delegates of 86 members Senators are elected for a term of four, and delegates for a term of two, years. The Legislature meets every two years, in odd years on the second Wednesday of January. Sessions of the Legislature may not be more than 45 days without the concurrence of two-thirds of the members elected to each House.

Executive.—The executive department consists of Governor, Secretary of State, State Superintendent of Free Schools, Auditor, Treasurer, Attorney-General, and Commissioner of Agriculture. Their term of office is four years, beginning with March 4 next after their election. The Governor is not eligible for immediate re-election

Judiciary.—The judicial power is vested in the Supreme Court of Appeals, and in circuit courts, and in such inferior tribunals as are authorized by law. The Supreme Court of Appeals consists of five judges, who are elected by the voters and hold office for 12 years. The State is divided into 23 circuits. In the first circuit two judges are elected, and in the other circuits one, for a term of eight years. Circuit courts are held in each county at least three times a year In each county is a county court composed of three commissioners. They are elected by the voters of the county and hold office for six years.

Suffrage and Elections.—Any male citizen of the United States is entitled to vote if he has been a resident of the State for one year, and of the county for 60 days. General elections of the State and county officers are held on the Tuesday following the first Monday in November. The Legislature of 1915 passed a primary election law providing for the nomination of candidates for office. Provision was also made for the designation of party preference for the President of the United States. Candidates for judges of the Supreme Court of Appeals, the circuit court, and criminal or intermediate courts are excepted, as are also candidates for office to be filled by cities, towns, or villages of less than 5000 inhabitants. Primary elections for nomination of candidates are held on the first Tuesday in June in the year in which the President of the United States is elected, and in all other years on the first Tuesday of August preceding the general election.

Local and Municipal Government.—The county is the unit of government, and in each county are elected for a term of four years a surveyor of lands, a prosecuting attorney, a sheriff, and not more than two assessors.

Miscellaneous Constitutional and Statutory Provisions.—White and colored persons may not be taught in the same schools. There are an inheritance tax and laws regulating insurance rates. There is also a workingmen's compensation act. The State is under constitutional prohibition, effective on July 1, 1914.

Finance. When West Virginia was set off from Virginia the question arose as to the share of the public debt to be borne by either Commonwealth. The financial welfare of West Virginia has been safeguarded by the most stringent provisions in the constitution, and there has been no debt incurred since the State entered the Union. The receipts for the fiscal year ending June 1, 1914, were $6,964,377, and the disbursements, $6,691,537, leaving a balance on hand June 30, 1914, of $956,306. See HISTORY.

Militia. The males of militia age in the State in 1910 numbered 275,048. The organized militia included in 1915, 1741 enlisted men and 123 officers. It comprised two regiments of infantry and a detachment of sanitary troops.

Population. The population of the State at each Federal census was: 1870, 442,014; 1880, 618,457; 1890, 762,794; 1900, 958,800; 1910, 1,221,119. The estimated population for 1915 was

1,359,474; 1920, 1,463,701. The State ranked twenty-eighth in population in 1910 and the average number of persons to the square mile was 50.8. The urban population, i.e., that in places of 2500 or more, was 228,242. The native born of native whites numbered 1,042,107, the native whites of foreign or mixed parentage 57,638, the foreign-born whites 57,072, and the negroes and other nonwhites 64,302. Of the foreign-born whites 30 3 per cent came from Italy, 14.6 from Austria, 11 1 from Germany, and 10.4 per cent from Hungary. Of the total native population 80 per cent was born in the State. Of that born in other States Virginia furnished 7.2 per cent, Ohio 4 per cent, and Pennsylvania 3.3. The males in that year numbered 644,044, and the females 577,075. The males of voting age numbered 338,349. The more important cities with their populations for 1910 and 1915 (estimated) are: Wheeling 41,641 and 43,097; Huntington 31,161 and 43,572, Charleston 22,996 and 28,822, Parkersburg 17,842 and 20,165; Bluefield 11,188 and 14,637.

Education. With the exception of Delaware and Maryland the percentage of illiterates is lower than in any other of the South Atlantic States. There were in 1910 74,866 persons of 10 years of age or over, or 8 3 per cent of the total, who were unable to read or write. The percentage of illiteracy among whites of native parentage was 6.7 per cent, among foreign-born whites 23.9 per cent, and among negroes 32.3 per cent. The total school population in 1910 according to the thirteenth census was 396,812. Of this number 259,971 attended school in that year. According to the reports furnished by the State Superintendent of Education the total school population in 1915 was 409,969. The enrollment in the public schools in that year was 304,871, and the average daily attendance 221,062. The total number of teachers in 1915 was 10,084. The average salary paid to teachers per month in all grades was $46 37 The total number of schoolhouses in 1915 was 6821. The high schools in that year numbered 152. The total disbursements for schools in that year were $6,984,350. Most of the rural schools in the State are now graded. Consolidation of rural schools has been accomplished with good results. Manual training, domestic science, music, and drawing have been introduced in a large number of rural schools. Agriculture is one of the prescribed subjects of study in these schools. In many rural and town schools savings banks have been organized. The majority of all rural teachers have organized their communities into social centres. Night schools are conducted in a number of public schoolhouses.

There were in the State in 1915, 82 four-year high schools, 76 high schools of the first class, 34 of the second class, 35 of the third class, and 11 not classified. The total enrollment in the high schools in 1915 was 11,296. There were in 1915 nine colored high schools.

The Legislature has enacted important measures which have resulted in the improvement of educational conditions. Among these are provisions for increase in school funds, an industrial education law, provision for medical inspection, improvement in the compulsory school law, and a law requiring boards of education not maintaining high schools to pay the tuition of pupils of their districts wishing to attend high schools elsewhere. The State normal schools are the Concord State Normal School at Athens, Fairmont State Normal School at Fairmont, the Glenville State Normal School at Glenville, the Marshall College Normal School at Huntington, the Sheperd College Normal School at Sheperdstown, and the West Liberty State Normal School at West Liberty. West Virginia University at Morgantown is a part of the educational system of the State. Other institutions of collegiate rank are Bethany College at Bethany, West Virginia Wesleyan College at Buckhannon, and Davis and Elkins College at Elkins. These are all coeducational. Colleges for women are St Hildes at Charleston and Lewisburg Seminary at Lewisburg.

Charities and Corrections. The charitable and correctional institutions of the State are under the supervision of the State Board of Control They include the following Weston State Hospital, Spencer State Hospital, Huntington State Hospital, Welch Hospital No. 1, McKendree Hospital No. 2, Fairmont Hospital No. 3, West Virginia Penitentiary, West Virginia Industrial School for Boys, West Virginia Industrial Home for Girls, West Virginia Schools for the Deaf and Blind, State Tuberculosis Sanitarium, West Virginia Colored Orphan's Home, West Virginia Children's Home.

Religion. The Methodists are the strongest denomination, closely followed by the Baptists. Together they number more than two-thirds of the total communicants. Next in order come the Roman Catholics, Presbyterians, Disciples of Christ, and Lutherans.

History. For many years after the settlement of the eastern part of Virginia the western section was entirely unknown. John Lederer, a German surgeon in the employ of Governor Berkeley, was probably the first white man to explore the region, in 1669. In the same year La Salle floated down the Ohio River and landed at several places within the State. Abraham Wood in 1671 discovered the Great Kanawha, and Governor Spotswood of Virginia made an expedition into the present State in 1716. The grant to Lord Fairfax of the northern neck of Virginia included part of the present State, and his surveyors planted a stone at the headwaters of the northern branch of the Potomac to show the limits of his grant. When the western part of Virginia began to fill up with the adventurous Scotch-Irish after 1732, scattered pioneers crossed the mountains, and soon came in conflict with the French, who also claimed the country. (See FRENCH AND INDIAN WAR; OHIO; VIRGINIA.) The Six Nations of New York also claimed this country by right of conquest, but ceded their claim to the whites in 1754 at Fort Stanwix. The other Indians refused to acknowledge the cession, and in 1774, at Point Pleasant, one of the bloodiest of Indian battles was fought between a confederacy of Shawnees, Delawares, Wyandots, Cayugas, and other Indians under Cornstalk, and Virginia settlers and militia under Gen. Andrew Lewis. Lord Dunmore, the Governor of Virginia, did not attempt to aid the settlers, though he was near with a strong force, and it was openly charged that his hope was to cripple the Colony so that it could not join in resistance to Great Britain. In spite of the King's proclamation of 1763 declaring the western territory to be "Indian country," colonization was rapid and counties were formed. After the Revolution an entirely different society grew up in the western woods

compared with that in the east. The hardy backwoodsmen had few luxuries, few slaves, and little touch with European culture Jealousies ensued between the sections, and the west complained bitterly that they had all the burdens of government without corresponding benefits. The representation in the eastern counties was based partially upon the number of negroes, and a western freeman did not have the same representation as a resident of the east. The peculiar shape of the western part of the State made a number of the counties border on the free States of Ohio and Pennsylvania, and many of the counties were Northern in sentiment at the approach of the Civil War. When Virginia passed the ordinance of secession there was much dissatisfaction. Numerous small meetings were held, and on May 13, 1861, delegates from 25 counties met at Wheeling and called a convention to meet June 11. Representatives from 40 counties attended, declared their independence of Virginia, and took measures for the establishment of a provisional government by electing Francis H. Pierpont (q.v.) Governor On July 2 a Legislature met and elected representatives to the United States Senate, who were admitted by that body. This action was approved by the people October 24, and delegates were also elected to a convention which met at Wheeling on November 26 to frame a constitution, which was adopted on May 3, 1862. On May 13 the Legislature of the "Restored Government of Virginia" gave its consent to the formation of a new State. The act of admission was approved by President Lincoln, Dec. 31, 1862, to take effect upon the insertion of a clause providing for gradual emancipation, and the State was formally admitted June 19, 1863 During the war an unusually large part of the population was in arms, and 32,068 men were furnished to the Federal army. Slavery was entirely abolished Feb. 3, 1865, in advance of the adoption of the Thirteenth Amendment. The return of the Confederate soldiers to the southern and eastern counties threatened the Republican control, and in 1866 an amendment was added to the constitution disfranchising all who had given aid and comfort to the Confederacy after June, 1861 In 1869 the number of voters numbered about 50,000, and the disfranchised 29,316. By a compromise, general amnesty and negro suffrage were coupled and adopted in 1871, and in 1872 a new constitution went into force. The vote of the State was cast for Republican electors before this time. For the 20 years from 1872 to 1892 Democratic candidates were uniformly successful. The great development of mining and manufacturing has brought about a change of sentiment, and in 1896, 1900, 1904, and 1908 the State was found in the Republican column.

In 1907 a suit was brought by the State of Virginia against the State of West Virginia in the United States Supreme Court to compel the latter State to assume its proportion of the State debt created prior to 1861, when West Virginia separated from the other State Virginia contended that West Virginia had agreed to assume her proportionate share at the time of separation. West Virginia alleged that most of the money realized from the sale of the bonds was expended in the present State of Virginia, and therefore she was under no obligation to assume any of the debt. The suit was pending in the Supreme Court until June, 1915, when that body handed down a decision holding that West Virginia should pay Virginia $12,393,929 as its net share of the debt. In addition West Virginia was required to pay $8,178,000 in interest. The court held, however, that West Virginia was entitled to a share of the assets arising from the original principal debt, and fixed that amount at $2,966,000. In the presidential election of 1908 Taft received 137,869 votes, and Bryan 111,418 The Republicans elected their candidate for Governor, William C. Glasscock, and the entire State ticket. In the presidential election of 1912 Wilson received 113,048 votes, Roosevelt 78,819, and Taft 56,657. A constitutional amendment providing for State-wide prohibition was adopted. The Republicans elected their candidate for Governor, H. D. Hatfield.

GOVERNORS OF WEST VIRGINIA

Arthur I. Boreman	Republican	1863–69
D. D T. Farnsworth (acting)		1869
William E. Stevenson	Republican	1869–71
John J. Jacobs	Democrat	1871–77
Henry M Matthews	"	1877–81
Jacob B Jackson	"	1881–85
E. Willis Wilson	"	1885–90
A Brooks Fleming	"	1890–93
William A McCorkle	"	1893–97
George W Atkinson	Republican	1897–1901
Albert B White	"	1901–05
William M O Dawson	"	1905–09
William C Glasscock	"	1909–13
Henry D Hatfield	"	1913–17
J J Cornwell	Democrat	1917–21
E. F. Morgan	Republican	1921–

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WEST VIRGINIA UNIVERSITY. A coeducational State institution of higher learning at Morgantown, W. Va., founded in 1868. It absorbed the West Virginia Agricultural College, the Monongahela Academy, and the Woodburn Seminary. It now comprises colleges of art and sciences, engineering and mechanical arts, agriculture, medicine, and law, schools of music, military science and tactics, a summer school, at Morgantown, and preparatory schools at Montgomery, and Keyser. Its principal sources of support are the land grant of 1862, the Morrill, Hatch and Adams funds, and biennial State appropriations, the total income in 1914–15 being $410,464. The university has a campus of 50 acres, and farms of about 600 acres for the use of the agricultural experiment station and the college of agriculture. The buildings and grounds were valued in 1915 at $1,600,000. The library contained 43,500 volumes In 1916 the university proper had an enrollment of 892, while in the Summer School, Farmer's Work, and special courses in agriculture were 1441. The faculty numbered 101.

WEST VIRGINIA WESLEYAN UNIVERSITY. A coeducational college founded under the auspices of the Methodist Episcopal Church at Buckhannon, West Virginia in 1890. Connected with the college is a preparatory department and a summer school is also main-

tained The total attendance in all departments in 1915–16 was 455, and the faculty numbered 26. The productive funds amount to about $100,000, and the annual income to about $50,000 The library contains about 6000 volumes. The president in 1916 was Wallace P. Fleming, Ph.D.

WESTWARD HO! 1. A comedy by Webster and Dekker, printed in 1607. 2. A novel (1855) by Charles Kingsley.

WESTWOOD, John Obadiah (1805–93). An English entomologist and antiquary, born in Sheffield. He was a founder of the Entomological Society of London, and finally its honorary life president. In 1861 he was appointed Hope professor of zoölogy at Oxford. He published more than 400 memoirs and articles on insects, covering their habits and transformations as well as their classification, his *Introduction to the Modern Classification of Insects* (1839–40) being of great importance in the systematics of this group. He also published extensively on English archæology.

WETHERALD, wĕth'ĕr-ald, Agnes Ethelwyn (1857–). A Canadian poet. She was born at Rockwood, Ontario, and was educated at Pickering College. She edited the Woman's department of the Toronto *Daily Globe*, later became a member of the staff of the *Ladies' Home Journal*, and contributed frequently to American magazines. Her poetical works include: *The House of the Trees* (1896); *Tangled in Stars* (1902); *The Radiant Road* (1904); *The Last Robin* (1907).

WETHERELL, wĕth'ĕr-el, Elizabeth. The pen name of Susan Warner (q.v.).

WETAS'KIWIN. A city and the capital of Strathcona District, Alberta, Canada, on the Canadian Pacific Railway, 40 miles south of Edmonton (Map: Alberta, G 6). It has thriving manufactures. Pop., 1901, 550; 1911, 2411.

WETHERSFIELD, wĕth'ĕrz-fēld. A town in Hartford Co., Conn., four miles south of Hartford, on the Connecticut River, and on the New York, New Haven, and Hartford Railroad (Map: Connecticut, E 3). It is the seat of the State Prison. The leading industries are seed growing, market gardening and dairying. Wethersfield is one of the oldest towns in the State, having been settled in 1634. Pop., 1900, 2637; 1910, 3148.

WET'MORE, Edmund (1838–). An American lawyer. He was born at Utica, N. Y., and was educated at Harvard (A.B., 1860) and Columbia (LL.B., 1863). Thereafter he engaged in law practice in New York City, and in 1900–01 was president of the American Bar Association. At various times he was also president of the Republican Club and the University Club in New York, and of the Sons of the Revolution. In 1906 he received the degree of LL.D. from Yale.

WETMORE, Elizabeth Bisland (1861–). An American author, born on the Fairfax Plantation, La. She was educated at home, and early did literary work for the New Orleans *Times-Democrat*. Later she came north, in 1891 being married to Charles W. Wetmore in New York. For a time Mrs. Wetmore served as one of the editors of the *Cosmopolitan*, and she contributed to the *Atlantic Monthly* and the *North American Review*. In later years she made her home in Surrey, England. Books written or edited by her, under her maiden name, include: *A Flying Trip around the World* (1891); *A Candle of Understanding* (1903); *The Secret Life* (1906); *Life and Letters of Lafcadio Hearn* (2 vols., 1906); *Seekers in Sicily* (1909), with Anne Hoyt; *At the Sign of the Hobby Horse* (1910), essays; *Japanese Letters of Lafcadio Hearn* (1910).

WET PACK. See Bath, *Therapeutic Baths;* Hydrotherapy; Pack.

WETSTEIN, vĕt'stīn (or **WETTSTEIN**), Johann Jakob (1693–1754). A Swiss theologian, born at Basel. He studied for the Church, and after 1717 devoted himself to the critical study of the Scriptures in Basel, where he was a curate. He was forced to leave the city in 1730 on account of suspected heretical beliefs. He was called to Amsterdam in 1733 as professor of Church history in the university, and spent the rest of his life in that city. Among his writings are *Prolegomena* (1730, annotated by Semler in 1764 and republished by Lotze in 1831), and a critical edition of the New Testament (2 vols., 1751–52) The latter was a distinct advance towards modern scholarship.

WETTER, vĕt'tĕr. A lake of Sweden See Vättер

WETTEREN, vĕt'tĕr-en. A town in the Province of East Flanders, Belgium, 8 miles east by south of Ghent, on the Scheldt River (Map: Belgium, B 4). It is of considerable industrial importance, having extensive bleaching establishments and manufactures of cotton goods, lace, gunpowder, etc. Pop., 1910, 25,066

WETTEREN POWDER. See Explosives.

WETTERHORN, vĕt'tĕr-hôrn. A peak of the Bernese Alps in Switzerland. It belongs to the Finsteraarhorn group, and is situated 8 miles southeast of the Lake of Brienz and east of Grindelwald (Map: Switzerland, C 2). It rises from the valley in an abrupt rocky wall, and has three summits, the highest of which has an altitude of 12,165 feet.

WETZLAR, vĕts'lär. A Prussian town in a detached part of the Rhine Province, on the Lahn, opposite the mouth of the Dill, 33 miles northwest of Frankfort-on-the-Main (Map: Germany, C 3). Pop., 1910, 13,389. The cathedral dates from the eleventh century, with additions in the fourteenth, fifteenth, and sixteenth centuries Wetzlar was formerly an Imperial free city, and from 1691 to 1806 was the seat of the Imperial Court of Justice. Here, on June 15, 1796, the Archduke Charles defeated the French under Jourdan. The town, which had been held by Prince Dalberg, was transferred to Prussia by the Congress of Vienna in 1815. During the summer of 1772 Goethe lived at Wetzlar; here and in the vicinity occurred the incidents which suggested the *Sorrows of Werther*.

WEXELS, vĕk'sels, Wilhelm Andreas (1797–1866). A Norwegian theologian and hymn writer, born in Copenhagen of Norwegian parents. He was educated at Christiania University. Throughout his long pastorate in Christiania he fought rationalism with speech and pen and won reputation both as an orator and as an author. For the clergy, the laity, and schools, he wrote religious books that were notably popular. He edited a hymn book (1849) and was himself the author of many hymns.

WEX'FORD. A maritime county of the Province of Leinster, Ireland (Map: Ireland, E 7). Area, 901 square miles. The surface is in general level or undulating, becoming mountainous towards the northwest. The soil is fertile. The barley crops are the largest in Ireland, and

rye, oats, potatoes, and turnips are also raised, while dairy products are exported in large quantities. Pop., 1901, 104,104; 1911, 102,287 County seat, Wexford.

WEXFORD. The capital of Wexford County, Ireland, a seaport, Parliamentary and municipal borough, at the mouth of the Slaney, 82 miles south of Dublin (Map: Ireland, E 7). The town is situated on the southwest shore of the estuary of the Slaney, known as Wexford Harbor, along which the quay extends nearly 1000 yards The chief occupations are distilling and the grinding of corn. An active shipping trade is carried on mainly through the artificial harbor constructed in 1906 at Rosslare, some 8 miles distant. The town was occupied by the Danes as one of their strongest settlements. From the time of the invasion, it became an English stronghold against the native population. During the Civil War it was occupied by the confederated Catholics, but was taken by Cromwell in 1649. The insurgents of 1798 had possession of it for a short time. Pop., 1901, 11,154; 1911, 11,455.

WEYBURN, wā'bŭrn. A town and the capital of Assiniboia District, Saskatchewan, Canada, on the Souris River and the Canadian Pacific Railway, 125 miles southeast of Regina (Map: Saskatchewan, G 8). It contains a customhouse, two hospitals, and has thriving manufactures. Pop., 1901, 113; 1911, 2210.

WEYDEN, vī'dĕn, ROGIER VAN DER (c.1400–64). An early Flemish painter, founder of the school of Brabant. He was not a pupil of Jan van Eyck, as was formerly supposed, but rather a rival. Modern research has established his identity with Rogelet de la Pasture, who was born at Tournai, where he became a pupil of Robert Campin in 1427, and a master of the Painters' Guild in 1432. In April, 1435, he removed to Brussels, and in the following year the office of painter to the city was created for him. His four great paintings for the town hall, historical themes illustrating incorruptible justice, survive only in three tapestries in the Bern Museum. From a few surviving notices concerning his life and family, it would seem that he was both pious and wealthy. In 1449 he went to Italy to celebrate the Pope's jubilee, held in the following year. There he enjoyed the highest reputation and the most distinguished patronage, and was employed seemingly as court painter at Ferrara. The great paintings of Italy, however, had no influence upon his art. He returned to Brussels, where he died in 1464, after entering a religious fraternity.

Rogier van der Weyden's art was as deeply religious as his personality. In sentiment it represents a reaction against the placid painting of Jan van Eyck, intended for comfortable middle classes, and appeals to the more popular religious tendency of the day. His intense dramatic action sometimes leads to exaggeration, and his drawing, though always careful, is sometimes defective. His colors are less bright and luminous than Van Eyck's, being rendered with dawn and twilight effects. The heads, with their large eyes and prominent brows, are wonderfully expressive and spiritual. His influence was even wider than Van Eyck's. In the Netherlands Hans Memling was his pupil, and he exercised a formative influence upon Dierick Bouts and Quinten Matsys. The Cologne school of the later fifteenth century was dependent upon him; Martin Schongauer of Colmar was probably his pupil, and even Wolgemut and the Nurembergers felt his influence Through his designs for reliefs he had a wide influence upon the sculpture of the day

As Rogier's works are not signed and were often reproduced in his atelier, they are difficult to identify The earliest surviving example seems to be a "Descent from the Cross" (c.1435), now in the Escorial, a powerful and imposing work, passionate yet restrained in sentiment, still showing the influence of Campin. Not long afterward comes the triptych of St. John Baptist in the Berlin Museum, and between 1443 and 1449 the important "Last Judgment" in the Hospital of Beaune. To his Italian journey belongs the "Madonna with Four Saints" (Städel Institute, Frankfort) bearing the coat of arms of Cosimo de' Medici; and to his ripest period the altar of the "Epiphany" at Munich, the wings of which, especially the "Annunciation," were often repeated (example in the Metropolitan Museum, New York). One of his latest works, a masterpiece of color, is the Middelburg Altar, with the "Nativity," and two other subjects, in the Berlin Museum, which also possesses his "Altar of the Blessed Virgin." The pathetic figure of the "Magdalen" in the National Gallery, London, is by his hand; but the triptych of the "Seven Sacraments" in the Antwerp Museum seems a school piece, as do also the different versions of St. Luke painting the Virgin (Munich, Boston, etc.). Although he was famed as a portraitist, only two portraits have survived: the "Man with an Arrow" in the Brussels Museum, and "Duke Lionello d'Este," in the Speyer collection, London.

Bibliography. Early biographies were by Wauters (Brussels, 1856) and Pinchart (ib., 1876). Later research is represented by C. Hasse, *Rogier von Brügge* (Strassburg, 1904); id., *Rogier van der Weyden and Rogier von Brugge* (ib., 1905); Karl Voll, *Die altniederlandische Malerei* (Leipzig, 1906); Paul Lafond, *Rogier van der Weyden* (Brussels, 1912); Friedrich Winkler, *Der Meister vom Flémalle und Rogier van der Weyden* (ib., 1913).

WEYERHAEUSER, wī'ĕr-hoi'zĕr, FREDERICK (1834–1914). An American capitalist, born at Neidersaulheim, Germany. He came to the United States in 1852 and settled in Pennsylvania, but moved to Illinois in 1856, and to St. Paul, Minn., in 1891. He came to be known as the "lumber king," being president of the Weyerhaeuser Timber Company, and head of the so-called Weyerhaeuser Syndicate, which controlled millions of acres of timber lands.

WEY'EB'S CAVE. A large stalactite cavern in Augusta Co., Va., opening into a western spur of the Blue Ridge, 11 miles northeast of Staunton (Map: Virginia, F 3). It ranks next in importance to the Mammoth and Wyandotte caves, and contains several chambers, of which the largest is Washington's Hall, 250 feet long and more than 90 feet high.

WEYLER, wĕ'ê-lĕr *or* wā'lĕr, VALERIANO, MARQUIS OF TENERIFFE (1839–). A Spanish general. He was born in Palma, Majorca, entered the army early, was military attaché of the Spanish Legation in the United States during the Civil War, and accompanied General Sheridan on some of his campaigns. In the 10 years' war in Cuba (1868–78) he held a command under Balmaceda, and in 1873 served in Spain against the Carlists. He was Governor-General of the Canaries (1879–83), of the

Balearics (1883–86), and in 1889 became Captain General of the Philippines, where he amassed a fortune He was later commissioned as Provincial Governor of Catalonia, and in 1896 he was sent to Cuba, in response to the demands of the advocates of severe methods, to succeed Martínez Campos (q.v.). His ruthless policy aroused a strong protest in the United States, and he was recalled in 1897. In 1900 he was made Captain General of Madrid. He was Minister of War in the Sagasta cabinet, which held office from March, 1901, to December, 1902, and in the cabinet of Montero Ríos in 1905–06, and Minister of Marine in 1905. As Captain General of Catalonia in 1909 he handled with skill the dangerous situation connected with the Ferrer riots. His marquisate was conferred for his services in the Canaries; and his other services were rewarded with grand crosses in many of the most distinguished orders of knighthood

WEYMAN, wā'man, STANLEY JOHN (1855–). An English novelist. He was born at Ludlow, Shropshire, and was educated at Christ Church, Oxford. He was called to the bar in 1881, and practiced until 1889. His first three books, *The House of the Wolf* (1890), *The New Rector* (1891), and *The Story of Francis Cludde* (1891), were followed by *A Gentleman of France* (1893), which established his reputation as an historical Romanticist. It was translated into several languages. Weyman later published, notably: *Under the Red Robe* (1894); *My Lady Rotha* (1894); *Memoirs of a Minister of France* (1895); *The Red Cockade* (1895); *The Man in Black* (1896); *Shrewsbury* (1897); *The Castle Inn* (1898); *Sophia* (1900); *In King's Byways*, 12 short stories (1902); *Abbess of Vlaye* (1904); *Starvecrow Farm* (1905); *Wild Geese* (1908).

WEYMOUTH, wā'mŭth. A town, including several villages, in Norfolk Co., Mass., 12 miles southeast of Boston, on the New York, New Haven, and Hartford Railroad (Map: Massachusetts, F 4). It has the Tufts Library and the Fogg Library. Weymouth is primarily an industrial town, being especially interested in the manufacture of shoes and in wool scouring. Pop., 1900, 11,324; 1910, 12,895; 1915 (State census), 13,969; 1920, 15,057. Thomas Weston came to Weymouth in 1622, but the first permanent settlement was made by Capt. Robert Gorges in 1623. It was here that Thomas Morton of Merrymount was first seized in 1628 by the Plymouth colonists. Until 1635, when it was incorporated, the place was called by its Indian name, Wessagusset. Consult C. F. Adams, *Wessagusset and Weymouth*, published by the Weymouth Historical Society (Weymouth, 1905), and other publications of the Society.

WEYMOUTH, or MELCOMBE REGIS AND WEYMOUTH. A seaport and fashionable watering place in Dorsetshire, England, on a bay at the mouth of the Wey, four miles north of the Isle of Portland, and eight miles south of Dorchester (Map: England, D 6). A fortified point, called the Nothe, separates the old town of Weymouth, lying to the south, and Melcombe-Regis, extending to the north. The two communicate by means of a bridge. The old town is uninteresting in appearance. Melcombe Regis, elegantly built, stands on a narrow peninsula, with the sea on the east, and an estuary on the west side. Its chief features are the sea terrace and an esplanade, over a mile long, adorned with a statue of George III. Ship and boat building, rope and sail making, and brewing are carried on, and there is steam traffic with France and the Channel Islands. The boroughs were united in 1571, and enlarged in 1895 Pop., 1901, 19,831; 1911, 22,324

WEYPRECHT, vī'prĕkt, KARL (1838–81). A German polar explorer, born near Michelstadt, Hesse He entered the Austrian navy in 1856, and was promoted for gallantry in the naval action at Lissa (1866). With Payer he explored Barents Sea (1871), reaching the high latitude of 78° 45′ N., 41° E. He commanded (1872–73) the Austro-Hungarian expedition which discovered Franz Josef Land (q.v.). At the meeting of German naturalists at Graz, he proposed (1875) that isolated expeditions for geographical work in polar regions be replaced by concerted scientific work at selected stations. This plan was agreed to at the Hamburg Polar Conference (1879) where the cooperation of 10 nations was assured. Eventually 14 stations were occupied (1881–83) by 11 nations. Weyprecht published: *Die Metamorphosen des Polareises* (1879); *Astronomische und geodatische Bestimmungen der osterreichisch-ungarischen arktischen Expedition* (1877), *Praktische Anleitung zur Beobachtung der Polarlichter und der magnetischen Erscheinungen in hohen Breiten* (1881). Consult Littrow, *Karl Weyprecht, Erinnerungen und Briefe* (Vienna, 1881), and A. W. Greely, *Three Years of Arctic Service*, chap. ii (New York, 1886).

WEYR, vīr, RUDOLF VON (1847–). An Austrian sculptor. He was born in Vienna, where he studied under Bauer and Cæsar at the academy. He became widely known through his marble reliefs for the hexedra of the Grillparzer Monument, Vienna (1878), depicting scenes from the poet's dramas. His sense of the decorative and rich imagination found further expression in plastic works for the New Museum, the University, and the Burg Theatre, the latter containing his masterpiece, a frieze in high relief of the "Triumphal Procession of Bacchus and Ariadne." Among his other sculptures in Vienna are several public monuments, particularly that to Brahms fountains, and excellent portrait statues. In his works sculpture and architecture are skillfully combined, with a preference for the baroque, tempered by a refined sense of beauty.

WHALE (AS. *hwæl*, OHG. *wal-fisc*, Ger. *Walfisch*, whale). Any large marine mammal of the order Cetacea (q.v.), the only essential difference between a whale and a dolphin or porpoise being the size, though the name is more particularly applicable to the toothless or whalebone whales. One of the most widely current errors in zoölogy is the notion that a whale is some kind of a fish. The warm blood, the well-developed brain, the double circulation, lungs, mammary glands, and reproductive organs, combine to show clearly the far higher organization of a whale as compared with even the highest fishes. Their young are born alive, well developed after a long pregnancy, and are suckled and cared for by the mother as in the case of land mammals. Nevertheless, in their extreme adaptation to an exclusively aquatic life, whales have superficial resemblances to fishes—the elongated, tapering body, the finlike limbs, and the termination of the body in a caudal fin, the principal organ of locomotion. The skin of a whale is, however, smooth and without scales, though there are frequently many barnacles and

parasitic crustaceans attached to it. The only outgrowths of the skin are hairlike bristles near the mouth, and these are not always present, being rather a characteristic of the young. The fore limbs of whales are supported by the same bones as in other mammals, but are much flattened, and the digits, which have an unusual number of phalanges, are all united in a common skin. The clavicle is wanting, the scapula is very large, and the humerus and forearm bones are very short. The hind limbs are entirely wanting, the only evidence of their ancestral occurrence being a pair of small, slender bones, completely embedded in the body wall and not connected with the backbone, supposed to represent vestigial ischia. The caudal fin, unlike that of a fish, is flattened horizontally, and the two halves, known as flukes, are therefore right and left, not dorsal and ventral as in a fish; this fin is connected with the body by a narrow but extremely muscular part, known as the "small."

The tail serves for locomotion, and is also a most effective weapon of both offense and defense Most whales have more or less of a dorsal fin on the median line of the back, but it is simply an outgrowth of the integument, and even in those forms where it is most highly developed it has no bony supports. The head of a whale is very large proportionately, in some species as much as one-third of the total length. The eyes are small, as is the ear opening; there are no external ears. The nostrils or nostril (there is often only one) are situated far back from the nose, on the vertex of the head, and are closed by a plug-like valve, which can only be opened by pressure from the inside. The so-called blowing of a whale takes place through the nostrils, and is merely the release of the long-confined moisture-laden breath, which condenses in the cooler air and gives the appearance of a column of water being blown from the nostrils. The idea that a whale takes water in at the mouth and blows it out through the nostrils is baseless, though water may be blown into the air if the breath is released before the animal has quite reached the surface. The mouth is always large, though the œsophagus may be quite narrow. Teeth are wanting in the true whales, but in all other cetaceans they are present, at least in the lower jaw, and in the embryos of true whales they are found well formed about the middle of fœtal life, but they are gradually absorbed and no trace of them exists at birth. The teeth are always simple, with conical or compressed crowns and single roots, and there is only one set, milk teeth not being developed. The number of teeth shows wide variation.

In the toothless whales the roof of the mouth is provided with a large number of vertical horny plates, quite close together, placed transversely on each side, so that there is a bare space in the median line. The outer end of each plate is smooth and hard, but the inner end is frayed out into long bristly fibres, so that the roof of the mouth looks as though covered with hair. (See WHALEBONE.) This whole apparatus serves as a sieve for straining out the minute animals on which these whales feed, the water being taken into the mouth anteriorly and then let run out at the sides of the mouth, between the ends of the baleen plates. The surface water of the ocean swarms with animal life, consisting largely of mollusks of various kinds, with some crustacean material. All this animal life is collectively known by whale fishermen as "brit" and is the only food supply of the toothless whales. Owing to the large size of the mouth, the maxillary and mandibular bones of the skull are greatly elongated, giving the cranium proper a disproportionately small appearance, although it is in reality of relatively good size. There are always seven vertebræ in the neck, but they are crowded close together, are practically immobile, and are more or less fused together into a single piece. The remaining vertebræ are remarkably large, numerous, and freely movable upon each other. There is no union of any of them in the sacral region. All the bones of a whale are spongy, the cavities being filled with oil.

There are many peculiarities in the soft parts of the whales, notably the development of blubber, a layer of fat, consisting of a dense mesh of areolar tissue, with interstices filled with oil. This is an extraordinary nonconductor of heat and maintains the temperature of the body, thus replacing the external coat of hair present in other mammals but wanting in all cetaceans. The salivary glands of a whale are rudimentary or wanting, the stomach is many-chambered and quite peculiar, the intestinal cæcum is wanting or small, the gall bladder is wanting, the larynx has a peculiar shape, the blood system is remarkable for its plexuses, both arterial and venous, the brain is large and round, with numerous and complex cerebral surface convolutions, and the mammary glands are situated far back, one on each side of the female reproductive opening. There is a special arrangement of dilated ducts and compressor muscles, so that the milk can be forced into the mouth of the young one in considerable quantities at a time, by the action of the mother, so that sucking under water is made feasible.

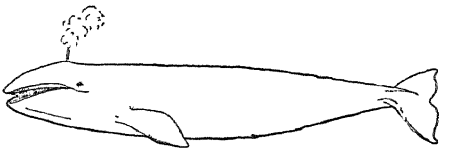
Whales are widely distributed in all parts of the ocean and are frequently gregarious, sometimes occurring in thousands. Some species, however, are generally seen singly or in pairs. A few species appear to be regularly migratory, while others wander almost at will, restricted by no natural barriers. All whales are carnivorous, but only the killers (q.v.) eat other warm-blooded vertebrates. Fishes and squids are the chief articles of diet of the toothed whales, while small mollusks and other invertebrates maintain the whalebone whales. Whales are generally timid, inoffensive animals, active and graceful in their movements and very affectionate towards one another, especially parents and offspring.

Commercially whales are of great importance. Ambergris, spermaceti, whale oil, whalebone, glue, and guano are the principal substances supplied by these animals, although leather is made from the skins of some of the smaller species. Before the discovery of petroleum, illuminating oil was derived almost wholly from whale oil, but kerosene has now entirely supplanted the animal oil. Numerous substances have also been discovered or invented for replacing whalebone, which have proved in some cases superior to baleen itself. This has resulted in an almost complete elimination from the market of Arctic whalebone. Ambergris (q.v.) is only incidentally a product of the whale fishery, but spermaceti is one of the principal productions of the sperm whale. It is a peculiar oily substance, which at the body temperature of the whale is a whitish fluid, but on cooling becomes solidified. After purification by refining it is a

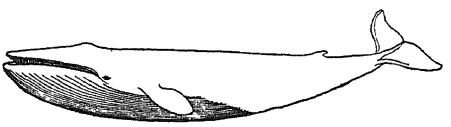
WHALES



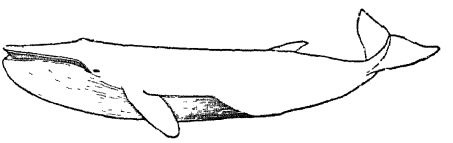
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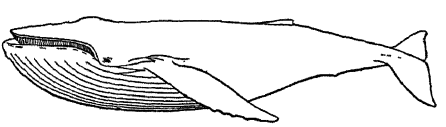
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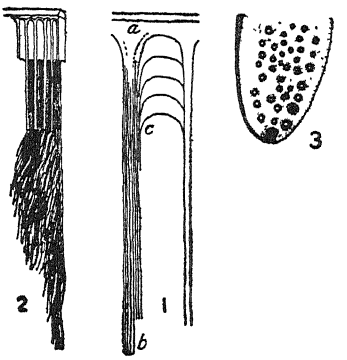


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1. WHITE WHALE or BELUGA.
2. CALIFORNIA GRAY WHALE.
3. SULPHUR BOTTOM (Pacific).
4. FINBACK (Pacific).
5. RIGHT WHALE
6. BOWHEAD WHALE
7. HUMPBACK (Pacific).
8. SPERM WHALE.

white crystalline substance used largely in pharmacy and in making candles. It is nearly odorless and tasteless.

The study of the anatomy, development, and natural history of whales is attended with unusual difficulties, and the accumulation of large series of specimens in museums is out of the question. It is therefore a matter of question

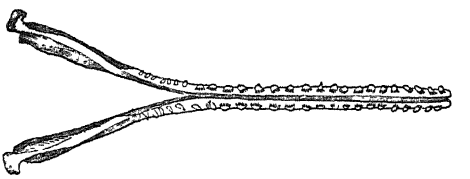


STRUCTURE OF WHALEBONE.

1, diagram of the matrix of the baleen plate, the dotted line, *a*, showing the outline of the pulp which forms *b*, the central fibrous part of the plate; *c*, external layers of firm substance formed by the elastic cementing material. 2, a vertical section of four baleen plates in situ, the transverse bar at the top represents the vascular gum from which the pulps proceed that penetrate the base of the plates Below this is shown the elastic substance cementing the plates together, beyond which the plates project free and terminate in a fringe of bristles. 3, transverse section of a portion of a baleen plate showing the area of the tubular cavities of the coarse central fibres, and the outer, denser substance.

whether a given species of whale wanders into all parts of the ocean, and the number of species and their geographical distribution is practically unknown. Not more than 25 well-defined species can be recognized, though nearly three times that many have been named. The classification is based primarily on the presence or absence of teeth after birth, the two suborders Denticete and Mysticete being generally accepted, though under varying names.

The Denticete (Odontoceti, Delphinoidea) include, besides the toothed whales, all those other cetaceans known as dolphins, narwhals, porpoises, killers, etc. The most important whale in this group is the sperm whale (*Physeter macrocephalus*), also called cachalot and spermaceti whale. It has a wide geographical range, occurring in all the important oceans, but it is most abundant off New Zealand, in the Sulu Sea, about the Cape Verde Islands, and off the coast of Japan. It occurs more generally in the tropics and warm temperate seas than elsewhere. The sperm whale reaches a length of 60 feet or more, the female being much smaller than the male. The head is enormous, forming about one-half of the entire bulk of the animal and occupying more than one-third of the length. From the head, the body tapers to the tail, at last rather rapidly. The general color is very dark gray, nearly black on the upper parts, lighter beneath. Old bull whales usually have a large gray spot on the front of the head. The muzzle is obtuse, almost as if squarely cut off in front, the breadth of it almost equaling the thickness of the body. In a protuberance on the upper part of it is the blow hole, which is single, situated a little on the left side, and in form not unlike the letter S elongated. The mouth is large and wide; and the throat, unlike that of the Greenland whale, is very wide, sufficiently so to admit the body of a man. The upper jaw projects some feet beyond the lower, and is destitute of teeth; the lower jaw has from 20 to 25 teeth on each side, varying with individuals. The teeth are conical and slightly recurved, projecting about two inches from the gum. The lower jaw is extremely narrow, the two branches being in contact throughout the greater part of its length; it fits into a groove in the upper, in which are cavities for the teeth. The eyes are small, and placed far back in the head, above the angles of the mouth; the left eye is said to be smaller than the right. Just above the eyes the dorsal line rises considerably; the dorsal fin is also represented by a protuberance about half way between the neck and the tail; and these parts are seen above water in the ordinary swimming of the animal (at the rate of 3 to 7 miles an hour), and just under the surface of the water, though when alarmed it swims with greater velocity. The enormous head of the sperm whale is occupied by an aggregation of numerous small



LOWER JAWS AND TEETH OF A SPERM WHALE.

chambers separated and divided by connective tissue, in front of the cranium and above the upper jawbones, called by whalers the case, which are filled with the spermaceti; sometimes 10 barrels of it occur in a single case. The blubber of the sperm whale is only about a foot thick and is not rich in oil, a large whale yielding about 100 barrels. When aroused these whales are dangerous, and by biting or striking with the tail they can destroy whaleboats, while by using the head as a ram they can sink small vessels. The remaining Denticete are mostly of small size and comparatively little importance. See DOLPHIN; KILLER; NARWHAL; PORPOISE.

The Mysticete (Mystacoceti, Balænoidea) include the true whales, those without teeth. They are nearly all of large size, some of them being the largest of living animals. The largest species is probably the sulphur-bottomed or blue whale (*Balænoptera musculus*), which reaches a length of 90 feet or more, and the weight of which has been calculated to approach 70 tons. Several genera of whalebone whales are recognized, the most important being *Balæna*, to which belong species that supply the most valuable whalebone and oil. The most important species is the Greenland or Arctic right whale (*Balæna mysticetus*), circumpolar in its distribution, but not ranging far to the southward, preferring regions of icebergs and ice floes. It reaches 60 or 70 feet in length. The body is thickest just behind the flippers or pectoral fins, tapering conically towards the tail and slightly towards the head. The tail is 5 or 6 feet long and from 20 to 25 feet broad, formed of two diverging lobes, broadest almost where they are united, but with a slight indentation. The pectoral fins are 8 or 9 feet long and 4 or 5 feet broad. The mouth is 15 or 16 feet long. The eyes, situated on the sides

of the head, about a foot above and rather behind the angles of the mouth, are not larger than those of an ox, but the sense of sight seems to be acute, at least in the water. The blow holes are on the most elevated part of the head, from 8 to 12 inches long, but of comparatively small breadth. The upper parts are velvety black, the lower parts white. The upper parts, in old whales, sometimes become piebald, the black being mixed with white and gray. The period of gestation is uncertain; one young is produced at a birth, and is from 10 to 14 feet in length when born. The mother displays great affection for her offspring, of which whale fishers sometimes take advantage, harpooning the young one—itself of little value—in order to secure the mother. Suckling is performed at the surface of the water, and the mother rolls from side to side, that she and the young may be able to breathe in turn. The usual swimming speed is about 4 or 5 miles an hour, and whales often swim not far beneath the surface of the water, with the mouth wide open to take in food. This whale is capable, however, of swimming with greater rapidity. Its tail is powerful, its single blow sufficient to destroy a large boat. Whales usually come to the surface to breathe at intervals of eight or ten minutes, but may remain under water half an hour or more. When they come up to breathe they generally stay on the surface about two minutes, during which they blow eight or nine times and then descend. The noise which they make in blowing is very loud, and the spout of spray ejected ascends several yards into the air, appearing at a distance like a puff of smoke. They often assume, as if in sport, a vertical position, with the head down, and flap the surface of the water with the tail, making a sound heard two or three miles off. The Greenland whale is not properly gregarious, being generally found alone or in pairs, except when numbers are attracted to particular feeding grounds, as is sometimes the case in the bays and inlets of northern coasts.

A closely related and very important species is the north Atlantic right whale (*Eubalæna glacialis*), with a smaller head, shorter baleen, and a differently shaped under lip. It has 15 dorsal vertebræ and ribs, while the Greenland whale has generally only 12. The southern right whale is found in all temperate seas in both the northern and southern hemispheres, although generally wanting in the tropics, and is not known to occur in the Antarctic Ocean. The right whales of the north Atlantic have been separated from those of the south Atlantic, and both from the Pacific Ocean forms, as distinct species, but the differences are slight. All of the right whales have been, and are still to a certain extent, pursued by whalers, and their numbers have become greatly reduced during the past century; the north Atlantic form is now very rare. The smallest of the whalebone whales is the New Zealand right whale (*Neobalæna marginata*), which reaches a length of only about 20 feet. Other whales are the gray whale (*Rhachianectes glaucus*) of the north Pacific, the baleen of which is very short and coarse; the humpback whales, of the genus *Megaptera*, which are two-thirds as large as the Greenland whale and have black baleen; and the rorquals of the genera *Balænoptera* and its allies. The rorquals (q.v.) are the largest whales and have a distinct and falcate dorsal fin. The pectoral fins are rather small and the skin of the throat is plicated, as is the case with the humpbacks, which, however, have very large pectoral fins. The rorquals are the most abundant and widely distributed of whales at the present time, as it is only recently that they have been sought by the whalers. The fossil remains of whales occur in the Miocene and Pliocene and later strata. See CETACEA.

Whale Fishery. The beginnings of the whale fishery are obscure, but it appears that in the ninth century the Norwegians sent out vessels in their pursuit, perhaps even to Greenland. The Biscayans, however, seem to have been the first to make it a regular commercial pursuit for profit in the sale of oil, whalebone, etc. Between about 1300 and 1500 whaling in the Bay of Biscay and adjoining waters was one of the principal industries of the Basque provinces and Gascony. Whales' tongues were then an important article of commerce, and in 1261 were subjected to a special tax. The Biscayan fishery finally died out through lack of whales, but meanwhile the northern fishery prosecuted by the English, French, Spanish, and Dutch came into prominence. The coasts of Spitzbergen became the centre of a very successful industry carried on mainly by the Dutch, who, it is said, supplied all Europe with oil during the latter half of the seventeenth century. In 1680 they had 260 ships and about 14,000 men employed in the whale fishery, but after that their fishery began to decline. In the eighteenth century Great Britain took the lead, encouraging the sending out of sailing vessels to engage in whale hunting by a generous bounty, the object being quite as much the training of seamen as the development of the whale fishery. The industry was in its most flurishing condition in 1815, when 164 ships were engaged. During the nineteenth century the United States became the great centre of the whale fishery, and is to-day the principal producer of whale products. Nantucket was the original centre of the American whaling industry, and sent her boats to Newfoundland, the Gulf Stream, West Indies, and even as far as the Cape Verde Islands and Brazil. The Revolutionary War paralyzed the industry and many of the interests were transferred to England and France. The whalers ventured into the Pacific in 1787, but the famous Kodiak ground on the coast of Alaska was not discovered until 1835. New Bedford fitted out her first vessel in 1755 and soon became the centre of the industry, for years the greatest whaling port in the world. In 1846 there were 735 vessels engaged in the fishery, valued at more than $20,000,000, and 70,000 people were more or less directly dependent on whaling for their livelihood. With the discovery of the abundance of whales in the Pacific and the growth of San Francisco, that city became a small centre for the whalers, but the universal use of mineral oils and cheap substitutes for whalebone has relegated the whaling industry to a comparatively unimportant place.

The vessels engaged were usually sailing vessels of 300 to 500 tons burden, or screw steamers of somewhat greater tonnage. Each vessel carried from four to seven boats and a crew of 35 to 60 men, each boat requiring at least six. The crew, from captain to cabin boy, had their wages regulated, at least to a certain extent, by the number of whales taken and the amount of oil brought home. Harpoons and lances were at first the only means of capture, but later rifles

with explosive bullets were considerably used. The introduction of prussic acid or strychnine into the body of the whale with the harpoon or bullet has been tried, as it results in a more rapid death for the animal and consequently less danger of loss, but it is said that sailors object to the use of poisons.

When the ship arrived at the whaling ground a lookout was stationed at the masthead. As soon as a whale was discovered, the boats were lowered, and a competition ensued among their crews, all exerting their utmost strength to reach the whale first. The harpooner was ready, as soon as the boat was sufficiently near the whale, to hurl his harpoon with all his force; the crew instantly backed the boat, and the whale generally plunged in terror to a great depth, sometimes carrying out more than 200 fathoms of line. It remained below for 20 minutes or more, and when it rose the boats hastened to it again; it was struck with a second harpoon, and probably, instead of at once descending, it struck violently with its tail, to destroy its enemies. It could not remain long below the surface, and when it came up it often spouted blood through the blowholes if the lungs had been injured. When it was lanced, it sometimes died almost at once, but occasionally there was a terrific struggle—the water was lashed into foam and dyed with blood. It not infrequently happened that, instead of dying at the surface of the water, the whale descended, and did not rise again, so that it was lost to the whaler. The carcass of the whale was towed by the boats to the ship, and made fast to the ship's chains. Should the prize have proved to be a right whale, the process of flensing was then commenced. Some of the crew, having their boots armed with iron spikes, to prevent them from slipping, descended upon the carcass, and cut into the blubber with blubber spades, removing a broad strip or blanket of skin, 20 or 30 feet long, which was hoisted to the deck by means of a hook and tackle. Great cubical pieces of blubber, of half a ton or a ton in weight, were then cut out and hoisted on deck. In this way the process was carried on, the whale being turned over and over, that every part might be reached; till in three or four hours the whole mass of blubber was removed from it—probably amounting to 20 or 30 tons. The remainder of the carcass was then flung adrift, and sometimes sank, but often floated, in consequence of incipient putrefaction. The blubber, after being hoisted on deck, was cut into smaller cubical pieces, and subjected at leisure to a process by which the cellular tissue was separated from it. This is called "making off" or "trying out"; and to accomplish it the blubber was heated in a large pot and afterward strained, the scraps or cracknels from one pot serving as fuel for another, and the ship being made filthy with smoke, soot, and grease. The product was finally stored in casks, to be conveyed home and boiled for oil. A ton of blubber yielded nearly 200 gallons of oil. A single whale has often furnished blubber and whalebone to the value of $3500 or $4000.

The pursuit and capture of sperm whales was not essentially different from that of the right whale, but after their capture the carcass was handled somewhat differently, as the head was the most valuable part. The whale was first secured by the head and then the whole case with the attached blubber was cut away and hauled up beside the vessel and made fast. The contents of the case were then bailed out with a bucket and the spermaceti separated from the oil by cooling. The blanket strips were then removed from the body and the blubber was tried out as in the right whale.

All this is now past history and the modern shore-whaling methods have wholly superseded the old whaling ships. So efficient and wholesale are these new undertakings that there is great danger of the complete extermination of a number of species of whales. The Norwegians first perfected the new ways and means of whaling, but very rapidly they were adopted all over the world and now we find shore stations in southeast Alaska, British Columbia, Newfoundland, Bermuda, South America, Japan, Africa, Russia, and Australia. The harpoon gun insures the death and securing of every whale encountered by the swift ships. If necessary the carcass is inflated with air. It is towed rapidly in to the whaling station, and even before quite out of the water men begin to strip off the blubber. In Japan, where every portion of the whale is put to some use, the wholesome meat is eaten, either fresh or canned, a single whale supplying as much as 80,000 pounds.

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WHALEBACK. The name applied to a type of freight steamer developed on the Great Lakes. The sides of a whaleback are curved in to meet a narrow flat deck several feet above the water line. Circular hatchways rise above this deck and support small deck houses and (in some instances) a flying fore-and-aft bridge. The whaleback is well suited to the lake trade, but the poor accommodations for the crew on long voyages have prevented its general adoption in ocean traffic. The first whaleback to cross the Atlantic was the *Charles W. Wetmore*, of 3000 tons, which made the voyage to Liverpool in 1891. The shape of the whaleback makes it particularly steady at sea, and it is possible that vessels of this type may have increased use in carrying ore and similar heavy cargoes. A modification of the type, called the turret deck, has been brought out in England. The sides are curved inward as in the whaleback, but at about one-fourth the beam from the side they are curved up again to form a narrow superstructure, which extends from stem to stern. A typical lake whaleback passing through the lock at the Sault Ste. Marie Canal is shown on the Plate accompanying the article CANAL.

WHALEBOAT. A rather narrow boat, sharp at both ends and with considerable sheer (i.e., the ends rise considerably above the middle part), which was much used in the whale fishery. These boats are now carried by many vessels in all trades and by men-of-war. They are suitable for nearly all uses at sea and are very generally fitted as lifeboats. The shape of the stern adapts them to use as surf boats or in

rough seas, in which case they are steered with a heavy oar working in a crutch on the stern-post. See BOAT.

WHALEBONE. The baleen plates which take the place of teeth in the mouths of the baleen whales (see WHALE) constitute the whalebone of commerce. They vary in length from a few inches up to 10, and even in rare instances 12 feet. Chemically they consist of albumen hardened by a small proportion of phosphate of lime. Their color is usually of a bluish black, but in some species they are striped longitudinally with bands of a whitish color, and they terminate at the point in a number of coarse black fibres of the baleen, which fibres are also found more or less down both sides of the blade. These fibres are used by brush makers. Whalebone before being fit for use is first trimmed, i.e., all the hairs are removed from the point and edges of each blade; and generally the surface of each flat side is scraped, the shavings being used for pillows and mattresses. The blades are then boiled in water or heated in steam for several hours, until they become soft enough to be cut with a common knife. The workman then cuts them into lengths fitted for the purposes to which they are to be applied. They were formerly extensively used in thin strips, in corsets and waists, and even for umbrella ribs, but within recent years steel rods have been largely substituted in these manufactures, while gutta percha, celluloid, featherbone, and similar compositions are used in dressmaking.

WHALEHEAD. See SHOEBILL.

WHALING INDUSTRY. See MERCHANT MARINE, WHALE.

WHALLEY, hwŏl'ĭ, EDWARD (?–c.1678). An English regicide, born in Nottinghamshire. He fought with distinction under his cousin, Oliver Cromwell, in the Civil War, and afterward acted as custodian of the King. He served in the Second Civil War under Fairfax, was one of those who signed the King's death warrant, and was wounded in the battle of Dunbar. Afterward he assisted Lambert in defeating Ker at Hamilton, and also participated in the battle of Worcester. On Aug 13, 1652, he presented to Parliament the petition of the army. When the Restoration came, he, as one of the regicides, fled, in company with his son-in-law, Major General William Goffe (q.v.), to Boston. In 1661 they removed to New Haven and in 1664 to Hadley. Several attempts were made by the home government to secure their arrest, but all were unsuccessful. Consult Ezra Stiles, *History of Three of the Judges of King Charles I* (Hartford, 1794).

WHALSAY, hwŏl'sĭ. See SHETLAND ISLANDS.

WHANG-TI. An old spelling of Hwang-ti (q.v.).

WHARF (AS. *hwerf*, breakwater, Icel. *hvarf*, shelter, OSwed. *hvarf*, shipyard). In law, a structure on the bank or margin of navigable waters to which vessels can be moored and from which they may be loaded and unloaded. On the Western rivers in the United States it is common to build wharf boats which are moored to the banks of the river, and which are always accessible at any stage of the water. This is rendered necessary by the fact that such rivers are subject to great freshets and extremely low water at different seasons of the year.

Owing to a doctrine of the common law that the soil of tide waters between high and low water mark belongs to the State, a riparian owner along such waters cannot establish a wharf without permission from the State, as such a structure would otherwise constitute a public nuisance. The State may grant to a city the permission to establish wharves upon its water front, as was done by the State of New York to the city of New York. In such cases a city may be authorized by the Legislature to condemn lands for the erection of public wharves, the revenue from which shall be paid into the city treasury. The number of public wharves, their locations, and the rates of wharfage which may be charged are fixed and regulated by statutes in most of the United States.

WHARF'AGE. A sum paid for the privilege of mooring a vessel to a wharf and loading or unloading her cargo, or for the storage of goods thereon before or after shipment. Wharfage may be charged for mooring a vessel to a natural landing. In most States the rates of wharfage are fixed by statute, and are a lien upon goods which remain in the possession of a wharfinger, and also upon vessels moored to a wharf if the charges are made for that privilege. Such a lien on a vessel may be enforced in courts of admiralty, and the vessel detained in the custody of a United States marshal unless the charges are paid.

WHARF'INGER (for **wharfager*, with epenthetic *n*, from *wharfage*). The owner or keeper of a wharf. The responsibility of a wharfinger for goods in his care is practically that of a bailee. He is only liable to exercise reasonable and ordinary care and diligence for the protection of goods left with him. His responsibility begins when the goods are delivered at the wharf, and ends only when they are delivered to a person duly authorized to receive them. See WHARFAGE.

WHARTON, hwar'ton. A borough in Morris Co., N. J., 20 miles west of Paterson, on the Rockaway River, on the Morris Canal, and on the Delaware, Lackawanna and Western, the Central of New Jersey, the Mount Hope Mineral, and the Wharton and Northern railroads (Map: New Jersey, C 2). There are iron mines, blast furnaces, silk mills, and army and navy arsenals, manufacturing powder. Pop., 1900, 2069; 1910, 2983.

WHARTON, ANNE HOLLINGSWORTH (1845–). An American writer, born at Southampton Furnace, Pa. She was educated at a private school in Philadelphia, devoted herself chiefly to the study of the social history of the Colonial and Revolutionary periods of the United States, wrote a number of entertaining books and magazine articles in this field, and was chosen historian of the National Society of Colonial Dames of America. Her publications include: *St. Bartholomew's Eve* (1866); *The Wharton Family* (1880); *Through Colonial Doorways* (1893); *Colonial Days and Dames* (1894); *A Last Century Maid* (1895); *Life of Martha Washington* (1897); *Heirlooms in Miniatures* (1897); *Salons Colonial and Republican* (1900); *Social Life in the Early Republic* (1902); *An English Honeymoon* (1908); *In Château Land* (1911); *A Rose of Old Quebec* (1913); *English Ancestral Homes of Noted Americans* (1915).

WHARTON, EDITH (NEWBOLD JONES) (1862–). An American novelist who, alike by her short stories and her novels, took a foremost place among the writers of her day and country. She was born in New York and was educated at home. In 1885 she married Edward Wharton

of Boston Her first book, *The Greater Inclination*, a collection of short stories notable for their clean-cut brilliance and finished artistry, appeared in 1899, to be followed by two other volumes of short stories—*Crucial Instances* (1901) and *The Descent of Man and Other Stories* (1904)—which fairly represent her success in this literary kind Among her novels, *The Valley of Decision* (1902), *The House of Mirth* (1906), *Madame de Treymes* (1907), and *The Fruit of the Tree* (1907), are in different ways typical. From her pen came also· *The Touchstone* (1900); *Italian Villas and their Gardens* (1904); *Italian Backgrounds* (1905); *The Hermit and the Wild Woman* (1908); *A Motor Flight Through France* (1908); *Tales of Men and Ghosts* (1910), *Ethan Frome* (1911): *The Reef* (1912); and *The Custom of the Country* (1913). In 1915 she wrote *Fighting France, from Dunkerque to Belfort*, and edited *The Book of the Homeless*, to which notable writers and illustrators contributed in order to aid the Belgian refugees whom the German invasion had brought to want. In other ways she did much for sufferers from the great war in 1916, being rewarded by the cross of the French Legion of Honor She maintained a residence in Paris.

As a novelist Mrs. Wharton's point of view is that of the cultured class with a wide social experience in the more exclusive circles at home and abroad. The people she presents in her novels are mainly from the artistic and literary worlds, or from the world of wealth and fashion; and her backgrounds—such as would be expected from her choice of characters—are faithfully and vividly painted, and often in circumstantial detail. It was with *The House of Mirth* that Mrs. Wharton most impressed the public of her day, and that novel, in point of characterization, and as a finely executed picture of a phase of American society, has strong claims to rank as her most notable achievement in fiction. Consult: H. D. Sedgwick, *The New American Type, and Other Essays* (Boston, 1908); Hildegard Hawthorne, *Women and Other Women* (New York, 1908); F. T. Cooper, *Some American Story Tellers* (ib., 1911); J. C. Underwood, *Literature and Insurgency* (ib., 1914).

WHARTON, Francis (1820–89). An American jurist, born in Philadelphia. After graduating at Yale College in 1839, he practiced law in Philadelphia until 1855. He was professor of English literature, jurisprudence, and history at Kenyon College (Gambier, Ohio) from 1856 to 1863, when he was ordained in the Protestant Episcopal Church and accepted a rectorate at Brookline, Mass. In 1866 he was called to the chairs of ecclesiastical and international law at the Episcopal Theological School in Cambridge and Boston University. From 1885 he was counsel to the United States Department of State and examiner of international claims, and in 1888 was made editor of the Revolutionary diplomatic correspondence of the United States. This work, in course of publication at the time of his death, superseded Sparks's *Diplomatic Correspondence of the American Revolution*. His best-known original work is *A Treatise on the Criminal Law of the United States* (1846), which was long standard. Among his other valuable legal writings are: *State Trials of the United States During the Administrations of Washington and Adams* (1849); *A Treatise on the Law of Homicide in the United States* (1855); *A Treatise on the Conflict of Laws, or Private International Law* (3d ed., 1905); and various commentaries. He also wrote *A Treatise on Theism and Modern Skeptical Theories* (1859) and *The Silence of Scripture* (1867). Under his editorship was published in 1886 *A Digest of the International Law of the United States*, a work of great value, "taken from Documents issued by Presidents and Secretaries of State, and from Decisions of Federal Courts and Opinions of Attorneys General."

WHARTON, Thomas, first Marquis of (1648–1715). An English statesman, son of Philip, Baron Wharton, the Puritan statesman, and born at Woburn, Bedfordshire. His interest in politics was not marked till 1679, when he urged the Exclusion Bill (q.v.). He was suspected of complicity with Monmouth and was certainly most active in arranging for the reception of William, Prince of Orange, in 1688. The preceding year he composed the satirical ballad "Lilli Burlero, Bullen-a-la," by means of which, as he used to boast, he had sung a king out of three kingdoms On the accession of William he was rewarded by numerous lucrative offices. In 1702, at the accession of Anne, he was removed from office, but by clever intriguing and the liberal use of money within the next few years he became one of the leaders of the Whig party. After June, 1706, he was a member of the Whig Junto, Halifax, Oxford, Somers, and Sunderland. In 1708 he was made Lord Lieutenant of Ireland, and held the post two years. For part of this time Joseph Addison was his secretary. Wharton was the shrewdest party manager of his day and a sincere if not disinterested Whig. Consult *Memoirs of the Kit-Kat Club* (London, 1821), and Leopold von Ranke, *History of England*, vols. iv, v, and vi (Eng. trans., Oxford, 1875).

WHARTON, Thomas (1735–1778). An American patriot, born in Chester Co., Pa. Upon the news of the passage of the Stamp Act in 1765 he joined in the nonimportation movement; became a member of the Committee of Correspondence in 1774; and was one of the 25 members of the Committee of Safety in 1775. On July 24, 1776, he was chosen president of the Council of Safety, and from 1777 until his death was President of Pennsylvania.

WHAT'COAT, Richard (1736–1806). A Methodist Episcopal bishop. He was born in Quinton, Gloucestershire, England, and entered the Wesleyan Conference in 1769. He was sent to America with Coke in 1784 to aid in forming the Methodist Episcopal church. In 1800, the health of Bishop Asbury being poor, Whatcoat was elected to assist him. Consult Phoebus, *Memoirs of Bishop Whatcoat* (New York, 1828).

WHATELY, hwāt'lī, Richard (1787–1863). An English prelate and scholar. He was born in London, and after some years at a private school, educated at Oriel College, Oxford, where he took his degree in 1808. He took the English essay prize in 1810, and a year later won the blue ribbon of Oxford scholarship of that period, being elected a fellow of Oriel, a member of the brilliant society adorned by Arnold, Pusey, Keble, and John Henry Newman. In 1819 he published his first book, *Historic Doubts About Napoleon Buonaparte*, in which he endeavored, with a success popular rather than scientific, to show that Hume's doubts in regard to miracles had equal force with reference to the existence of Napoleon. In 1822 he took the living of Halesworth, in Suffolk, and delivered the Bampton

lectures at Oxford, on "The Use and Abuse of Party Feeling in Religion." He was appointed principal of St. Alban Hall, Oxford, in 1825. About this time he wrote for the *Encyclopædia Metropolitana* articles on logic and rhetoric, which were also published in separate form, *Elements of Logic* (1826), and *Elements of Rhetoric* (1828). He became professor of political economy in 1829, but in 1831 left Oxford for good with his elevation to the Archbishopric of Dublin. In this post he was active in all matters of ecclesiastical and social importance, and showed a deep interest in every question affecting the welfare of Ireland. The success of the national system of education there was in large measure due to him. He belonged to the liberal school both in religion and in politics; but his ability and conscientiousness were admitted even by those who differed most widely from him on such burning questions as catholic emancipation or the doctrine of the atonement. In addition to the works named above, Whately published *Introductory Lectures on Political Economy* (1831); *Essays on Some of the Peculiarities of the Christian Religion* (1825); *Thoughts on Secondary Punishments* (1832). *The Search After Infallibility* (1847), and the *Kingdom of Christ Delineated* (1841). Consult: E. J. Whately (his daughter), *Life and Correspondence* (new ed., 2 vols., London, 1875); W. J. Fitzpatrick, *Unedited Memoirs of Richard Whately* (ib., 1864); Tuckwell, *Pre-Tractarian Oxford* (1909).

WHAT YOU WILL. A comedy by John Marston, written about 1601, printed in 1607.

WHAUP. See CURLEW.

WHEAT (AS. *hwæte*, Ger. *Weizen*, wheat, from AS. *hwīt*, Goth. *hwits*, OHG *wīz*, Ger. *weiss*, white). The best known and most valuable of all cereal crops. Under the name wheat are included nearly all the forms of the genus *Triticum* producing seeds, or grain used for human food. Its original home is unknown, but evidence seems to indicate that it is probably a native of western Asia. The cultivation of wheat antedates history, as the most ancient monuments show that at their erection it had been domesticated. The ancient Egyptians and Greeks attributed its origin to some of their deities, among them to Demeter (Latin, Ceres), goddess of agriculture. It was cultivated as early as the Stone Age by the lake dwellers of Switzerland, and in China, where it was considered a direct gift of heaven, it was grown 2700 years before the Christian Era. It is one of the five species annually sown by the Chinese in a public ceremony. Wheat was not grown in America prior to Columbus's discovery. The hypothesis that cultivated wheat was a modification of *Ægilops orata*, a grass of the Mediterranean regions and of western Asia, led to studies in Europe from about 1840 to 1860 which showed that while this wild grass underwent considerable change when cultivated for a series of years, and that the blossoms would be fecundated with wheat pollen, there was neither evidence nor indication that this grass could ever have been developed into wheat. Although none of the various species of wheat known to agriculture is found in a wild state, some botanists consider that the species of one-grained wheat (*Triticum monococcum*) has a wild representative which occurs in the Balkan region. It was an important crop in ancient Egypt and Palestine, and continues to be most important in our own days in all temperate parts of the globe. It is cultivated to a considerable extent in India, and vast areas in the United States and Canada are admirably adapted to it. Wide regions in South America are equally suitable, and wheat of fine quality is produced in Australia. In the torrid zone it does not succeed except in elevated situations, and although extensively grown in some cases in warm climates, as in California, Egypt, and India, the greater part of the world's supply is obtained in regions of cold winters.

Wheat is a hardy plant and is successfully cultivated from 39° to 60° north lat., and from the Tropic of Capricorn to 40° south lat. Its cultivation does not extend so far north as that of barley, oats, or rye. It requires a mean temperature of at least 55° F., for 3 or 4 months of the year. As it is an annual, its capacity of enduring the cold of winter is of importance only in connection with growing winter wheat, which is sown in the fall. The quality of the grain varies in different soils and climates, and particular varieties are distinguished by differences in quality as well as by external characters. Wheat grown in comparatively dry climates is superior in quality to that grown in humid regions. Dry weather with bright sunshine from the time the plants begin to head until they are ripe is everywhere of the greatest importance. The different varieties are classified by farmers as spring and winter wheats, bearded and beardless or bald varieties, soft and hard wheats, and also according to the color of the grain, as red, white, amber, etc. In consequence of long cultivation in various climates and on different soils, the varieties of wheat are very numerous and new varieties are continually coming into notice.

Botanists have classified the cultivated varieties of the genus *Triticum* into eight species and subspecies. The most important, *Triticum vulgare*, comprises the common bread wheats, by far the most valuable and widely distributed, containing more varieties than all other species put together. This species includes soft and hard winter wheats, hard spring wheats, white wheats, and early wheats. The soft winter wheats are grown in the eastern United States, western and northern Europe, Australia, Argentina, and in portions of Asia. The hard winter wheats are produced in the Rocky Mountain and the Mississippi River regions of the United States, in southeastern Europe, and western Asia. These are usually grown on good black soils in regions of hot and dry summers. The hard spring wheats are distributed over the northern portion of the great plains in the United States, in western Canada, eastern Russia, and western and southern Siberia. The white wheats are cultivated along the Pacific coast in both North and South America, in Australia, and western Asia. The early wheats occur in the southern United States, Australia, India, and Japan. Only a few varieties are grown in the United States. The club or square-head wheats are by some botanists named *Triticum compactum*, but are generally considered only a subspecies. The heads of this group are generally short and frequently square. Club wheats are grown chiefly along the Pacific coast, and in Turkestan, Abyssinia, and in scattered districts of Europe. *Triticum turgidum*, or poulard wheat, is a subspecies of *Triticum vulgare*, distributed in the Mediterranean and the Black Sea regions. Some varieties of this group

are used in making macaroni, and are sometimes mixed with the bread wheats in the manufacture of flour. *Triticum durum* is similar to *Triticum turgidum*, and, like it, a subspecies of *Triticum vulgare*. They are the hardest-grained of all the wheats grown, and are popularly known as the durum or hard wheats They are specially valuable for the manufacture of macaroni. They are cultivated in the Mediterranean and Black Sea regions, the northern Great Plains region of the United States and to some extent in Mexico, Chile, and Argentina. Durum wheats were effectively introduced into the United States by the Department of Agriculture in 1898 and have since then become an important crop in parts of the semiarid region. *Triticum polonicum*, or Polish wheat, is a distinct species, similar in quality to *Triticum durum*, but less frequently cultivated *Triticum spelta*, or spelt, although very different from the preceding groups, is considered a subspecies Its striking characteristic is that the chaff adheres to the grain and is not removed in threshing. Spelt is grown in central and southern Europe, and to a small extent in America. Emmer (*Triticum dicoccum*) resembles the preceding group and is often erroneously called spelt, from which it differs mainly in the compact heads and harder grain of a deeper red color. Its distribution is about the same as that of spelt. *Triticum monococcum*, or Einkorn, is a very distinct species. The spikelets of this species usually have but one grain. It is grown to a limited extent in central and southern Europe.

Wheat requires a fertile and well-prepared soil. The fact that it makes a poor growth on light, humid, and acid soils shows the necessity of fertility and proper drainage. The most favorable soils are permeable and deep, a little clayey and of medium fertility. Gravelly and sandy soils are not suited to it. The crop grows well on alluvial soils, and on most soils which may be classed as heavy but which do not possess great tenacity. Since young wheat plants are injured by the heaving of the soil due to the action of frost, perfect drainage is essential. Rolling the land before sowing winter wheat leaves the soil in a drier condition and thus minimizes the action of frost. Although the character of the soil mainly affects the yield, and the character of the climate the quality, friable, fertile, calcareous soils produce a softer, plumper, and starchier grain than a less fertile, light, clayey soil. This latter class of soils has a tendency to produce elongated, hard, glutinous grains, or a wheat having the qualities of a good bread wheat. The preparation of the land for winter wheat consists in plowing the soil about four or five inches deep as early in the season as possible, to allow it to become somewhat compact before seed is sown. This is sown broadcast or in drills. When broadcast, usually with machines for the purpose, it is harrowed in. Drilling, however, is the most popular method and has the advantage of evenly distributing the seed and covering it at a uniform depth. The drill leaves the soil in small ridges, which tend to hold the snow and protect the soil to a certain extent against the alternate thawing and freezing so injurious to the crop. Spring wheat is usually grown on fall-plowed land, and in the United States also frequently follows a corn crop without plowing the soil. It is generally sown as soon as the soil is capable of being worked in the spring. Since wheat grows best and makes most of its growth during the cool part of the year, it should be sown as early as conditions will permit A moist soil at sowing time, provided it is not so moist that it cannot be properly worked, is the desirable condition Where wheat follows a corn crop (maize) without an intervening plowing of the soil, it is sown broadcast among the corn stalks and the field then cultivated with a disk harrow or a corn cultivator and the surface smoothed down by repeated harrowings. The corn stalks are either cut into short pieces with a stalk cutter or are simply broken down by means of the harrow or other implement to facilitate seeding and harvesting

Wheat is generally harvested before it has become dead ripe in order to prevent the grain from shattering. In California, however, where this precaution is not so necessary, wheat is often left standing for a week or more after it is ripe enough for cutting. The time of harvesting, like the time of sowing, varies with the latitude. In the United States the harvest begins in Texas early in May and ends in some of the northern States in August Harvesting is usually done with the self-binder, although where labor is cheap the reaper is still largely used. After the grain has been bound into sheaves it is set up into shocks for protection against rain and to dry and cure When the work of cutting and shocking is done the crop is either threshed directly from the field or the sheaves are hauled and stacked, remaining so until threshing time. The principal point to be observed in building a stack is that the sheaves, especially the outer tier, must have an outward slant in order to shed the rain. In some countries, as those of Europe, the stacks are built with great care and the grain is frequently not threshed until the following spring. In the United States threshing is usually completed in the fall. In sections of the United States where wheat is grown on an extensive scale the grain is often harvested with headers, or machines which cut the grain just below the head. Some of these machines cut the heads and thresh out the grain at the same time. At the present day wheat is threshed with improved and perfected machines operated by horse or other power. The old method of flail threshing is now even less common than hand sowing. In Europe, where the straw represents a greater value than in the United States, machines are used which thresh the heads, but allow the straw to pass through straight and be rebound into sheaves for more convenient storage.

In the United States the place of wheat in the rotation is generally after corn, since corn leaves the soil in clean condition. Where wheat is sown without previously plowing, it necessarily follows corn. The method of sowing wheat among the corn stalks and working it in with cultivator and harrow is practicable only on comparatively new soils or lands in a very good condition. It is largely practiced in regions newly opened up to cultivation. In Europe wheat is preferably grown after clover. In the eastern United States the use of commercial fertilizers in wheat growing is quite common, but in the western part of the country fertilizers are generally not applied. Barnyard manure is rarely applied directly to wheat, but usually to a preceding corn crop.

The wheat crop of the world amounts to about 4,000,000,000 bushels, of which Europe supplies

nearly one-half. The total crop of the United States in 1915 was 1,011,505,000 bushels produced on 59,898,000 acres, the average yield per acre being 16.9 bushels. This was the largest crop produced up to that time. The chief wheat-growing States and their production in 1915 were: North Dakota, 151,970,000 bushels; Kansas, 106,538,000 bushels; Minnesota, 73,420,000 bushels; Nebraska, 72,154,000 bushels, and South Dakota, 63,762,000 bushels. Illinois and Washington produced over 50,000,000 bushels, and Indiana and Ohio over 40,000,000. The progress of wheat cultivation in the western States was extremely rapid during the latter part of the nineteenth century, owing to the influx of settlers into new regions. In 1821 the total exports of wheat from the United States were valued at $178,314, and of wheat flour at $4,298,043; in 1900 at $73,237,080 and $67,760,886, respectively, and in 1914, $87,953,456 and $54,451,175. In the calendar year 1915 exports of wheat amounted to $282,457,092 and of flour $96,201,234. Great Britain, Germany, France, Austria-Hungary, the United States, and Russia rank in yield per acre in the order mentioned. In total yield the United States leads all other countries.

The most common diseases to which wheat is subject are rust (*Puccinia graminis*), stinking smut, or bunt (*Tilletia fœtens*), and black or loose smut (*Ustilago tritici*) (see RUST; SMUT; FUNGICIDE, and Plate of FUNGI, TYPES OF), and the most common insect enemies are the chinch bug and the Hessian fly (qq.v.).

Food Value. The wheat grain consists mainly of a large starchy mass surrounding an embryo and surrounded by six layers of tissue, known to the miller as bran, which forms about 13 per cent of the seed by weight. The innermost layer of the bran, averaging about 8 per cent of the entire seed, contains cerealin or aleurone, a nitrogenous substance. The bulk of the seed within this layer consists of starch, nitrogenous substances (especially gluten) and fat. Wheat flour of various sorts is used almost universally for making bread and various kinds of pastry. From wheat rich in gluten, macaroni and other Italian pastes are made. These are common articles of diet in most countries, and staple articles in some, notably Italy. In recent years the consumption of breakfast foods made from wheat has increased very greatly. In some of these the grain is more or less finely ground; in others it is rolled or flaked. Some of these foods are cooked in the process of manufacture. Cereal breakfast foods are also made from the parched grain. The average composition of wheat and some of its products is shown in the following table:

TABLE I. COMPOSITION OF WHEAT, FLOUR, BREAD, AND OTHER PRODUCTS

	Water	Protein	Fat	CARBOHYDRATES		Ash
				Starch, etc	Crude fibre	
Average values	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
Wheat as it enters the mill	9 66	14 18	2.61	69 94	1 70	1 91
First break	8 23	14 18	2 68	71.56	1.62	1 73
Sixth break	7.66	16.28	5 34	59.42	5.60	5 68
Bran	10.91	16 28	5 03	56.21	5 98	5 59
Tailings from reduction No 5	12 12	16 63	3 85	63 93	1.18	2.29
Second germ	8.75	33.25	15 61	35.19	1 75	5 45
Entire-wheat flour	11.4	13 8	1.9	71 0	0.9	1.0
Graham flour	11 3	13.3	2 2	70.5	0 6	1 8
Patent roller process flour:						
Baker's grade	11 9	13 3	1 5	72 0	0 7	0 6
Family and straight grade	12 8	10.8	1 1	74 6	0 2	0.5
High grade	12 4	11 2	1 0	74.7	0 2	0 5
Low grade	12 0	14.0	1 9	70.4	0 8	0 9
Milling products from hard Scotch Fife spring wheat						
First patent flour	10 55	11 08	1 15	76 85		0 37
Second patent flour	10 49	11 14	1 20	76.75		0 42
Straight or standard patent flour	10 54	11 99	1 61	75 36		1 50
First clear grade flour	10 13	13 74	2 20	73.13		0.80
Second clear grade flour	10 08	15.03	3 77	69.37		1.75
"Red dog" flour	9 17	18 98	7 00	61.37		3.48
Shorts	8.73	14 87	6 37	65.47		4 56
Bran	9 99	14 02	4.39	65.54		6.06
Entire-wheat flour	10.81	12 26	2 24	73.67		1.02
Graham flour	8 61	12.65	2 44	74.58		1 72
White bread	35.3	9 2	1 3	53 1		1 1
Graham bread	35.7	8.9	1 8	52.1		1.5
Whole-wheat bread	38 4	9 7	0 9	49 7		1 3
Crackers (or biscuits)	6.8	10 7	8.8	71.9		1.8
Parched wheat breakfast food	8.6	13.6	2 4	74 5		0.9
Crushed and cracked wheat breakfast food	10.1	11.1	1 7	75.5		1 6
Flaked wheat breakfast food	8.7	13 4	1 4	74.3		2 2
Macaroni	10.3	13 4	0.9	74.1		1 3

As shown by analyses, the different sorts of flour do not vary very greatly when ground from the same lot of wheat, although the amount of mineral matter and protein is somewhat larger in the whole wheat and Graham flour than in the higher grade flour. Digestion experiments with healthy men have shown that the fine-flour bread is more digestible than the breads made from the coarser grain. The average coefficients of three sorts of bread made from flours ground from the same lot of wheat, obtained experimentally by Snyder, are stated in Table II.

It has been calculated that wheat flour bread and crackers, pastry, and similar products constitute 19 per cent of the total food of the average American family, furnishing about 27 per cent of the total protein, 6 per cent of the total fat, and 46 per cent of the total carbohydrates. They contain a high percentage of

starch and may be profitably combined with materials rich in protein, meat, eggs, etc., to form a well-balanced diet. Many foods contain minute amounts of physiologically active substances, to some of which the name vitamines has been given. Vitamines are found in the outer layers of cereal grains, and so it comes about that, to prevent illness, the grain products containing the outer layer should be used, unless the diet is abundant and varied, in which case any lack of vitamines in the grain food will be made up from vegetables, eggs, and other foods.

Wheat is ordinarily so valuable for human food that it is not used for feeding farm animals. But when the crop is very abundant and the market value correspondingly low, it may be profitably fed. Several milling products of wheat, such as bran, shorts, and middlings, are important feeding stuffs, as are also various by-products obtained in the manufacture of wheat breakfast foods. Wheat straw is a well-known feeding stuff, and is also used for bedding. The unthreshed wheat is sometimes fed under the name of sheaf wheat. The green wheat is occasionally cut and cured as hay. Shrunken or damaged wheat is very often more valuable as a feeding stuff than for marketing, while wheat screenings (inferior grains and weed seeds) are also fed. The average composition of winter and spring wheat and several wheat products is shown in the following table:

TABLE II COEFFICIENTS OF DIGESTIBILITY OF BREAD OF DIFFERENT SORTS

	Protein	Fat	Carbohydrates	Energy
	Per cent	*Per cent*	*Per cent*	*Per cent*
White bread (standard patent)	85 3	56 4	97.5	90.1
Entire-wheat bread	80 4	55 8	94.1	85 5
Graham bread	77.6	58 0	88.4	80 7

TABLE III. COMPOSITION OF WHEAT AND WHEAT PRODUCTS

	Water	Protein	Fat	Nitrogen-free extract	Crude fibre	Ash
	Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
Wheat, spring	10 4	12.5	2 2	71.2	1.8	1 9
Wheat, winter	10.5	11.8	2.1	72.0	1.8	1 8
Wheat, bean spring wheat	11.5	16 1	4.5	54.5	8.0	5 4
Wheat, bean winter wheat	12.3	16 0	4.0	53 7	8.1	5 9
Wheat middlings	12.1	15 6	4.0	60.4	4.6	3.3
Wheat shorts	11.8	14 9	4.5	56.8	7.4	4 6
Wheat screenings	11.6	12.5	3.0	65.1	4.9	2.9
Wheat straw	9.6	3.4	1.3	43.4	38.1	4.2

A great advance has been made in the chemistry of wheat, particularly its protein, to which Osborne and his associates have made especially noteworthy contributions.

As regards composition, wheat grain is very nutritious. It contains somewhat more starch, less fat, and more protein than corn, and thus is a better balanced feeding stuff. Winter and spring wheat do not differ materially in composition. Low-grade flour of dark color and not very satisfactory for baking has a high feeding value, especially for growing pigs, hard-worked horses, and milch cows. Stale bread is sometimes fed to farm animals. The terms "middlings" and "shorts" are often used interchangeably. Occasionally shorts consist of reground bran, almost free from floury particles, with the sweepings and dirt of the mill added. Such material is very inferior for stock and should not be used. Good middlings do not have a very high content of crude fibre and are especially useful for feeding pigs and horses. For the latter, middlings should be mixed with corn meal, oats, or other feeding stuffs, as this material is rather concentrated. Digestion experiments with middlings have shown that about 75 per cent dry matter, 80 per cent protein, 33 per cent crude fibre, and 81 per cent nitrogen-free extract are digestible. Bran contains a high percentage of crude fibre, and in this respect somewhat resembles straw. Although it contains considerable nutritive material, it is given by many horsemen only as an occasional food. It is especially useful for feeding dairy cows, as it gives the desired bulk to the ration and supplies a considerable amount of protein and ash, which are needed for the production of milk. Digestion experiments have shown that on an average about 62 per cent of the total dry matter, 78 per cent protein, 29 per cent crude fibre, and 69 per cent nitrogen-free extract, of wheat bran are digestible. See Plate of CEREALS.

Bibliography. T. F Hunt, *The Cereals in America* (New York, 1904); P. T. Dondlinger, *The Book of Wheat* (ib., 1908); R. E. Smith, *Wheat Fields and Markets of the World* (St. Louis, 1908); W. P. Rutter, *Wheat Growing in Canada, the United States, and the Argentine, including Comparisons with other Areas* (London, 1911); A. M. Ten Eyck, *Wheat: A Practical Discussion of the Raising, Marketing, Handling, and Use of the Wheat Crop, relating largely to the Great Plains Region of the United States and Canada* (Lincoln, Neb., 1914); United States Department of Agriculture, *Farmers' Bulletins*, Nos. 534, 596, 616, 678, and 680 (Washington, 1913–15); also references under BREAD. See FLOUR; MACARONI; PLOW, PLOWING; REAPERS, REAPING; ETC.

WHEATEAR' (variant of *white ear*, corrupt supposed singular of *whitearse*, in allusion to its white rump; influenced by popular etymology with *wheat* + *ear*). A small European migratory song bird (*Saxicola* or *Œnanthe œnanthe*) of the thrush family, which now and then occurs on the north coasts of Asia and America. Its colors are gray, black, and white, with the under parts buffy. Its form is slender and its wings and legs are long. It is terrestrial in habits, and feeds on worms and insects. The

wheatear makes its nest in an old wall, or in a crevice of a quarry or gravel pit, often in a deserted rabbit burrow, and generally lays six pale-blue eggs. The male has a pleasant but not loud song, and sings well in confinement, in winter as well as in summer

WHEAT GRASS. See AGROPYRON

WHEAT INSECTS. In Europe 53 species of insects are recorded by Kaltenbach as feeding upon wheat, in North America the number is much larger. Except the chinch bug and the Hessian fly (qq.v.), which are the most dreaded, the following are the most important species

The wheat midge (*Diplosis tritici*) was probably imported into the United States from Europe, first into the Province of Quebec, spreading gradually through the New England States into New York and westward throughout the Mississippi valley. The orange or yellow adult insect, which appears in early summer and is one-tenth of an inch long, lays small and pale-red eggs singly or in clusters in the crevices in the wheat heads, from the kernels of which the small orange-yellow larvæ extract the milky juice, causing the grain to shrivel and the heads to blight. When full grown the larvæ, which live about three weeks, descend to the ground and form small cocoons, in which they hibernate. Deep plowing of wheat fields and the prompt burning of chaff and screenings after threshing are the best remedies.

The joint worm of wheat (*Isosoma tritici*), a true gall insect of the family Chalcididæ, most species of which are parasites, is a small, black, four-winged fly, a little over an eighth of an inch long. Its eggs are laid in the wheat stalk, where the larvæ produce little oblong galls, usually in groups of three or four at or near the joints. (See JOINT WORM.) The wheat straw worm (*Isosoma grande*), a close relative which produces no galls, but lives on the inner surface of the stems, is of great interest, since it has an alternation of the generations, the sexual generation being wingless and rather small and the summer generation large, winged, and composed entirely of parthenogenetic females Burning the stubble during the fall or winter is recommended as a control for both these species. Several species of plant lice are occasionally found upon wheat; the wheat plant louse (*Nectarophora cerealis*), probably a European species, is frequently troublesome.

The wheat bulb worm (*Meromyza americana*) is, in the adult stage, a small, greenish, black-striped fly of the family Oscinidæ, which also attacks other cereals, timothy, and the blue grass throughout the wheat belt, where it develops three or more generations annually. The flies lay their eggs upon the young plants, and the pale-green maggots work their way down to the crown and feed upon the central part of the stem, cutting it off and causing the central blade to wither. Prompt burning of the straw and stubble after harvest and rotation of crops are recommended. The army worm and the grass worm (qq.v.) are dangerous enemies of the wheat crop, and there are several sawflies which do a lesser amount of damage. The principal European insect enemies of the crop are the frit fly (*Oscinis frit*), the Hessian fly, the wheat midge, and a stem borer—one of the sawflies (*Cephus pygmæus*) just mentioned, which appears as an adult in April and deposits eggs in the stems of young wheat. The larvæ bore through the joints and work up and down the stem, and when full grown cut and almost saw the straw circularly on the inside near the ground, forming a cocoon in which they pass the winter as larvæ, transforming to pupæ and issuing as adults the following summer. This insect has been imported, and is known in Canada and New York, but is rather scarce and does little damage; in Europe it is ranked as one of the principal enemies.

Stored wheat suffers from the attacks of several insects. The granary weevil, the rice weevil, the Angoumois grain moth, the wolf moth, the Mediterranean flour moth, the Indian meal moth, the meal snout moth, and several species of flour beetles and meal worms, as well as certain of the grain beetles (see GRAIN INSECTS), feed upon wheat in storage and after it is ground The remedies for all of these insects are practically identical, and comprise cleanliness and the treatment of bins or establishments with the vapor of bisulphide of carbon, or with hydrocyanic acid gas, both of which, however, should be applied with great care, and in accordance with specific rules laid down by economic entomologists.

Consult F. H. Chittenden, *Some Insects Injurious to Stored Grain* (Washington, 1897), and C. L. Marlatt, *The Principal Insect Enemies of Growing Wheat* (ib., 1901)

WHEATLEY, HENRY BENJAMIN (1838–1917). An English scholar and bibliographer, born at Chelsea, London. For the Early English Text Society (q.v.), of which he became honorary secretary, he edited Alexander Hume's *Of the Orthographie and Congruitie of the Britain Tongue* (1865), the prose romance of *Merlin* (1865–69), the *Manipulus Vocabulorum* of Peter Levins (1868); and he edited Wraxall's *Historical and Posthumous Memoirs* (5 vols., 1884); *Pepys's Diary*, including *Pepysiana* (9 vols., 1893–99), his most important work, and *Diary and Correspondence of John Evelyn*, with a life (4 vols., 1906) He also published *Samuel Pepys and the World he Lived in* (1880); *Story of London* (1904); *Hogarth's London* (1909).

WHEATLEY, PHILLIS (c.1753–84). An American negro poet, born in Africa. She was brought to the United States in 1761 and purchased by John Wheatley, of Boston. He had her well educated, and she soon showed remarkable intellectual quickness. When still a girl, she wrote many verses, and in 1773, a year before she visited England, her *Poems on Various Subjects, Religious and Moral, by Phillis Wheatley, Negro Servant to Mr. John Wheatley, of Boston, in New England*, were published in London with the indorsement of several distinguished men. She was made much of by the Countess of Huntingdon's set, and in America drew forth a complimentary letter from Washington. Of real poetic ability she was destitute. In 1775 the family to which she belonged was broken up, and three years later she made an unfortunate marriage with a colored man named John Peters. There were at least four posthumous editions of her poems, and her letters were printed in 1864 at Boston in *Proceedings of Massachusetts Historical Society.*

WHEAT'ON. A city and the county seat of Du Page Co., Ill., 25 miles west of Chicago, on the Chicago and Northwestern Railroad (Map: Illinois, H 2). Wheaton College is situated here. The city has a public library. It is a shipping point for grain and general farm produce. Pop., 1900, 2345; 1910, 3423.

WHEATON, FRANK (1833–1903) An American soldier, born in Providence, R I. He received a public-school education, and was a civil engineer in California until 1855, when he was commissioned lieutenant in the First United States Cavalry In March, 1861, he was promoted to the rank of captain. Four months later he was appointed lieutenant colonel of the Second Rhode Island Volunteers, and before the end of the year he was commissioned colonel. He participated in the first battle of Bull Run and in the Peninsular and Maryland campaigns. In November, 1862, he was promoted to be brigadier general of volunteers, and was brevetted major general in both the volunteer and the regular service. In 1864 he commanded a division in the Shenandoah valley and at the battle of Cedar Creek he was one of the first to rally his forces During the last year of the war he served under Grant, and took part in the campaign which ended at Appomattox. In 1866 he was commissioned lieutenant colonel of the Thirty-ninth Infantry and rose to the rank of major general in the regular army before his retirement in 1895.

WHEATON, HENRY (1785–1848) An American lawyer, diplomat, and publicist, born in Providence, R. I. He graduated at Brown University in 1802, was admitted to the bar in 1805, and studied for several years in Paris and London. He then practiced for some time in Providence, and in 1812 settled in New York City, where for three years he edited the *National Advocate.* In 1814 he became a judge advocate of the army, and in 1815–19 was a justice of the Marine Court of New York City. From 1816 to 1827 he was reporter of the United States Supreme Court, and the *Reports* published by him in 12 volumes are of exceptional value. In 1821 he was a member of the New York Constitutional Convention, in 1823 of the State Assembly, and in 1825 of the Commission appointed to revise the statute law of New York. In 1827 he was sent as chargé d'affaires to Denmark. In 1835 he was appointed Minister Resident to the court of Prussia and from 1837 to 1846 was Minister Plenipotentiary there. A treaty negotiated by him in 1844 formed the basis upon which future German treaties were drawn up. His best work is his *Elements of International Law* (1836). It has been republished in many editions in America, of which that of Lawrence (1855), with a biographical memoir, and that of Dana (1866) are the most valuable. It has also been republished in London, and translated into French, Chinese, and Japanese. Among his other publications are: *A Digest of the Decisions of the Supreme Court of the United States from its Establishment in 1789 to 1820* (1820–29); *Life of William Pinkney* (1826), abridged for Sparks's "American Biographies"; *History of the Northmen* (1831; French trans., 1844); *Histoire du progrès des gens en Europe depuis la paix de Westphalie jusqu'au congrès de Vienne, avec un précis historique du droit des gens européens avant la paix de Westphalie* (1841; Eng. trans., 1846); and *An Enquiry into the Validity of the British Claim to a Right of Visitation and Search of American Vessels suspected to be engaged in the Slave Trade* (1842).

WHEATON, LOYD (1838–). An American soldier, born at Penfield, Mich. He entered the Federal army as a first sergeant in the Eighth Illinois Infantry on the outbreak of the Civil War, participated in the siege of Vicksburg, in the battle of Shiloh, and in many other engagements, and became successively captain (1862), major (1863), and lieutenant colonel (1864), in the volunteer service In 1866 he entered the regular army as a captain, and in October, 1871, was instrumental in suppressing a Fenian raid from United States territory upon the Province of Manitoba. He was then engaged for some years in frontier duty; took part, in July and August, 1874, in Custer's expedition to the Black Hills, and became major in 1891 and lieutenant colonel in 1895. In 1898, during the Spanish-American War, he was made a brigadier general of volunteers, and for a short time commanded the First Division of the Seventh Army Corps in Cuba Sent to the Philippines early in 1899, he there served with great ability against the insurrectionary forces, commanded temporarily the pacified provinces in southern Luzon, and in 1900 became commander of northern Luzon. He was made major general of volunteers in the latter year and in 1901 brigadier general (February) and major general (March) in the regular army In 1902 he was retired.

WHEATON COLLEGE. An institution for the higher education of women, located at Norton, Mass., and founded in 1834 as Norton Female Seminary. The name was changed to Wheaton Female Seminary in 1839, and it was so known until 1912 when it assumed the name and responsibilities of the college. A pioneer school in the education of women, its organization was superintended by Mary Lyon, who directed its work for the first two years. In 1897 the school was reorganized and the departments of study enlarged and strengthened. The courses are adapted to both cultural and vocational ends, and there is a two years' course for graduates of high schools who do not care to enter for a degree and take the full college course of four years. The campus, containing 18 buildings, embraces more than 100 acres. The student enrollment in 1915–16 was about 220, and the faculty numbered 30. The productive funds amount to about $1,000,000, and the annual income to about $120,000. The library contains about 10,000 volumes. The president in 1916 was Samuel V. Cole, D.D , LL.D.

WHEATSTONE, hwēt'stōn *or* -stūn, SIR CHARLES (1802–75). An English physicist and inventor. He was born at Gloucester, and when 21 entered into business in London as a maker of musical instruments. The scientific principles involved in their construction occupied his attention, and in 1833 he communicated his first paper, *On Acoustic Figures,* to the Royal Society—a discussion of the figures produced in Chladni's well-known experiment. This was followed in 1834 by *Experiments to Measure the Velocity of Electricity,* in which, with a mirror revolving 800 times in a second, he demonstrated its velocity. (See CHRONOSCOPE.) In 1834 he was appointed professor of experimental physics in King's College, London. In the course of experiments at the college on the velocity of electricity he devised an electric telegraph for transmitting messages. In May, 1837, a patent was taken out in the joint names of Cooke and Wheatstone "for improvements in giving signals and sounding alarms in distant places by means of electric currents transmitted through metallic circuits." From this instrument, which had five needles, grew the system of electric telegraphs which was extensively used in Great Britain.

After the five-needle telegraph came apparatus

where only two needles were employed, then the letter-A type dial telegraph, the type-printing telegraph, the magneto-electric dial telegraph, and the automatic telegraph system, in which great speed of transmission was obtained. In a paper on binocular vision before the Royal Society (1838) he explained the principle of the stereoscope (q.v.), an instrument of his invention subsequently improved by Brewster. The polar clock, another of his inventions, was an interesting application of Brewster's discovery that the plane of polarization of the light of the sky always made an angle of 90° with the sun. In 1840 he showed that by means of electro-magnetic regulating devices a number of clocks far apart could be kept going synchronously from a central clock. Wheatstone's bridge (q.v.), though not the invention of this famous electrician, but of Hunter Christy, was first brought into general use through his efforts in 1843, and has proved a fundamental method in the measurement of electrical resistance. Wheatstone was one of the first to recognize the importance of Ohm's law and to apply it in electrical measurements. He also had a share in the development of the dynamo, devising a method for making the magneto-machines then in use self-exciting by employing a shunt circuit passing around the field magnets. Wheatstone was more successful as an experimenter, skillful mechanician, and inventor than as a professor, and, though he held his chair many years, he rarely lectured in public, owing to his diffidence. Many of his important discoveries were communicated to the Royal Society by Faraday. This did not prevent his contributing many interesting papers to scientific journals and the *Proceedings* of various learned societies, which were collected and published in 1879 by the Physical Society of London under the title of *Scientific Papers of Sir Charles Wheatstone*.

WHEATSTONE'S BRIDGE. An important and much-used method for the measurement of electrical resistance. Employing a battery, a galvanometer, and auxiliary resistances, it is possible to determine the resistance of a conductor with a high degree of accuracy. The principle of the method will be readily understood by reference to the accompanying diagram, which shows the simplest form of Wheatstone's bridge, viz., the slide wire bridge. The terminals of a battery are connected with the ends of a straight wire of German silver, stretched along a scale.

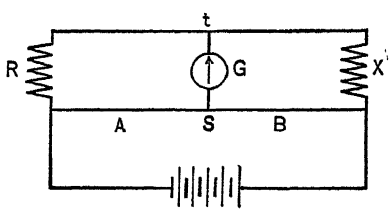


Fig. 1.

The current divides, a part of it traversing the bridge wire, and a part flowing through *R* and *X*, the former being a resistance whose value is known and the latter the unknown resistance. The two branch circuits unite and return to the battery. At *t*, the junction of *R* and *X*, one terminal of the galvanometer, *G*, is attached, while the other is connected with a slider, *S*, which can be moved along the wire so as to make contact at any desired point. According to Ohm's law there will be a fall of potential along the wire depending upon the resistance, and, since it is a uniform conductor, this will be proportional to the length. The same fall of potential as along the wire must also take place through *R* and *X*, consequently some point will be found which is at the same potential as *t*. Where there is a difference of potential, there must result a flow of electricity which will deflect the needle of the galvanometer. We can determine when the two points are at the same potential by moving the sliding contact until there is no deflection of the needle on closing the circuit. The potential at *S* is proportional to the distances of these parts from the ends of the wire, *A* and *B*, therefore the resistance *R* must be to the resistance *X* as *A* is to *B*. In practice *R* is selected so that the measurement will be made when the point of contact is at the centre of the wire rather than at the ends, for, as can be readily seen, the degree of accuracy is far greater when *A* and *B* are of nearly the same value than when

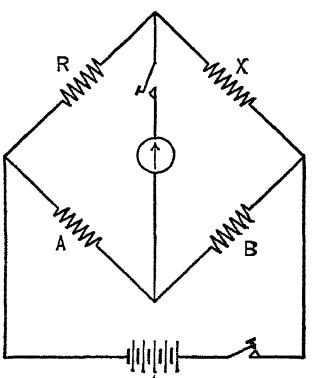


Fig. 2.

one is large with respect to the other. The slide wire bridge is useful for many purposes and answers well in explaining the principle, but the apparatus is generally constructed with a series of resistance coils. In the usual arrangement as indicated in the diagram, Fig. 2, there is a series of fixed ratios formed by coils of wire taking the place of the stretched wire used above and other coils so arranged as to give *R* any value between 1 and 10,000 ohms. The ratio coils generally have their resistances 10, 100, and 1000 ohms, which permits a range of measurements from $\frac{1}{1,000,000}$ to 1,000,000 ohms. See RESISTANCE, ELECTRICAL. Consult H. R Kempe, *Electrical Testing* (7th ed., London and New York, 1908); S P. Thompson, *Elementary Lessons in Magnetism and Electricity* (7th ed., ib, 1915); E. F. Northrup, *Methods of Measuring Electrical Resistance* (ib., 1912).

WHE'DON, DANIEL DENISON (1808–85). An American professor and Methodist Episcopal editor. He was born at Onondaga, N. Y., and graduated from Hamilton College in 1828, and was ordained to the ministry. After teaching at Cazenovia Seminary and at Hamilton, he served as professor of languages at Wesleyan University (1833–43) and as professor of rhetoric at the University of Michigan (1845–54). From 1856 to 1884 he edited the *Methodist Review*, New York. He wrote a *Commentary on the New Testament* (5 vols., 1860–80); *The Freedom of the*

Will as the Basis of Human Responsibility (1864), *Essays, Reviews, and Discourses* (2 vols, 1887).

WHEEL (AS *hwēol, hwiol, hweohl*, Icel *hjōl*, E. Frisian *wēl*, wheel) Part of the apparatus for steering a large ship. It consists of a horizontal barrel on which the tiller ropes are wound in opposite directions—one on the forward end and one on the after—and one or more wheels with 8 to 12 radial spokes which project beyond the rim of the wheel 6 or 8 inches to form handles The difference in diameter of the wheel and barrel is a measure of the gain in power that the wheel affords. In vessels steered by steam or other power the wheel is used, but it is smaller than in hand-steered ships, and either connects to the steering engine by means of shafts and gearing, operates small wire ropes which lead to the engine valve, or effects electric connections to the motors.

WHEEL, BREAKING ON THE. A mode of inflicting the punishment of death among the Greeks and Romans. It was used in western Europe until the end of the eighteenth century for assassins, incendiaries, highwaymen, and pillagers of churches It was first instituted in France by an edict of 1534 There was some variety in the mode: the accused was sometimes extended on beams formed like an X and his bones broken by blows with an iron bar. Then the body was placed on a wheel, bent round, with its arms and legs behind the back and its head turned up to the sky. The culprit was then left to die, his sufferings perhaps continued for 24 hours. By way of terminating the suffering the executioner was sometimes permitted to deal two or three severe blows on the chest or stomach, known as *coups de grâce;* and occasionally, in France at least, the sentence provided that the criminal was to be strangled after the first or second blow. The punishment was abolished in France in 1789, and in Prussia in 1811.

WHEEL AND AXLE. A machine which is a modification of the lever (q.v.). Its most primitive form is a cylindrical axle, on which a wheel concentric with the axle is firmly fastened. When employed for raising heavy weights, the weight is attached to a rope which is wound round the axle, and the force raising the weight is applied to a rope wound round the grooved rim of the wheel. The wheel and axle is neither more nor less than a lever whose extremities are not points as in the normal form, but the circumferences of circles. Accordingly the raising force and weight are not attached to particular points in these circumferences, but to cords wound round them, and thus the imaginary simple lever (formed by joining the points where the cords become tangents to the circles) is preserved unaltered in position and magnitude. The conditions of equilibrium are, that F (the force required to raise the weight) × R (the radius of the wheel) = W (the weight) × the radius of the axle, or, since the circumferences of circles are proportional to their radii, that F : W : : circumference of axle : circumference of wheel. When there is no wheel, but only a winch, the circumference described by the power in one revolution is substituted for the circumference of the wheel. The capstan and windlass are simple and common examples of this mechanical power, and combinations of toothed wheels, or of wheels from one to another of which motion is communicated by an endless band, are compound illustrations of the same.

WHEEL ANIMALCULE. See ROTIFERA.

WHEEL BUG. See PIRATE BUG.

WHEELER, ANDREW CARPENTER (1835–1903). An American author, born in New York City. As a young man he went to Milwaukee, Wis, and remained there till the outbreak of the Civil War, when he went to the front as correspondent. In 1865 he returned to New York and was connected with the *Leader* and the *World.* While dramatic critic of the latter paper he began the publication of essays and sketches under the pseudonym of Nym Crinkle These were widely read, and many of them were collected in book form. Afterward he wrote under the name of J. P (or Jay Paul) Mowbray (sometimes J. P. M.). As Nym Crinkle he produced between 1870 and 1885: *The Chronicles of Milwaukee; The Primrose Path of Dalliance; The Iron Trail; Easter in a Hospital Bed;* and a play, *The Twins.* As J. P. Mowbray he published *A Journey to Nature* (1901), *The Making of a Country Home* (1902), *Tangled Up in Beulah* (1902); and *The Conquering of Kate* (1903)

WHEELER, ARTHUR OLIVER (1860–). A Canadian alpinist and topographer, born near Kilkenny, Ireland, and educated at Balinasloe and Dulwich colleges In 1876 he went to Canada, where he became a land surveyor and entered government work. As Dominion topographer (1893–1910) he made irrigation and phototopographical surveys in Alberta, British Columbia, and near a part of the Alaskan boundary. In 1906, with Mrs. H. J. Parker, of Winnipeg, he founded the Alpine Club of Canada, was its president in 1906–10, and organized 10 annual camps, no two of them in the same place. During 1906–14 he continued surveying and exploring in the region now known as Mount Robson Park. Wheeler climbed more than 300 peaks in the Canadian Rockies. He edited the *Canadian Alpine Journal* in 1906–13 and published *The Selkirk Range* (1903); *The Selkirks: A Guide for Mountain Pilgrims* (1911), with Mrs. H. J. Parker.

WHEELER, BENJAMIN IDE (1854–1927). An American educator and classical scholar, born at Randolph, Mass. He graduated at Brown University in 1875, taught classics at the Providence (R. I.) High School and at Brown; traveled in Greece, and studied at Leipzig, Heidelberg (Ph.D., 1885), Jena, and Berlin. Upon his return to America he taught for a year at Harvard, in 1886 became professor of comparative philology in Cornell University, and two years later professor of Greek. In 1895–96 he held also the chair of Greek literature at the American School for Classical Studies, Athens. He was appointed president of the University of California in 1899. In 1909–10 he served as Roosevelt professor at the University of Berlin. Among his works are: *Der griechische Nominalaccent* (1885); *Analogy, and the Scope of Its Application in Language* (1887); *Introduction to the Study of the History of Language* (1891), with H. A. Strong and W. S. Logeman; *Principles of Language Growth* (1891); *The Organization of Higher Education in the United States* (1897); *Life of Alexander the Great* (1900); *Unterricht und Demokratie in Amerika* (1910).

WHEELER, EVERETT PEPPERRELL (1840–1925). An American lawyer and author. Born in New York City, he graduated from the College of the City of New York in 1856, and from Harvard (LL.B.) in 1859. He served as a mem-

ber of the Board of Education of New York City (1877–79), as chairman of the New York City Civil Service Commission (1883–89 and 1895–97) and of the committee on law reform of the American Bar Association (1908–11), and as president of the Reform Club (1889–90) and of the New York Civil Service Reform Association. His writings include *Wages and the Tariff* (1888); *Modern Law of Carriers* (1890), *Real Bimetallism* (1895); *The Harter Act* (1899), *The Knowledge of Faith* (1904), *Daniel Webster, Expounder of the Constitution* (1905).

WHEELER, HENRY LORD (1867–). An American chemist. He was born in Chicago, and was educated at Yale (Ph.B., 1890; Ph.D., 1893), also pursuing higher studies in chemistry at Leipzig and Chicago. He had become an assistant at Yale in 1890 and by 1908 had risen to be professor of chemistry. In 1909 he was elected to the National Academy of Sciences. He contributed largely to the literature of his chosen specialty and his many papers, chiefly on organic chemistry, appeared in the *American Chemical Journal* and the *Journal of the American Chemical Society*.

WHEELER, JOSEPH (1836–1906). An American soldier, born at Augusta, Ga. He graduated at West Point in 1859, was commissioned a second lieutenant of dragoons, and served at the cavalry school at Carlisle, Pa., until April, 1861, when he resigned his commission and entered the Confederate service. In the following September he was appointed colonel of the Nineteenth Alabama Infantry, and was actively engaged in the earlier campaigns in Kentucky and Tennessee. At Shiloh, in April, 1862, he commanded a brigade, and later in the year was transferred to the cavalry and participated in the battle of Perryville and other engagements of General Bragg's Kentucky campaign. On Oct. 30, 1862, he was promoted to the rank of brigadier general, and covered the retreat of Bragg's army to the southward. In January, 1863, he was commissioned major general. He commanded the Confederate cavalry at Chattanooga and at Chickamauga, and covered Bragg's rear after the defeat at Lookout Mountain and Missionary Ridge. He harassed Sherman's flank during the march to Atlanta. In August, 1864, he led a successful raid in Sherman's rear northward as far as the Kentucky line. Subsequently he opposed Sherman's advance on Savannah, and in February, 1865, was promoted to the rank of lieutenant general, and continued in command of the cavalry division of General Johnston's dwindling army until its surrender. After the war he became a lawyer and cotton planter. In 1880 he was elected to Congress as a Democrat and was a member continuously until 1899. In May, 1898, he was appointed by President McKinley a major general of volunteers, and was assigned to the command of the cavalry division of the Army of Santiago in the Spanish-American War. He commanded the troops in the engagement of Las Guasimas, was senior field officer in the battle of San Juan Hill, and subsequently was one of the American commissioners to arrange for the surrender of Santiago. In 1899–1900 he commanded a brigade in the Philippine Islands, was commissioned a brigadier general in the Regular Army in June, 1900, and retired in the September following. He published *The Santiago Campaign, 1898* (1899).

WHEELER, SCHUYLER SKAATS (1860–1923). An American electrical engineer, born in New York City. He studied at Columbia, but left college in 1881 to become assistant electrician of the Jablochkoff Electric Light Company, and in 1883 was a member of Edison's engineering staff. In 1888 he organized the firm of Crocker and Wheeler, and in the following year became president of the Crocker-Wheeler Company at Ampere, N. J., manufacturers of electrical equipment. Wheeler had an important part in the development of the electric motor and in the direct application of electricity to driving tools, inventing an electric elevator and an electric fire engine, and devising paralleling of dynamos and series multiple motor control. For his invention of the electric buzz fan he received the John Scott medal of the Franklin Institute in 1904. He served as president of the American Institute of Electrical Engineers in 1905–06. Besides contributions to the technical press, Wheeler published *Practical Management of Dynamos and Motors* (1894), with F. B. Crocker.

WHEELER, WAYNE BIDWELL (1869–). An American temperance worker, born at Brookfield, Ohio. He graduated from Oberlin in 1894, and in law from Western Reserve University in 1898. While a student he engaged in temperance work, and after graduation joined the Ohio Anti-Saloon League as a field secretary, later becoming district superintendent, attorney, and in 1902, superintendent. He led a spectacular fight against the reelection of Myron T. Herrick as Governor of Ohio in 1906, and obtained the first great victory for the Anti-Saloon League in American politics. Wheeler became a member of the executive committee, and also attorney, of the national organization of the league.

WHEELER, WILLIAM ADOLPHUS (1833–74). An American lexicographer, born at Leicester, Mass. A graduate of Bowdoin (1853), Wheeler, after teaching for several years, assisted Joseph E. Worcester in preparing his *Dictionary*, and contributed to the revision of Noah Webster's *Dictionary* (1864). Alone or with others, he was also responsible for other dictionaries or compilations.

WHEELER, WILLIAM ALMON (1819–87). An American legislator, Vice President of the United States from 1877 to 1881. He was born at Malone, Franklin Co., N. Y. He studied for two years at the University of Vermont. After studying law at Malone, he was admitted to practice, and met with considerable success in his profession. From 1847 to 1849 he was district attorney of Franklin Co., and in 1850 and 1851 was a Whig member of the New York State Assembly. In 1851 he abandoned his law practice for banking, and was also interested in railroads. In 1857 he was chosen, as a Republican, to the State Senate, and was elected president pro tempore. In 1860 he was elected a member of the Thirty-seventh Congress. In 1867 he was a member of the New York Constitutional Convention, of which he was elected president. From 1869 until 1877 he was again a member of Congress, serving as chairman of the important committees on Commerce, the Pacific Railroads, and Southern Affairs, and taking a leading part in legislation affecting the reconstructed Southern States. In 1875–76, while chairman of the Committee on Southern Affairs, he originated and effected the compromise, known by his name, between the warring political factions in Louisiana. From 1877 to 1881, during the administration of President Hayes, he was Vice President of the United States.

WHEELER, WILLIAM MORTON (1865–). An American zoölogist, born in Milwaukee, Wis. He was educated at the German American Normal College at Milwaukee and at Clark University (Ph.D., 1892). After two years as assistant professor of zoology at the University of Chicago, he became professor at the University of Texas (1899), and was curator of invertebrate zoölogy in the American Museum of Natural History, New York, from 1903 to 1908, and thereafter professor of economic entomology at Harvard. He remained connected with the Natural History Museum as honorary curator of social insects. He was elected to the National Academy of Sciences, and joined the editorial staff of the *Biological Bulletin, Journal of Morphology, Journal of Animal Behavior,* and *Psyche.* He published important monographs, mainly on insects, besides *Ants, Their Structure, Development, and Behavior* (1910).

WHEEL'ING. The largest city of West Virginia and the county seat of Ohio County, 66 miles by rail southwest of Pittsburgh, on the Ohio River, and on the Pittsburgh, Cincinnati, Chicago, and St. Louis, the Baltimore and Ohio, the Pennsylvania, and the Wheeling and Lake Erie railroads (Map: West Virginia, D 1). It is situated on ground rising gradually from the river A steel railroad bridge spans the Ohio, and there is a suspension bridge, 1010 feet long, which is one of the chief attractions of the city. Noteworthy features include also the Henry Clay Monument, the site of Old Fort Henry, the custom house and post office, the public library, Linsly Institute, public hospitals, and the county courthouse. Among the prominent structures, besides those mentioned, are the Y. M. C. A. and Y. W. C A., the Market Auditorium, Board of Trade Building, the high school, the Elks Home, the Home for the Aged, and the Roman Catholic Cathedral. Owing to its excellent transportation facilities, Wheeling is an important wholesale and jobbing centre, and is also of considerable industrial prominence, being known especially for its iron and steel interests. The manufacture of glass, enameled ware, pottery, smoking tobacco, and stogies is extensive. The smaller establishments comprise packing houses, print works, and manufactories of wagons and carriages, boxes, leather, etc. Coal mining is carried on extensively in the district, 15,000 miners being employed within a radius of 10 miles. According to the 1914 census of manufactures the industries of the city were capitalized at $26,858,000, and had an output for the year valued at $27,879,000.

In 1915 the city adopted the commission-manager form of government, to go into effect in 1917. The water works, which represent an expenditure of $1,500,000, and the electric-light plant are the property of the municipality. For maintenance and operation the city spent in 1915 about $500,000, the chief items being: schools, $200,000; gas plant, $34,000; water works, $75,000; fire department, $70,000; police department, $57,000; and interest on the debt, $42,000. Pop., 1900, 38,878; 1910, 41,641; 1915 (U. S. est.), 43,097; 1920, 54,322.

Settled by Col. Ebenezer Zane in 1769, Wheeling was the first town established on the Ohio River. It was laid out in 1793, was incorporated as a town in 1806, and was chartered as a city in 1836. In 1774 Fort Henry, named in honor of Gov. Patrick Henry, was built here. In September of the same year it was fiercely attacked by a force of 300 Indians, who killed 23 out of a garrison of 42. In 1781 the Indians made another attack, and in 1782 a force of English and Indians unsuccessfully besieged the place for several days In 1861 the Wheeling Convention, representing the people of Virginia opposed to secession, met here and established the restored government, and here the Constitutional Convention of West Virginia met in 1861–62. From 1863 to 1870 and again from 1875 to 1885 Wheeling was the capital of the State.

WHEEL LOCK. See SMALL ARMS.

WHEELOCK, hwē'lok, ELEAZAR (1711–79). An American educator, born at Windham, Conn. He graduated at Yale in 1733, was ordained pastor of the Congregational church at Lebanon, Conn., in 1735, and there established a school for the education of Indian and white youths. In 1770 he removed to Hanover, N. H., and there reestablished his school, for which an endowment of $50,000 had been obtained, under the name of Dartmouth College (q.v.). During the remaining nine years of his life Dr. Wheelock was president of the new college, and despite privation and hardship succeeded in putting it on so firm a basis that it survived the disasters of the Revolution He published a number of sermons and a *Plain and Faithful Narrative of the Indian School at Lebanon.* Consult Baxter P. Smith, *History of Dartmouth College* (Boston, 1878); Frederick Chase, *History of Dartmouth College and the Town of Hanover* (Cambridge, 1891); and David McClure and Elijah Parish, *Memoirs of the Rev. Eleazar Wheelock, D D.* (Newburyport, 1811).

WHEELOCK, JOHN (1754–1817). An American educator, born at Lebanon, Conn., the son of Eleazar Wheelock (q.v.). After three years in Yale, he attended Dartmouth for a year, and in 1771 graduated with the first class that went out from that college. He then tutored for four years in Dartmouth; served in the Patriot army during the Revolutionary War, attaining the rank of lieutenant colonel. In 1780, soon after the death of his father, he succeeded him as president of Dartmouth. Four years later he went to Europe to secure assistance for that institution, but on his return in 1784 was shipwrecked and lost all the money he had collected. He then succeeded in getting aid from the State, and was able to enlarge the institution. In 1815, owing to friction between him and the board of trustees, he was removed from the presidency; but the Legislature created a new corporation, which in 1817 restored him. Out of this dispute grew the famous Dartmouth College Case (q.v.). Wheelock died in 1817 before the case was decided. Among his published works may be mentioned *Sketches of the History of Dartmouth College* (1816).

WHEEL ORE. See BOURNONITE.

WHEELSTONES. See BEADS, ST. CUTHBERT'S.

WHEEL'WRIGHT, EDMUND MARCH (1854–1912). An American architect, born at Roxbury, Mass. He graduated from Harvard in 1876, and studied architecture at the Massachusetts Institute of Technology and in Europe. He was employed in the offices of Peabody and Stearns in Boston, and later by firms in New York City and Albany, N. Y. In 1883 he established himself independently in Boston, later becoming head of the firms of Wheelwright and Haven and Wheelwright, Haven, and Hoyt. In

1891-95 he was city architect of Boston, in which capacity he designed many important school buildings and the Harvard Bridge over the Charles River. Wheelwright also designed Jordan Hall, Boston, the Boston Opera House, the Cleveland Museum of Art, additions to the Massachusetts General Hospital, and the Cambridge bridge. In 1904 he was sent to Europe with R. Clipston Sturgis (q.v.) by the Trustees of the Boston Museum of Fine Arts to study museum buildings, and thereafter they served jointly with the late Professor Despradelle, as advisory architects to Guy Lowell (q.v.) for the design of the new Museum of Fine Arts. Wheelwright published *Municipal Architecture in Boston* (2 vols., 1898), and *School Architecture* (1901).

WHEELWRIGHT, JOHN (1592–1679). A New England clergyman. He was born in Lincolnshire, England, graduated at Cambridge in 1614, and was vicar of Bilsby (1623–31), suspended by Laud for nonconformity, he went to America in 1636, and became pastor at Braintree, Mass. His adoption of the religious views of his sister-in-law, Anne Hutchinson (q.v.), alienated Wilson, pastor of the Boston church; this and a sermon in her defense, considered seditious, caused his banishment from the colony by the General Court (1638). He went to New Hampshire, founded the town of Exeter, and organized a church; in 1643 he removed with a part of the church to Wells, Maine. His sentence of banishment having been revoked on his declaration that he had erred, at least in part, he returned to Massachusetts and was minister at Hampton, 1646–54; went to England in 1657 and was well received by Oliver Cromwell, who had been his fellow student, he returned in 1660 and became minister at Salisbury, N. H. (1662). The sermon alluded to above is in the *Collections of the Massachusetts Historical Society* (ed. by C. Deane, Boston, 1867). Wheelwright's writings with memoirs by Bell were published by the Prince Society (Boston, 1876).

WHEELWRIGHT, WILLIAM (1798–1873). An American capitalist, born at Newburyport, Mass. He was United States consul at Guayaquil, in Ecuador, from 1824 to 1829, when he removed to Valparaiso, in Chile, where he established a line of passenger vessels along the coast. He founded a line of coasting steamships to connect all the ports between Valparaiso and the Isthmus of Panama, and in 1840 the first two vessels of the Pacific Steam Navigation Company reached the west coast. Wheelwright also built a number of railroads in South America, established the first gas and water works, and strung the first telegraph line on that continent. He wrote *Statements and Documents Relative to the Establishment of Steam Navigation in the Pacific* (1838) and *Observations on the Isthmus of Panama* (1844). Consult: J. B. Alberdi, *La Vida y los trabajos industriales de William Wheelwright en la America del Sur* (Paris, 1876; Eng. trans. by Caleb Cushing, Boston, 1877), and John Codman, *Biographical Sketch of William Wheelwright, of Newburyport, Mass.* (Philadelphia, 1888).

WHELK (AS. *weluc, wiluc*, whelk, probably from *wealcan*, to roll, walk, OHG. *walkan*, to roll, wallow, Ger. *walken*, to full cloth). The popular name of many prosobranch gastropod mollusks, of the family Buccinidæ. In the true whelks (*Buccinum*) the shell is ovate, turreted, and more or less ventricose, its mouth ovate, emarginate, or produced into a very short canal below. The animal has a broad head, with two tentacles, with the base of which the stalks bearing the eyes are united; the proboscis is large, and the tongue armed with teeth, which are used for the purpose of rasping substances used for food—almost any animal substances being welcome for this use—or for perforating the shells of other mollusks in order to prey upon them. There are numerous species, chiefly found on the coasts of the colder parts of the world. The coasts of the North Atlantic produce several species, of which the most abundant is the English whelk (*Buccinum undatum*). It occurs from low-water mark to a depth of 600 fathoms, is sometimes three inches in length, grayish or brownish white, with numerous raised ridges and spiral striæ. On the American coast it is common as far south as Cape Cod. It is much used in Europe as an article of food. For the giant whelks see CONCH. The dog whelks are small coiled mollusks of the genus *Nassa* common along both the Atlantic and Pacific coasts. All of these whelks are carnivorous and occasionally destructive to clams and oysters.

WHETSTONE. See ABRASIVES; HONES.

WHET'STONE, GEORGE (?1544–?1587). An English author, of a wealthy Lincolnshire family. He served in the Low Countries in 1572 and was present at the battle of Zutphen (Sept. 13, 1586), when Sir Philip Sidney was mortally wounded. He also accompanied Sir Humphrey Gilbert on the disastrous voyage to Newfoundland (1578–79). Whetstone is mainly of interest because his *Promos and Cassandra*, a play in rhymed verse (1578; reprinted by Collier and Hazlitt's *Shakespeare's Library*, 1875), and the prose tale with the same title, in his *Heptameron of Civill Discourses* (1582, also reprinted by Collier and Hazlitt), furnished the plot for Shakespeare's *Measure for Measure*. Among his other works are the *Rocke of Regard*, verse tales mostly from the Italian (1576; reprint by Collier, 1870); *A Remembraunce*, an elegy on George Gascoigne (1577; in Arber's reprints of Gascoigne's works, 1868); and *A Mirour for Magestrates of Cyties*, a prose treatise (1584).

WHEWELL, hū'el, WILLIAM (1794–1866). A distinguished English scholar and philosopher. He was born at Lancaster, graduated with honor at Trinity College, Cambridge, in 1816, and became a fellow (later tutor) of Trinity. In 1820 he became a fellow of the Royal Society, and in 1827 of the Geological Society. He spent much time in traveling and studying architecture and natural science. He was professor of mineralogy at Cambridge (1828–32), and (1838–55) Knightbridge professor of moral philosophy. He became master of Trinity in 1841, and in the same year was president of the British Association. In his earlier literary career he produced several textbooks on mathematical subjects, now superseded and also contributed a variety of papers to scientific journals and to the *Transactions* of learned societies. Later in life he concentrated mainly on the production of large works. Among important books are: *On the True Motion of Points* (1832); *Astronomy and General Physics considered with Reference to Natural Theology* (the third Bridgewater treatise, 1833); *On the Principles of English University Education* (2d ed., 1838); *History of the Inductive Sciences* (1840); *Phi-*

losophy of the Inductive Sciences (1840): and *The Elements of Morality, Including Polity* (1845). His treatise on *The Plurality of Worlds* (1853) had a considerable popularity from its subject; his *Lectures on the History of Moral Philosophy in England* (1852), and *The Platonic Dialogues for English Readers*, a selected translation, may also be mentioned Most of his works have appeared in numerous editions. He died at Trinity in consequence of injuries sustained through a fall when riding. He was a man of varied acquisitions, a clear-headed student, a vigorous and independent thinker and writer. His chief ambition was to grasp, survey, and coördinate the sciences. He did excellent service to both science and history in his endeavor to gratify it. He helped to reorganize the course of study at Cambridge, and left his mark as one of the most efficient masters of Trinity, besides twice holding the office of vice chancellor. He became wealthy through two marriages, and was generous in the use of his money; his gifts to the university alone are estimated at over £100,000. In philosophy he was an intuitionist, and is now best remembered as an opponent of J. S. Mill. Consult Isaac Todhunter, *William Whewell: An Account of his Writings with Selections from his . . . Correspondence* (2 vols., London, 1876), and Mrs. Stair Douglas, *Life and Selections from the Correspondence of William Whewell* (ib., 1881).

WHEY (AS. hwæg, MDutch, *wey, huy, hoy, hui*, Dutch *wei*, whey, of unknown etymology). A by-product obtained in the manufacture of cheese (q.v.). When milk is curdled with rennet or any similar substance, the curd separates from the liquid portion of the milk, and the latter is termed "whey." If skillfully manipulated, the curd contains the casein and holds most of the fat of the milk mechanically. In continuing the process, the whey is drawn off from the curd, and later more completely removed by pressing. For every pound of Cheddar cheese made, there is nearly nine pounds of whey as a by-product. Its principal use is as a feed for pigs, calves, and sometimes for cows. It is less valuable for this purpose than skim milk or buttermilk, for the casein, which contributes largely to the value of both of these, is lacking in whey. It contains about 93 per cent of water (only 7 per cent of solids), 5 per cent of milk sugar, 0.9 per cent of casein and albumin, 0.3 to 0.5 per cent of fat, and about 0.5 per cent of ash. Hence its principal constituent is sugar. It is, in reality, a very thin feed and spoils quite readily. In large factories whey is used for making milk sugar. (See SUGAR.) Whey cheese, made in some of the countries of northern Europe, is practically evaporated whey, with some cream added. Butter has been made from whey by running it through a separator, but in good cheese-making practice whey contains very little butter fat. Wheyn is a nourishing, mildly stimulating beverage prepared from whey. The whey of goats' milk is regarded by some as especially beneficial in the treatment of certain diseases, and in Switzerland and elsewhere there are large establishments for carrying out the whey cure, either alone or associated with the grape cure.

WHICH'COTE, BENJAMIN. See CAMBRIDGE PLATONISTS.

WHICKHAM, hwik'am. A manufacturing town in Durham, England, 3 miles west-southwest of Newcastle. It has iron foundries, chemical works, timber yards, and saw mills. Pop., 1901, 12,851; 1911, 18,332.

WHIFFIN, hwif'ĕn, BLANCHE, better known as MRS. THOMAS WHIFFIN (1845–). An American actress, born in London. Her maiden name was Galton. She was educated in France; made her stage début at the Royalty Theatre, London, in 1865; came to America in 1868; and toured the United States under John Templeton's management. In 1879 she played Buttercup in the first American production of Gilbert and Sullivan's *Pinafore*. She joined Daniel Frohman's company at the Lyceum in 1887, and later Charles Frohman's company at the Empire. Mrs Whiffin in later years appeared in *Zira* (1905); *The Great Divide* (1905–07); *The Builder of Bridges* (1909); *The Brass Bottle* (1910); *Cousin Kate* (1912); *Tante* (1913); *A Scrap of Paper* (1914); *Rosemary* (1915). She was still active at 70 and a great favorite.

WHIG AND TORY (Whig, probably abbreviated from *whiggamore*, a nickname for the Presbyterian peasantry of the western lowlands of Scotland, from *whiggam*, apparently a word to urge on a horse, from *whig*, to jog along; Tory, from Ir. *toridhe, tornidhe, torrighe*, pursuer, plunderer, from *torighim*, to fancy, pursue). The names which for about two centuries were popularly applied to the two great political parties in Great Britain. Both were at first names of reproach. Whig was meant to imply that those who were thus designated were no better than the Presbyterian rebels of Scotland, while the name Tory was intended to imply some connection with Irish brigands, who were supposed to desire a Catholic king. The names came into use about 1680. In general, the Tories were adherents of the ancient Constitution of England and the supporters of regal and ecclesiastical authority, while the Whigs as a rule favored reform in the direction of a more democratic government. In the eighteenth century, however, the Whigs represented to a great extent the aristocratic oligarchy which ruled England. In 1832, when the Reform Bill was passed through the efforts of a wing of the Whig party, the two old parties really disappeared, the Tories being ultimately succeeded by the Conservatives and the Whigs by the Liberals.

WHIG PARTY. In American history, the name first applied to those who during and immediately preceding the Revolutionary War opposed the measures of the British Government, in contradistinction to the Loyalists or Tories. The name came to be synonymous with patriot in America, and is believed to have made its appearance first in New York in 1768. After the Revolution the word disappeared as an American party term until about 1834, when it came to be applied to a new political party opposed to the Democratic party. After the close of the War of 1812 the Federalists as a party disappeared, and with the absence of any well-defined political issues an "era of good feeling" followed. During the administration of John Quincy Adams party lines were again drawn. those who supported the Administration and favored a system of internal improvements, a protective tariff, and a national bank, together with a broad construction of the Constitution generally, being designated as National Repub-

leans, while their opponents were known as Democrats or Democratic-Republicans. (See DEMOCRATIC PARTY.) In the presidential election of 1828 those of the former belief voted for Adams, while the latter supported Jackson. Nullifiers, whose enmity President Jackson had incurred by his measures in 1832 (see NULLIFICATION), Antimasons, the followers of Hugh L. White (q.v.) in Tennessee, and the States Rights party in the South constituted in addition to the National Republicans some of the elements of the opposition, and by 1833 these were drawing together on the basis of their common dislike for Jackson. In 1834 the opposing elements became fused into a new party, which was called "Whig," in allusion to its opposition to executive usurpation, by Col. James Watson Webb, editor of the New York *Courier and Enquirer*. By 1836 the party had not become sufficiently well organized to enter successfully into a presidential contest. No national convention was held, but in 1835 several candidates were put forward—Webster in the northeast, in the northwest Gen. W. H. Harrison, and in the southwest Senator Hugh L. White, of Tennessee—by numerous mass meetings and by several Whig State conventions. In 1840 the party passed over its real leaders, Clay and Webster, renominated General Harrison, and went before the people with no platform except the personal popularity of the candidate. After a remarkable campaign, the Whigs triumphed, but their rejoicing was soon cut short by the death of the President and the accession of a Vice President, Tyler, who was not of their political faith and who greatly embittered the Whigs by his vetoes of the bank bill. In 1844 the Whig party nominated its leader, Henry Clay, and likewise for the first time adopted a platform of principles, summed up in the following words: "A well-regulated national currency; a tariff for revenue to defray the necessary expenses of the government, and discriminating with special reference to the protection of the domestic labor of the country; the distribution of the proceeds from the sales of the public lands; a single term for the presidency; a reform of executive usurpations." The hopes of the party were destroyed by the injection of the Texas question into the campaign, for the trimming attitude of their candidate caused many antislavery Whigs in the North to refuse their support. The question of the annexation of Texas did not sever the bond between the Northern Whigs and Southern Whigs, although it was the first of the series of causes which ultimately led to the disruption. The Whigs of both North and South supported the war with Mexico after it was once declared, but the question of admitting or excluding slavery from the territory acquired thereby (see WILMOT PROVISO) clearly revealed that Northern and Southern Whigs could not much longer stand together. The antislavery or Conscience wing of the Whig party in Massachusetts now arose in opposition to the so-called "Cotton Whigs." In the presidential election of 1848 the Whigs, with Gen. Zachary Taylor as their candidate, were for the second and last time successful. It was chiefly through the efforts of Henry Clay that the passage of the Compromise Measures of 1850 was effected. The Whig National Convention at Baltimore in 1852, by a vote of 212 to 70, recognized this compromise as a finality, though it was destined to seal the fate of the Whig party. The election of that year resulted in the overwhelming defeat of the Whig candidate, General Scott. The Kansas-Nebraska Bill (q.v.) of 1854 led to the disruption of the Whig party and to the formation of a new party in the North (see REPUBLICAN PARTY), which was finally joined by most of the Northern Whigs, many of whom were at first affiliated with the Know-Nothing movement. In the South most of the Whigs for a time acted with the Know-Nothing party. In 1856 a convention representing what was left of the Whig party indorsed the nomination of Fillmore, the candidate of the Know-Nothings, for the presidency. In the presidential election of 1860 remnants of the old Whig and Know-Nothing parties under a different name, the Constitutional-Union party (q.v.), supported Bell and Everett for President and Vice President, but upon the outbreak of the Civil War the last trace of the Whigs disappeared, the Southern Whigs having become absorbed by the Democratic party. Consult: R. McK. Ormsby, *History of the Whig Party* (2d ed., Boston, 1860); T. H. McKee, *National Conventions and Platforms of all Parties, 1789–1901* (4th ed., ib., 1901). An authoritative work is A. C. Cole, *The Whig Party in the South* (Washington, 1913); also references under POLITICAL PARTIES.

WHIM'BREL, or WHAUP. See CURLEW.

WHIN. See FURZE.

WHINCHAT (from *whin*, furze, gorse, from Welsh *chwyn*, weed + *chat*, on account of its chattering note). A small, ground-keeping European bird (*Pratincola* or *Saxicola rubetra*), seen in Great Britain in summer, wherever furze (or whin) bushes grow.

WHIP (from ME. *whippen*, probably a variant of *wippen*, from Dutch *wippen*, to move up and down, shake). A term used in English politics to designate the party representative whose duty it is to notify members of Parliament belonging to his party of the near approach of a division and to compel their attendance while the vote is being taken. The whip of the party in power is appointed a junior lord of the Treasury, with some minor patronage, in order to increase his influence.

WHIP'PET. See GREYHOUND.

WHIPPING. Corporal punishment meted out to petty offenders by the criminal law of various countries. It is still used in Russia, England, and Delaware in the United States. It is sometimes administered in private, but more often in public, the culprit in some cases being tied to a so-called whipping post. In early English times this form of punishment could not be inflicted on a gentleman, but was frequently inflicted upon the villein, tenant, and laborer. Until within a century whipping was even more common in Scotland than in England, but by the Act of 25 Vict., ch. 18, no person above the age of 16 can now be whipped in that country. The Act of 26 and 27 Vict., ch. 44 (not applicable to Scotland), authorizes whipping in addition to penal servitude for various crimes in England, and this sentence is still in favor with many English magistrates. In both England and Scotland the whipping of juvenile offenders is regarded as a salutary discipline by a public opinion which is no longer quite in favor of the similar treatment of adults. In Russia the terrible punishment of the knout is inflicted on both common criminals and political offenders. Many penologists believe that a

substitution of whipping for imprisonment in a large class of cases would be wise. For corporal punishment in the army and navy, see FLOGGING.

WHIP'PLE, ABRAHAM (1733–1819). An American naval officer, born at Providence, R. I. He was captain of the privateer *Gamecock* in the French and Indian War, and on one cruise took 23 prizes. On the night of June 8–9, 1772, he commanded the eight longboats that surprised and destroyed the British revenue vessel *Gaspée*. In 1775 he was put in command of two vessels belonging to Rhode Island, and soon afterward captured one of the tenders of the frigate *Rose*. He did much damage to British shipping, as captain successively of the *Columbus*, of the schooner *Providence*, and of the frigate *Providence*. In the last he slipped through the blockade of Rhode Island and carried important dispatches to France. In July, 1779, with the *Providence* and two other vessels, he fell in with a British merchant fleet of nearly 150 sail, convoyed by a 74 and some smaller vessels, and succeeded in capturing 10 vessels, eight of which reached Boston, where they were sold for about $1,000,000. At the defense of Charleston, S. C., in 1780, he commanded the naval forces, was captured, and remained a prisoner until the end of the war.

WHIPPLE, EDWIN PERCY (1819–86). An American critic, born at Gloucester, Mass. He was long a distinguished lecturer on literary and biographical topics. His first book was *Essays and Reviews* (2 vols., 1848–49), which was followed by: *Literature and Life* (1849); *Character and Characteristic Men* (1866); *Literature of the Age of Elizabeth* (1876); *Recollections of Eminent Men* (1887); *American Literature and Other Papers* (1887); and *Outlooks on Society* (1888). Whipple, in his day, attained a high position as a critic, and was a formative force in American literature; and some of his work, e.g., the *Age of Elizabeth*, is still read. An edition of his *Charles Dickens* (2 vols., Boston), with an introduction by Arlo Bates, appeared in 1912.

WHIPPLE, HENRY BENJAMIN (1822–1901). An American Protestant Episcopal bishop, born at Adams, N. Y. Because of ill health he gave up his plan of a college course and engaged in business. In 1847 he began to study theology privately, was ordained priest in 1850, and became rector at Rome, N. Y. In 1857 he removed to Chicago. Two years later he was elected and consecrated Bishop of Minnesota. He was a warm friend and defender of the Indians, among whom he established successful missions. He also founded a group of schools at Faribault, Minn. He wrote much for current periodicals, and also an autobiography, *Lights and Shadows of a Long Episcopate* (New York, 1899; new ed., 1912).

WHIPPLE, SQUIRE (1804–88). An American civil engineer, born at Hardwick, Mass. He graduated at Union College in 1830; became a civil engineer on the Baltimore and Ohio Railroad; in 1840 designed a successful scale for weighing canal boats and patented an iron bridge truss; also after 1852 erected several important bridges of the Whipple trapezoidal type. He was sometimes called the father of iron bridges. In 1872 he patented a lift drawbridge, and in the following year built one over the Erie Canal at Utica. He published *Treatise on Bridge Building* (1847; enlarged ed., 1873) and *The Doctrine of Central Forces* (1866).

WHIPPLE, WILLIAM (1730–85). A signer of the Declaration of Independence, born at Kittery, Me. He became the captain of a merchant vessel before he was 21 years of age, and engaged in the West India trade and in slave-trading voyages to Africa. At the age of 29 he withdrew from the sea, and entered business at Portsmouth, N. H. In 1775 he was a delegate to the New Hampshire Provincial Congress, was elected a member of the Provincial Council of Safety, and was elected to the Continental Congress in January, 1776. He continued to be a member of the Congress until September, 1779; in 1777, as brigadier general of militia, he commanded one of the New Hampshire brigades in the operations against Burgoyne and helped negotiate the terms of surrender; and in 1778 commanded the New Hampshire troops in the operations against the British in Rhode Island. In 1780 he was elected to the State Assembly and was several times reelected. He was superintendent of finance for New Hampshire from 1782 until 1784, and was president of the commission that settled the dispute between Pennsylvania and Connecticut over the Wyoming valley. In 1782 he became a judge of the Superior Court of Judicature.

WHIP'POORWILL'. A North American nightjar (*Antrostomus vociferus*), famous for the call which has given it this name, but which might be more nearly expressed by the syllables *whup'per'ee'*. It is common in summer throughout the eastern part of the United States. It is about 10 inches long, the plumage much mottled and indistinctly marked with small transverse bands of black, white, and buff, the top of the head streaked with black, a narrow white collar on the throat. The bristles at the base of the bill are very stiff, and more than an inch long. This bird is seldom seen during day, but seeks its food by night, catching moths and insects on the wing. Its flight is near the ground, zigzag, and noiseless. Its notes are heard usually just after sunset in the early summer, rapidly reiterated, often several hundred times with hardly a pause for breath. When several of these birds are near by the noise will prevent sleep. The whippoorwill makes no nest, but the female deposits her eggs, two in number, on the ground or leaves in the woods. The eggs are white, prettily marked with lilac and brown. In the southern parts of the United States the whippoorwill is replaced by a larger species, the chuck-will's-widow (q.v.), and on the upper Missouri and to the west by a smaller one, the poorwill (q.v.).

WHIP SNAKE. One of the long, slender, whiplash-like green tree serpents of the family Dryophidæ of India and the Malay countries. They are poisonous, and one species (*Dryophis nasutus*) of India is said by the natives to dart at the eyes of men passing it. Wallace remarks that the ease and rapidity with which these snakes glide through the bushes almost without disturbing a leaf is very curious, and they are so well protected by their color that they may often be touched before they are seen.

The same name is given in the United States to a slender, swift, brownish blacksnake (*Zamenis flagelliformis*) of Texas and westward, usually called coachwhip snake. The Indians and negroes believe it will whip or lash its adversary with its tail, and fear it, but it is quite harmless, though ready to fight when cornered.

WHIP-TAIL SCORPION. See SCORPION.

WHIRLICOTE, hwĕr'li-kōt. See CARRIAGE.

WHIRLIGIG BEETLE. See WATER BEETLE.

WHIRLIGIG MULLET. A curious little mullet (*Querimana quiana*) of the southeastern coast of the United States, often found swimming round and round in great schools at the surface like whirligig beetles; usually mistaken for young mullet or bluefish.

WHIRLPOOL RAPIDS. A remarkable series of rapids in the Niagara River, 3 miles below Niagara Falls. The central portion of the current is forced by the narrowness of the channel (300 feet) to a height of 20 to 30 feet above the edges. In spite of the dangerous character of the rapids, they have several times been passed by persons in barrels and once by a steamer, the *Maid of the Mist* (q.v.). A short distance below is the whirlpool from which the rapids take their name.

WHIRLWIND. A term specifically applied to small whirls or eddies of winds that continue only a few seconds, seldom longer than a minute; the diameter of the whirl is correspondingly small, and is made visible principally by dust, leaves, or light objects flying in the air. The most extensive dust whirls occur in hot, dry plains, as in India, Texas, and the eastern slope of the Rocky Mountains, and especially in the Desert of Sahara, where heaps of sand, sufficient to cover a caravan, are said to fall to the ground occasionally as the whirling simoom passes over. In the smaller whirls the rotation of the eddy may be either positive or negative, but in the larger whirls the direction, like that of the tornado, is always the same as that of the storms attending areas of low pressure, viz., from the west, by the south, to the east in the Northern Hemisphere, and the reverse in the Southern. Consult: P. F. H. Baddeley, *Whirlwinds and Dust Storms of India* (London, 1860); Theodor Reye, *Die Wirbelsturme* (Hanover, 1880); William Ferrel, *On Cyclones, Tornadoes, and Waterspouts* (Washington, 1882); W. M. Davis, *Whirlwinds, Cyclones, and Tornadoes* (Boston, 1884); also references under STORM.

WHISKY (probably a variant of *usquebaugh*, from Gael., Ir. *uisgebeatha*, water of life, from *uisge*, OIr. *usce*, water; connected with AS., OHG. *waschan*, Ger. *waschen*, Eng. *wash*). A distilled liquor, chiefly obtained from the fermented mash of different varieties of grain. The term is sometimes used to designate liquors obtained from starchy or saccharine substances other than grain, as, e.g., potato spirits.

Although it is customary to use a mixture of different kinds of grain in the preparation of a mash for the production of whisky, the classification of different varieties is based mainly upon the kind of grain in the infusion. Thus rye whisky is made from a mash composed of rye with sufficient barley malt to change the starch into sugar; corn whisky, chiefly from corn or maize; wheat whisky, from wheat; malt whisky, from malted barley, etc. Each variety has its own peculiar aroma derived from the grain, modified somewhat by the character of the ferment used. Rye whisky, sometimes called Monongahela, is produced largely in Pennsylvania; corn whisky is chiefly made in Kentucky, and is frequently called Bourbon, from the county in Kentucky of that name. Malt whisky is not extensively produced in the United States, but a small percentage of malt is used in the mash of all whiskies, in order to secure its diastatic action on the starch of grains.

As grain, particularly maize, is the cheapest source of either starch or sugar in the United States, distilled liquors, including both alcohol and whisky, are principally made from it; consequently the processes and methods of production for the latter are covered, as to the main features, by descriptions of the ordinary procedure followed in the manufacture of a strong alcoholic liquor from a starchy or saccharine mash. (See DISTILLED LIQUORS.) While the chief constituent of whisky is alcohol, and a large quantity of factitious liquor is sold under this name which is simply rectified alcohol, colored and flavored to resemble whisky, yet genuine whisky is very far from being merely a 50 per cent mixture of alcohol and water. The pharmacopœia definition is: "An alcoholic liquor obtained by the distillation of the mash of fermented grain (usually a mixture of corn, wheat, and rye), and at least four years old." This recognizes one very important distinction between whisky and alcohol, viz., the process of aging, to which the former is subjected in order to fit it for beverage purposes. Again, the fermentation is not carried to the same degree of attenuation in the production of whisky as in the production of alcohol, where the highest possible spirit yield is desired. Two different methods of fermentation are in use for whisky, the products of which are known respectively as sweet-mash and sour-mash whiskies.

In a sour-mash distillery the hot slop from the previous fermentation as it comes from the still is used instead of water to mash the next lot of grain. In the sweet-mash distillery the grain is mashed with water. In both kinds of distilleries yeast is added, but the period of fermentation allowed is 72 hours in the sweet-mash distillery and 96 hours in the sour-mash. The yield of proof spirits is generally slightly larger in the sweet-mash process. The old-style method of making a sour mash has largely gone out of use, and instead a certain amount of the slop is mixed in the fermenters with the water-mashed grain.

In the distillation and rectification processes the aim in alcohol production is to obtain a highly concentrated alcoholic liquor freed from all volatile impurities, and, so far as possible, chemically pure; very elaborate rectifying stills are used, therefore, and the operation is completed by filtration through wood or bone charcoal. In the production of whisky the conservation of alcohol is not so important an object, and it is not desirable to eliminate all other volatile constituents, as some of them, when modified and mellowed with age, impart to the liquor its fine flavor. Patent stills wherein fractionation is effected, like the Coffey still, produce a spirit which does not give the best results on maturing. This explains also why whisky made by crude and obsolete methods, such as Scotch and Irish pot-still whisky, often far surpasses in quality the product of the most modern and best-equipped distilleries.

Aging constitutes the final and most important difference in the treatment of alcohol and whisky. Alcohol is ready for sale and use as soon as it leaves the rectifying still and char filter. Whisky, on the other hand, is entirely unfit for consumption when first produced, being fiery and unpalatable; it requires long storage

in wooden casks to bring about the changes in secondary constituents which develop its aroma. It is sometimes sent on long sea voyages, in the holds of vessels, this being supposed to have a favorable effect upon its maturing. Various quick aging processes have been devised and some patented, but none has so far proved satisfactory. Chemically the change which occurs in a matured liquor is considered as a process of oxidation, promoted by the porosity of the wooden cask (a liquor does not age in a glass or metal container), whereby the alcohols present are converted into acids, aldehydes, and the corresponding fragrant ethers, and possibly in part still further oxidized and eliminated. The liquor also acquires some new constituents from the wood of the cask, which is often charred inside, with the idea of promoting chemical action. Freshly distilled whisky is colorless, and contains no solid matter whatever; after being stored in wood several years it has the amber tint familiar to every one, and contains perhaps 100 grains of solid matter per gallon—tannin, extractive and coloring matter—all derived from the oak commonly used in the barrels.

The importance of the maturing process is recognized in the United States laws governing the production of whisky, and provided for by the privilege accorded distillers of deferring the payment of the gallon tax until the liquor is "withdrawn from bond"; the bonded period may be extended as long as eight years with allowance for loss by evaporation, during which time the whisky remains in a bonded warehouse under government control. The government stamp on whisky withdrawn from bond is practically a guarantee of its age and purity, and the Act of March 3, 1897, known as the Bottling in Bond Act, is intended to enable the purchaser of even so small a quantity as a quart to secure a product which comes direct from government control and has, therefore, suffered no addition or adulteration. The internal-revenue strip stamp over the cork of the bottle is imprinted with the age and quantity of the contained whisky.

After the passage of the Food and Drugs Act of June 30, 1906, there arose in the United States and also in England a great controversy as to whether the highly rectified alcohol produced in the rectifying still was entitled to be called whisky. In England a royal commission was appointed, and after long deliberation decided that it was. In this country the controversy raged for several years without final decision until President Taft took up the question personally and rendered a decision that any distillate of grain diluted to potable strength was whisky.

Whisky, in common with other kinds of distilled liquors, bears a heavy burden of taxation in the United States. (See INTERNAL-REVENUE SYSTEM.) The gallon tax has been $1.10 since 1894, which is at least four times the cost of production, and a yearly license, called special tax, is exacted from distiller, wholesaler, and retailer. The entire process of manufacture is subject to supervision by government officers, and the distiller is held to a rigid accounting for all materials used; he must pay tax upon not less than 3½ gallons of proof spirits for every bushel of grain mashed, whether he obtains that yield or not, and heavy penalties are provided for fraud or evasion of tax. In proportion to alcoholic content the rate of tax upon distilled liquors is much higher than upon any form of fermented liquors. See LIQUORS, FERMENTED AND DISTILLED, STATISTICS AND HISTORY OF.

WHISKY INSURRECTION. The term popularly applied to the organized opposition among the farmers and distillers of the four western counties of Pennsylvania in 1794 to the enforcement of the Federal law of March, 1791, imposing an excise tax on whisky. The law was exceedingly unpopular in this part of the country, where whisky was the chief article of manufacture, and from which, by reason of the remoteness of the country, grain could not well be shipped to the East except in the more portable form of whisky. The frontier inhabitants regarded the law as an unjust discrimination against them, and vigorously opposed its enforcement. The government at once instituted prosecutions against some of the chief offenders, but when the marshal undertook to serve the necessary processes he was compelled by a body of armed men to desist. In pursuance of an act passed by Congress in May, 1792, President Washington issued a proclamation commanding the insurgents to disperse, and warning others against abetting them. On Aug. 14, 1794, a convention of more than 200 delegates, representing the western counties of Pennsylvania and one county in Virginia, assembled at Parkinson's Ferry on the Monongahela, with Albert Gallatin (q.v.) as secretary of the meeting. Three commissioners who had been appointed by the President, together with commissioners appointed by the Governor of Pennsylvania, appeared at the convention, and offered a general amnesty, conditioned upon submission to the laws, but no promises or pledges could be secured from the convention. The commissioners thereupon returned to Philadelphia, and on the basis of their report the President issued a second proclamation on September 25, commanding submission and announcing the march to the scene of disturbances of a force of militia, a requisition for 15,000 militiamen having already been made upon the Governors of Pennsylvania, New Jersey, Virginia, and Maryland. Upon the approach of the troops the ardor of the insurgents was somewhat dampened, and David Bradford, the prime mover in the insurrection, fled to New Orleans. Meantime another convention assembled at Parkinson's Ferry and passed resolutions pledging submission and obedience to the laws. Thereupon Governor Henry Lee of Virginia, who was acting as commander of the militia, issued a proclamation of amnesty, requiring an oath of allegiance to the United States, and ordered the arrest of those offenders who refused to make a declaration of submission. A number of suspected persons were seized. Some were dismissed for want of evidence, and others were bound over to appear for trial. Two were convicted of treason, but were pardoned by the President. As a precautionary measure, 2500 troops under the command of General Morgan were retained in the disaffected community throughout the winter to serve as a police force. The real significance of the disturbances, which never rose to the dignity of an insurrection, was that it was the first instance in which the strength of the new Federal government to maintain domestic tranquillity and enforce laws was put to the test. The promptness with which the resistance was put down won respect for the government and established valuable precedents with regard to its

peace and duty on similar occasions in the future.

WHISKY JACK. See JAY.

WHISKY RING. In American history, a term popularly applied to an association of internal revenue officers and distillers formed during the administration of President Grant for the purpose of defrauding the government of the excise on distilled spirits. Distillers who refused to pay the assessment were entrapped into technical violations of the law and were forced to contribute or submit to prosecution. Finally it was discovered that the revenue returns were far short of the average, but the criminals could not be reached, on account of the prompt information which they received from members of the ring in the Treasury Department. In 1875, through the active efforts of Benjamin H. Bristow, the Secretary of the Treasury, the frauds were discovered. On May 10, 16 distilleries in St Louis, Milwaukee, and Chicago were seized and indictments were promptly found against some 240 distillers and revenue officials, besides the chief clerk in the Treasury Department, Avery, and O. E. Babcock, the private secretary and confidential adviser of the President. The trials began at Jefferson City, Mo., in October, 1875, and resulted in the conviction of a Treasury agent and a supervisor. Babcock was acquitted in 1876. Most of the other offenders either pleaded guilty or were convicted. The leading defendants who were convicted were pardoned after a short interval. A select committee appointed by the House of Representatives made an exhaustive investigation of the subject. The report with the testimony taken is published in the *House Miscellaneous Document*, No. 186, first session, Forty-fourth Congress. It was shown that during the ten months ending May 1, 1875, the government had been defrauded of $1,650,000 in taxes.

WHISPERING GALLERY. The name given to a number of galleries on the interior of domed buildings which from their construction possess a peculiar echo, transmitting sounds with great intensity to distant points. The most noted of such whispering galleries is in the cupola of St Paul's, London, where a low whisper uttered near one wall may be distinctly heard at the opposite wall 108 feet away.

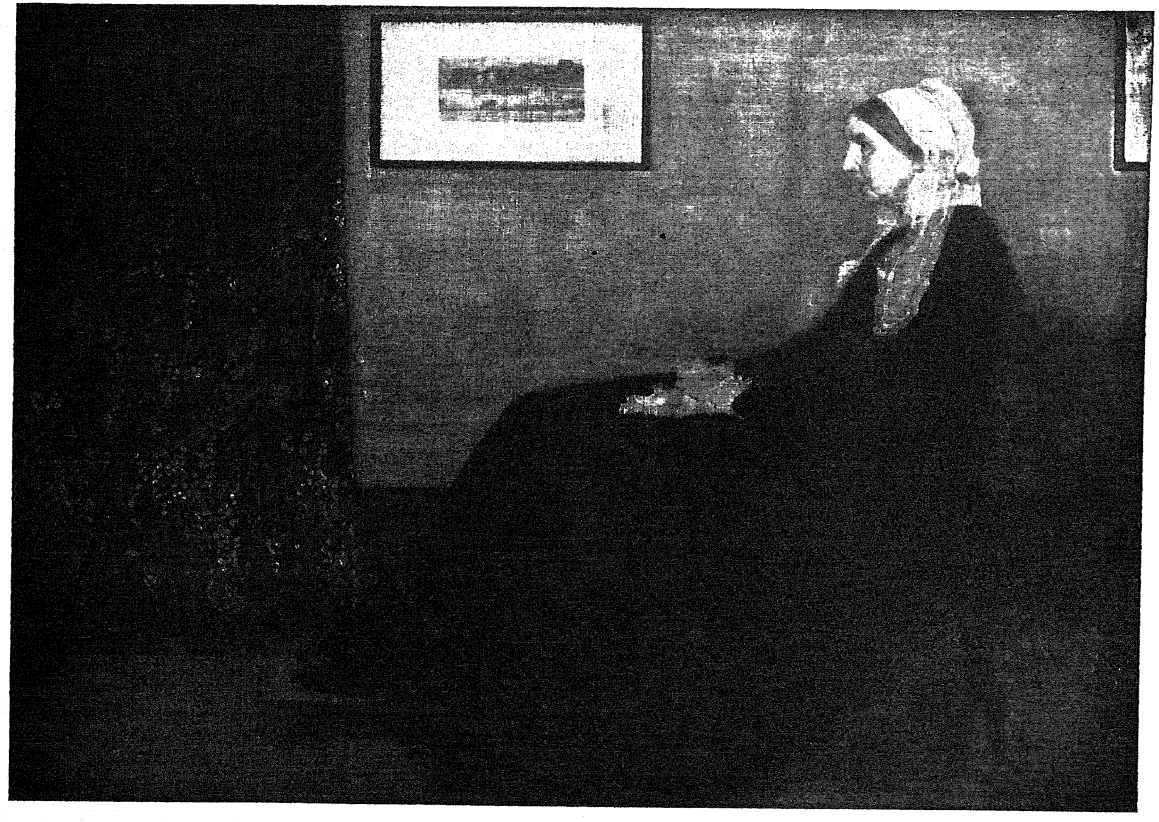
WHIST. A game of cards played with a full pack by four persons, two in partnership against the other two. Its origin, like that of most card games, is very obscure. Under its old name of triumph it had become so commonly understood that when Bishop Latimer preached the Christmas sermon at Cambridge in 1529, he had no doubt his hearers could follow his allegories based upon it. Its first serious study and the formulation of its rules came about by the frequent meetings of a party of whist players at the Crown Coffee House in Bedford Row, London, of whom Edmond Hoyle (q.v.) was one. Up to this time it had been usual to discard the deuces, so that the tricks were often even, six on each side. By bringing the entire pack of cards into play they added the potent factor of the odd trick. In 1760 the laws were revised by the members of two celebrated London clubs, Whites and Saunders, and the rules so revised remained in existence until 1862, when Cavendish published his celebrated treatise, of which more than 30 editions have since been issued. The next important change in the methods of play was the adaptation by Cavendish of the American leads, a method suggested by Nicholas B. Trist of New Orleans, in 1883–84, to classify the various scattered rules for leading, so as to make it possible to establish general principles. This system involves a systematic course of play when opening, and the continuing of leads from strong suits. The rules revised by the Portland Club of London govern whist, except where it is necessary to adopt those of the American Whist League, or where German whist, or Bridge (q.v.) is played. The two pairs of partners sit facing each other, and the entire 52 cards are dealt one at a time, face down, 13 to each player, the last card being turned face upward and its suit determining trumps, the player at the left of the dealer leads first, and the succeeding player must follow suit if he can. The highest card of the suit led (unless some player not having a card of that suit has played a trump) wins the trick. The winner of the trick then leads, playing any card of any suit he chooses, and so on in turn, until all the cards, making 13 tricks, have been played.

Long whist, a game of 10 points in which honors are scored, is now seldom played. Short whist, a game of five points, where honors are scored, is popular in England. The American game is of seven points without honors. Dummy whist is a game played by three persons, the fourth hand, called the dummy, being exposed on the table. The dummy deals at the beginning of each rubber, and is not liable to a penalty for a revoke, neither is the dummy's partner liable to any penalty for an error from which he can gain no advantage, but otherwise the laws are the same as those of whist proper. Double dummy is played by two persons, each player having a dummy or exposed hand for his partner. In this game there is no misdeal and the laws are the same as for dummy whist. In duplicate whist the deal is played but once by each player, but in order to bring the play of teams, pairs, or individuals into comparison each hand is played over again. When it comes the turn of a player to play, he is required to place his card face up before him and let it remain until the others play to the trick, after which he turns it over with the ends towards the winners of the trick. When the deal is played, each player places his hand in the tray or whatever device is employed, face downward, and the trump card is placed face upward on top of the dealer's hand. Russian whist closely resembles the American game, except that there are no trumps and the scoring varies according to agreement, although it is generally as in long whist.

There is a very large bibliography of whist which is easily accessible. The standard work is Cavendish, *Principles of Whist, Stated and Explained* (21st ed., London, 1902). Consult also, Foster, *Complete Hoyle* (New York, 1908).

WHISTLER, or **SIFFLEUR.** A large marmot (q.v.) of the Rocky Mountains, which dwells mostly in the open region above timber line and is noted for its clear whistling note. It is closely related to the woodchuck, and, like other marmots, burrows deeply, and hibernates. Two species are recognized, *Arctomys flaviventer* from Texas to northern Montana, and *Arctomys pruinosus* from the Columbia River to Arctic America. The latter is the siffleur of the old fur hunters.

WHISTLER, hwis'lẽr, JAMES ABBOTT MCNEILL



WHISTLER

PORTRAIT OF THE ARTIST'S MOTHER, FROM THE PAINTING IN THE LUXEMBOURG GALLERY, PARIS

(1834–1903) An American painter and etcher. He was born at Lowell, Mass., July 10, 1834, of an old American military family. His father, Major George Washington Whistler, of the United States army, was a distinguished engineer, and his mother, a Miss McNeill of Wilmington, N. C., was of a well-known Southern family. In 1837 the family removed to Stonington, Conn., thence in 1840 to Springfield, Mass., and in 1843 to St. Petersburg, Russia, Major Whistler having been commissioned by the Czar to construct the railroad between St Petersburg and Moscow. While in St. Petersburg Whistler attended the Imperial Art Academy. After the Major's death (1849) the family returned to Stonington, then settled at Pomfret, Conn., where the lad was sent to school preparatory to entering West Point in 1851. Military discipline and attention to detail were odious to him, and although he distinguished himself in drawing, his record in other subjects was such that after three years he was dismissed from the academy. He was, however, assigned to the United States Coast Survey, but did not remain long, because of a prank in engraving caricatures on the margin of a plate executed in that service. In 1856 he became a pupil of the classicist Gleyre in Paris, but was not perceptibly influenced by this master. He was for some time a follower of Courbet, whose sincere realism he deeply admired, and was intimate with Fantin-Latour and Legros. The low tones and the grand lines of his work call Velazquez to mind, though he never saw the best of the great Spaniard's works in Madrid. From the Japanese he learned subtle decorative effects. But none of these elements dominate his art to such an extent that he can with propriety be called any man's pupil. His individuality was from the beginning unique.

From 1857 to 1863 his pictures were refused at the Salon; but in the latter year his "Little White Girl" achieved a signal success in the Salon des Refusés. As an etcher he found earlier recognition. His *Little French Series* (1858) representing Parisian views, some of a genre character, established his reputation, and the wonderful *Thames Series* (1871) placed him in the first rank. Being executed with considerable detail, these plates met with greater approbation than those of his later life, when he had carried the process of selection to its logical conclusion. His later subjects were taken from Holland, France, and other localities which he visited, but the best known are the *First Venice Series* (1880) and the *Second Venice Series* (1881). They are the culmination of his etching, and place him in the same rank with Rembrandt, the world's greatest etcher, whom he even excels in subtlety of execution. In the rendition of color and of light and shade, in the subtle grouping of line, these works are unique. Whistler was also highly successful in dry-point etching and lithographic drawing, in which media he executed a number of plates. Some 300 of his etchings have been published with comments by Frederic Wedmore (1899), and good examples may be found in the print rooms of the Venice Academy, Dresden Gallery, Bibliothèque Nationale, British Museum, Public Library, New York, and elsewhere.

The eccentricities of Whistler and his quarrels with English artists and critics during his long residence in London from 1859 were, for a long time, better known than his paintings. He was of a very combative disposition, and profoundly impressed with the importance of his own views. His central idea was that painting should appeal only to the eye, and that it was not a medium for the expression of ideas or emotions, the subject being absolutely irrelevant. Emphasizing the analogy with music, he called his paintings arrangements, symphonies, nocturnes, and the like, pitching them in one or two related color tones. For him the public and the critics were fools with no right to an opinion whatever. He quarreled indiscriminately with friend and foe, chiefly by means of public letters, in which he gave vent to an inimitable wit and satire. Especially well known is his quarrel with John Ruskin, who in his *Fors Clavigera* (1877) had given vent to his feelings over one of Whistler's "Nocturnes" in the following language: "I have seen and heard much of cockney impudence before now; but never expected to hear a coxcomb ask 200 guineas for flinging a pot of paint in the public's face." The artist promptly sued for damages, and in the celebrated trial which followed he was awarded one farthing, which coin he triumphantly wore as a watch charm ever afterward. He was no less known for his wit, which usually carried a personal sting, and he left behind a wealth of anecdote. To propagate his ideas he turned increasingly to literature, developing a style as well balanced as it is clear and incisive. *Ten o'Clock* (1888), a lecture delivered at that hour of night, is a statement of his artistic theories; his other works are *The Gentle Art of Making Enemies* (1890), in which he was past master, and the *Baronet and the Butterfly* (1890), an account of a celebrated quarrel. No artist ever had a more interesting signature than Whistler's butterfly, the movement of which suggests the sentiment of the painting or letter.

From the year 1859 Whistler resided chiefly in London, making frequent journeys to Paris, and journeying to Venice in 1880. In 1866, unexpectedly, he visited Valparaiso, Chile. It was before 1890 that he executed most of his paintings. Best known among them is the portrait of the "Artist's Mother" (Luxembourg) —an arrangement in gray and black, executed with rather more detail than most of his works, and a charming picture of placid domesticity. Of almost equal merit is his portrait of Carlyle (1872, Glasgow Museum), in which he has immortalized the thinker. His portrait of Miss Alexander (owned by W. C. Alexander), in gray and green, is delicate and subtle in execution. These portraits are not mere faces or figures, but rather figure paintings, with masterful well-arranged backgrounds. Other celebrated examples of female portraits are Rose Whistler (1862, Boston Museum); "The Yellow Buskin" (Wilstach collection, Philadelphia); "Miss Rosa Corder" (Frick collection, New York); "The Gold Girl, Connie Gilchrist" (Metropolitan Museum); "Lady in a Fur Jacket" (William Burrell); Lady Meux; and Miss Florence Leyland (Brooklyn Institute Museum). His portraits of men include those of his friend Théodore Duret and of Sir Henry Irving as Philip II of Spain (both in Metropolitan Museum); Comte de Montesquieu (Frick collection, New York); and the violinist Sarasate, an arrangement in black (Pittsburgh Academy). Among his celebrated figure subjects are "The Lange Leitzen" (1864, J. J. Johnson, Philadelphia); "At the Piano" (1867), showing the passing influence of Ros-

setti, 'A Princess of the Land of Porcelain" (1865, Freer collection, National Gallery, Washington), the Music Room,' a harmony in green and gold (Col Frank J Hecker, Detroit), and the wonderful 'Symphony in White, No 3' (Edmund Davis), almost Hellenic in spirit

Few artists had as broad a range of subjects as Whistler His landscapes portray the mysterious beauty of the night and the majesty of the ocean who before him saw the splendor of the London fog' He discovered beauty in all about him in the squalid quarters of London and in the commonplace of the drawing room as well as in the magic canals of Venice Among his principal 'Nocturnes" are Cremorne Gardens, No 2" (Metropolitan Museum) the "Falling Rockets (Mrs Samuel Untermyer, Greystone, on the Hudson) (black and gold), 'St Mark's Venice' (blue and gold), "Battersea Bridge (blue and silver) "Thames in Ice" (National Gallery Washington), "Chelsea Snow (gray and gold), Southampton Water" (Art Institute, Chicago) Among marine views are Valparaiso Harbor" (Freer collection, National Gallery), a twilight scene in flesh color and green Blue Wave, Biarritz' (Alfred A Pope), and 'The Ocean' (gray and green), in the Frick collection To these must be added some of the many views of London, like 'Trafalgar Square," Westminster' (Johnson collection, Philadelphia), and 'Westminster Bridge" (Alfred A Pope) Whistler also executed many fascinating water colors, and his Venetian pastels equal, in delicacy and refinement, anything that has yet been done in that medium As a decorator Whistler was also important, and his soft, restful colors have exercised a wide influence upon household decoration Among his best-known decorations are those for the music room of his friend Sarasate in white and clove color (Paris) and for the celebrated "Peacock Room" formerly in Mr Leyland's London house, in blue and gold (now in the National Gallery, Washington)

For a long time Whistler did not meet with deserved recognition, but in 1887 he was elected president of the Royal Society of British Artists Under his administration the quality of art exhibited by the society greatly improved, but its finances declined, and in 1888 Whistler and his following withdrew He remarked, "The artists have come out, and the British remain" In the same year he married the widow of the architect E W Godwin, and she exercised a quieting influence on his life and character The appreciation so long denied was fully meted out to him from 1889 He was made honorary member of the academies of Munich, Dresden, Rome, etc, Chevalier of the Legion of Honor, Knight of the Bavarian Order of St Michael, and he received gold medals at the Paris Exposition, at Chicago, Philadelphia, Antwerp, Dresden, etc During the years 1898–1901 he taught at intervals at the Académie Carmen, Paris, a school opened under his supervision, which in the early years was attended by large numbers of American students These gradually dwindled down to such a small number that the school was closed To this last period belong the "Master Smith" and the "Little Rose of Lyme Regis" (both in the Boston Museum), "The Little Blue Bonnet" (Herbert Pratt), "The Little Lady Sophie of Soho" (Freer collection, National Gallery, Washington) In 1892 he settled in Paris, but in 1895 returned to England 'because' of Mrs Whistler's ill health After her death in 1896, except for short trips abroad he lived mostly in London, where he died July 17, 1903

Whistler holds a unique position in the development of art He was essentially modern, and something of all the most modern tendencies of art centred in him, and yet he was absolutely independent of them all An avowed realist, he differed from others in that nature merely supplied him the material for color harmonies His paintings were often impressions, but, unlike the Impressionists, he was not primarily a painter of light, preferring sad colors He resembled the Japanese in the peculiar decorative character of his work The effect is subtle and dreamy, as of a vision rather than reality. Although he was a fine draftsman, color was to him the chief factor in painting, and not even Velazquez was a greater master of color values His brush work was careful and painstaking, although in the finished painting no trace of effort can be seen His influence has materially affected the British, especially the Glasgow school, the American, and even the French school Although his theories of art were essentially cosmopolitan his ambition was for American art, and he greatly wished his pictures to come into American hands—a wish richly fulfilled The most comprehensive collection of Whistler's work was made by Charles L Freer of Detroit, Mich, who presented it in 1906 to the National Gallery, Washington It contains half a hundred oil paintings, water colors, etchings, etc

Bibliography The authorized biography of Whistler is by E R and J Pennell, *Life of James McNeill Whistler* (new ed, Philadelphia, 1911) Consult also A J Eddy, *Recollections and Impressions of J A McNeill Whistler* (New York, 1903), Mortimer Menpes, *Whistler as I Knew Him* (ib, 1904), Théodore Duret, *Whistler* (Paris, 1904), Way and Dennis, *Art of James McNeill Whistler* (New York, 1905), Frederick Wedmore, *Whistler and Others* (ib, 1906), *Masters in Art*, vol VIII (Boston, 1907), containing a full bibliography, E L Cary, *The Works of J McNeill Whistler* (New York, 1907), O H Bacher, *With Whistler in Venice* (ib, 1908), Samuel Hartmann, *The Whistler Book* (Boston, 1910), Frank Rutter, *Whistler* (New York, 1911), A E Gallatin, *Portraits and Caricatures of James McNeill Whistler An Iconography* (ib, 1913), id, *Whistler's Portraits and other Modern Profiles* (2d ed, ib, 1913), id, *Notes on some Rare Portraits of Whistler* (ib, 1916) For his etchings consult *A Descriptive Catalogue of the Etchings and Drypoints of J A McNeill Whistler* (Chicago, 1909), and E G Kennedy, *Etchings of Whistler* (New York, 1910) Also D C Seitz, *Writings by and about James Abbott McNeill Whistler A Bibliography* (New York, 1910), who also collected and arranged *Whistler Stories* (New York, 1913)

WHISTLER, or **WHISTLEWING** See GOLDENEYE

WHISTON, WILLIAM (1667–1752) A clergyman of the Church of England He was born at Norton, in Leicestershire He studied at home and in a school at Tamworth until 1686, when he went to Cambridge, where he distinguished himself, chiefly in mathematics In 1690 he took his degree, and obtained a fellowship in 1691 In 1693 he became chaplain to John Moore, Bishop of Norwich, and in 1698 was presented to the living of Lowestoft,

in Suffolk In 1696 appeared his *New Theory of the Earth*, a work which procured him a considerable reputation In 1701 he was appointed deputy to Sir Isaac Newton, and in 1703 succeeded him in the Lucasian professorship at Cambridge In addition to his duties he engaged in clerical work with much success as a preacher. The development of his theological opinions led him into Arian heresy, and his avowal of his views in his preaching and his writings led, in 1710, to expulsion from his professorship and the university In 1711 appeared the most noted of his original writings, *An Historical Preface to Primitive Christianity Revived*. His subsequent prosecution in the Church courts dragged along for five years, when it was dropped Whiston remained formally a member of the Church of England until 1747, when he joined the Baptists. Having no regular means of livelihood, he became reduced to great straits; but in disseminating his religious opinions he continued unwearied, and his publications were numerous He also busied himself with scientific investigations, and he was one of the first persons to give lectures with experiment in London In 1715 he instituted a society in London for promoting primitive Christianity, and the meetings were held at his home. He died Aug 27, 1752 Of his many works his translation of Josephus is best known (1737; many subsequent editions). His *Memoirs* (1749) appeared during his life.

WHIT'AKER, JOSEPH (1820–95). An English publisher of theological works especially, and best known perhaps for his *Whitaker's Almanac*. From 1856 to 1859 he edited the *Gentleman's Magazine;* in 1858 he founded the monthly journal, *The Bookseller;* and 10 years later put out his first annual *Almanac*. A *Reference Catalogue of Current Literature* (1874) was periodically revised and enlarged. With one of his sons, Joseph Vernon Whitaker, he founded the *Stationery Trades Journal* in 1880.

WHIT'BY. A town in Ontario County, Ontario, Canada, on Lake Ontario, with harbor, and on the Grand Trunk and Canadian Pacific railways, 30 miles northeast of Toronto (Map: Ontario, G 6). It is the seat of Ontario Ladies' College. It has some manufactures. Pop., 1901, 2110; 1911, 2248.

WHITBY. A seaport and favorite watering-place in the North Riding of Yorkshire, England, on both sides of the mouth of the Esk, where it enters the North Sea, 50 miles northeast of York (Map: England, F 2). The old town, anciently called Streoneshalh, with its picturesque houses, rises in terraces on the cliff crowned by the noble ruins of the Benedictine abbey founded by St. Hilda about 657. Here lived and died Cædmon (q.v.). In 867 the abbey was burned by the Danes, who renamed the town Whitby (White town). In 1078 it was rebuilt by William de Percy as a monastery for men only. Hence the nuns of Whitby described by Sir Walter Scott in *Marmion* are a pure fiction. The magnificent ruins we now see belong of course to the second abbey, for the old buildings of wood and thatch must have been utterly destroyed. The new portion of the town is on the west cliff. A swivel bridge connects the two parts of the town, and admits vessels into the inner harbor. There are shipbuilding and repairing docks, rope and sail-making works, an active import and export trade, important herring fisheries, and a specialty is the manufacture of jet ornaments from a variety of petrified wood found in the vicinity. Pop., 1891, 13,075; 1901, 11,748, 1911, 11,139. Consult Robinson, *Whitby and its Abbey* (London, 1860), and see WILFRID.

WHITCHER, hwich'ẽr, FRANCES MIRIAM (BERRY) (1811–52). An American humorist, born at Whitestown, N. Y. She contributed poems and sketches to the newspapers and won much celebrity for her humorous creation, "The Widow Bedott" She married the Rev. Benjamin W. Whitcher, of Elmira, N. Y., in 1847, and it is said that the claims of people who thought she had used them as models drove her and her husband from his charge Her chief book, *Widow Bedott Papers*, was gathered from her writings in 1855, and a coarsely amusing play was afterward made from it by D. R Locke. Consult the memoir by M L. W. Whitcher in Frances Whitcher's *Widow Spriggins* (New York, 1867).

WHITE, ANDREW DICKSON (1832–**1918**). An American educator, diplomat, and scholar, born at Homer, N. Y. He graduated at Yale in 1853, studied in Paris, and after serving as attaché to the United States legation at St Petersburg during part of the Crimean War, did further graduate work at Berlin. In 1857 he became professor of history and English literature in the University of Michigan. Five years later his health compelled him to go abroad. From 1863 to 1867 he served as a member of the New York Senate. In the latter year he became president of Cornell University (q.v.), which he had helped to found, and occupied that position, together with the professorship of history, until 1885. Two years after his resignation he gave to the new school at Cornell, called in his honor the President White School of History and Political Science, his historical library, consisting of about 30,000 volumes and 10,000 pamphlets and manuscripts. The university, which received from him in all $300,000, owns a bronze statue of Dr. White, done by Karl Bitter. While president he had been one of the commissioners sent in 1871 to Santo Domingo to report on the desirability of annexing that island; in 1876 was chairman of the jury of public instruction at the Centennial Exposition; and in 1878 was honorary commissioner to the Paris Exposition, receiving the officer's cross of the Legion of Honor. Later he was Minister to Germany (1879–81) and to Russia (1892–94); served on the commission to investigate the Venezuela-Guiana boundary line (1896); from 1897 until 1902 was Ambassador to Germany; and in 1899 was made chairman of the American delegation to The Hague Peace Conference. He was elected to the American Academy of Arts and Letters, and was first president (1884) of the American Historical Association. He published: *Outlines of a Course of Lectures on History* (1861); *Syllabus of Lectures on Modern History* (1876); *The Warfare of Science* (1876), enlarged as *A History of the Warfare of Science with Theology in Christendom* (2 vols., 1896; new ed., 1913), and translated into French, Italian, Portuguese, and German; *Seven Great Statesmen in the Warfare of Humanity with Unreason* (1910); *The Work of Benjamin Hale* (1911). Consult his *Autobiography* (2 vols., New York, 1905).

WHITE, BOUCK (1874–). An American Socialist and author, born at Middleburg, N. Y. He graduated from Harvard in 1896, and from Union Theological Seminary (New York) in

1902, for some years was a Congregational minister, and in 1908–13 was head resident of Trinity House, Brooklyn Dismissed because of certain socialistic views, he organized the church of the Social Revolution in New York City As a protest against the attitude of the Rockefeller interests towards the mine war in Colorado, White appeared (May, 10, 1914) at a service of the church to which the Rockefeller family belonged, in order to discuss the question, "Did Jesus teach the immorality of being rich" Upon attempting to speak he was arrested, and soon after, on the charge of disorderly conduct, was sentenced to six months in the workhouse For desecrating the national flag he was again sent to prison in 1916 His writings include *Quo Vaditis* (1903), *The Book of Daniel Drew* (1910), *The Call of the Carpenter* (1911), *The Mixing* (1913), *The Carpenter and the Rich Man* (1914), *Letters from Prison* (1915)

WHITE, CHARLES ABIATHAR (1826–1910) An American geologist, born at North Dighton, Mass He was State geologist of Iowa in 1866–70, and professor of natural history in the State University of Iowa in 1867–73, and in 1873–75 held a similar chair in Bowdoin College He was geologist and paleontologist of the United States Geological Survey between 1874 and 1892, and after 1895 was an associate in paleontology at the United States National Museum His writings comprise 238 titles Those published between 1860 and 1885 were catalogued by J. B Marcott (1885)

WHITE, CLAUDE GRAHAME See GRAHAME-WHITE, CLAUDE

WHITE, DAVID (1862–) An American geologist, born at Palmyra, N Y He graduated at Cornell University in 1886, and in 1899 became a member of the United States Geological Survey, eventually rising to be chief geologist He was also appointed in 1903 associate curator of paleobotany in the Smithsonian Institution His numerous papers on geological and paleontological subjects were published in government reports and scientific reviews

WHITE, EDWARD DOUGLASS (1845–1921) An American jurist, chief justice of the United States Supreme Court He was born in Lafourche Parish, La, and was educated at Mount St Mary's College (Emmitsburg, Md), Georgetown College (Georgetown, D C), and the Jesuit College at New Orleans He left college to enlist in the Confederate army, and served as a private during the latter part of the war At its close he began the study of law in the office of Edward Bermudez, and in 1868 was admitted to the Louisiana bar. His rise to distinction in his profession was rapid Entering politics as a Democrat, in the footsteps of his father, who had been seventh Governor of the State, he was elected State Senator for the term 1874–78 Under appointment of Governor Nichols, he was an associate justice of the Louisiana Supreme Court from 1878 to 1891 In 1891 he was elected to the United States Senate over H C Warmoth, but in 1894, after three years' service, he was appointed by President Cleveland an associate justice of the United States Supreme Court He soon became known as one of the ablest members of the court, and many of his opinions, some of which were delivered without manuscript, were of fundamental importance. In 1910, to the general surprise (and approval) of the nation, President Taft, Republican, Protestant, and of northern interests, appointed to the chief justiceship the ex-Confederate soldier, Democrat, and Roman Catholic Some of White's important opinions were on the Insular cases, *In re Neagle*, *Pacific States Telephone and Telegraph Co v Oregon*, and on the Standard Oil Company and American Tobacco Company cases of 1911 In the latter cases he expounded the famous light-of-reason doctrine to be used in interpreting the Sherman antitrust law (See TRUSTS) Important dissenting opinions were delivered in the Income Tax case of 1894, the Northern Securities (q v) case of 1904, and the Bakeshop cases

WHITE, EDWIN (1817–77) An American historical and genre painter, born at South Hadley, Mass He began to paint portraits at a very early age, and studied in Paris under Picot, and subsequently in Rome, Florence, and Dusseldorf Returning to the United States in 1875, he settled in New York City His genre paintings are marked by a fine feeling for color and a delicate and refined sentiment His historical pictures deal principally with subjects of American history Among the best are "Washington Resigning his Commission" (State House, Annapolis, Md), the unfinished picture of the "Signing of the Compact on the Mayflower" (Yale College), "Thoughts of Liberia, Emancipation," and an "Old Woman Spinning" (Public Library, New York); and "The Antiquary" (Metropolitan Museum)

WHITE, SIR GEORGE STUART (1835–1912) A British soldier, born in County Antrim, Ireland He enlisted in the army in 1853, and was made a captain in 1863 and major in 1873 In 1881 he became lieutenant colonel of the Gordon Highlanders and military secretary to the Viceroy of India, and in 1884–85 participated in the Nile expedition He also took part in Lord Roberts's famous march to Kandahar In 1893–98 he was commander in chief of the forces in India Participating in the Boer War, he conducted the defense of Ladysmith, which made him famous He was promoted to lieutenant general in 1895 and later to general and to field marshal See SOUTH AFRICAN WAR

WHITE, GILBERT (1720–93) An English naturalist He was born July 18, 1720, at Selborne, a secluded village of Hampshire, and grew up in Selborne, at the house known as The Wakes, famous as his lifelong home He attended school for a short time at Farnham, and was afterward sent to the Basingstoke Grammar School Late in 1739 he was admitted to Oriel College, Oxford, where he graduated in 1743, and was elected fellow Ordained to the priesthood, he became curate at Swarraton, and subsequently at Selborne and Faringdon, a neighboring parish He lived mostly at The Wakes, which he inherited in 1763 In 1752 he was made dean of Oriel He died and was buried at Selborne

In 1751 White began a *Garden Kalendar*, which was afterward elaborated into a *Naturalist's Journal*, wherein was recorded the temperature, the wind, and the weather for each day, the trees first in leaf, the plants first in flower, and the birds first to appear or disappear The manuscripts of these diaries, from which extracts have been published, are in the British Museum In 1767 White made the acquaintance of Thomas Pennant, one of the most distinguished naturalists of the eighteenth century, and the two men carried on a correspondence for nine years White's part of this

correspondence and a series of letters to Daines Barrington, another naturalist, formed the basis of the famous *Natural History and Antiquities of Selborne* (1789). The book gives a careful description of the parish of Selborne, quaint and delightful accounts of trees, flowers, birds, etc. Since this volume made its appearance many treatises on natural history have appeared, but this has become a classic. White struck the exact mean between science and literature. Darwin praised the *Natural History* for accurate observation, and Lowell for its "open-air" quality. Others have been fascinated by the style, at once precise and natural. Editions of the *Natural History* are numerous. Perhaps the best is that by Thomas Bell (London, 1877), who bought The Wakes in 1840. Consult the standard biography, *The Life and Letters of Gilbert White of Selborne*, edited by his great-grandnephew, Rashleigh Holt-White (London, 1901), and H. C. Shelley, *Gilbert White and Selborne* (New York, 1906).

WHITE, Gleeson Joseph William (1851–98). An English writer on art, born at Christ Church, in Hampshire. He was educated at Christ Church School and afterward became a member of the Art Workers' Guild. In 1890 he came to New York City, where he conducted the *Art Amateur* (1891–92). Returning to England in 1893, he founded the *Studio*, which he edited for about a year, and to which he contributed up to the time of his death. Among his publications relative to art are: *Practical Designing* (1893, 3d ed., 1897); *Salisbury Cathedral* (1896); *English Illustrations in the Sixties* (1897); and *Master Painters of Great Britain* (4 vols., 1897–98). He also edited during his last years the "Ex Libris Series"; the "Connoisseur Series"; the "Pageant"; and, with E. T. Strange, Bell's "Cathedral Series." White was himself a designer of repute. In 1887 he edited *Ballades and Rondeaus*, a selection from Lang, Dobson, and others.

WHITE, Henry (1850–1927). An American diplomat, born in Baltimore. He was educated privately in the United States and France, and, possessed of large wealth, selected diplomacy for a career. He was secretary of legation at Vienna in 1883–84, was then transferred to London as second secretary, and became secretary in 1886. Frequently charged with important duties as chargé d'affaires, he was the American representative at the International Conference of 1886 which abolished sugar bounties. He was recalled by Cleveland in 1893, but was reappointed secretary of embassy at London in 1897, and served until 1905. By appointment of President Roosevelt he was Ambassador to Italy in 1905–07 and to France in 1907–09, and by appointment of Taft special ambassador to Chile in 1910. In 1906 he was selected to head the United States delegation to the Algeciras Conference respecting Moroccan affairs and, although American participation was regarded as contrary to the Washington-Jefferson policy of neutrality towards all European matters, his tact enabled him to exercise in some respects the influence of an umpire.

WHITE, Henry Kirke (1785–1806). An English poet, born at Nottingham, the son of a butcher of that place. At 15 he was apprenticed to an attorney, and he began to study by himself Latin and other languages. He also became a member of a literary society in Nottingham, and showed ability as a speaker. To the *Monthly Preceptor* he sent several poems which brought him attention. In 1803 he published *Clifton Grove, a Sketch in Verse, with Other Poems*, which secured him influential friends, notably Robert Southey and Charles Simeon of King's College, Cambridge. The latter obtained for him a sizarship in St. John's College, Cambridge. At the university he distinguished himself in the classics; but overstudy ruined his health and he died in his college rooms. In 1807 two volumes of his *Remains* were published by his friend Southey, to whom his manuscripts had been intrusted, prefaced by a memoir. Byron ranked White next to Chatterton. This position time has not confirmed.

WHITE, Henry Seely (1861–). An American mathematician, born at Cazenovia, N. Y. He graduated in 1882 from Wesleyan University, Conn., and later studied at Gottingen (Ph.D., 1891). He served as professor of pure mathematics (1894–1905) and also as secretary of the faculty (1903–05) at Northwestern University, and thenceforth as professor of mathematics at Vassar, in 1911–13 being also president of the Vassar Brothers Institution. In 1907–08 he held the presidency of the American Mathematical Society, of whose *Transactions* he was associate editor (1902–06) and editor after 1907, and in 1915 he was elected to the National Academy of Sciences. White made contributions on the theory of invariants, and on the geometry of curves and surfaces.

WHITE, Horace (1834–1916). An American journalist and financial expert, born at Colebrook, N. H. He graduated at Beloit College in 1853, and in 1854 became city editor of the Chicago *Evening Journal*. In 1856–57 he served as assistant secretary of the National Kansas Committee. As a reporter for the Chicago *Tribune* he accompanied Abraham Lincoln in 1858 in his campaign against Stephen A. Douglas, his account being published in Herndon's *Life of Lincoln*. From 1864 to 1874 he was editor in chief and one of the owners of the Chicago *Tribune*. In 1883 he bought an interest in the New York *Evening Post*, and in conjunction with Carl Schurz and Edwin L. Godkin assumed the control of its columns. In 1899 he succeeded Godkin as editor in chief and he held that position till his retirement in 1903. Widely known for his able discussions of currency and banking problems, he published: *Money and Banking* (1895; 5th ed., rev., 1914); a translation from the Greek of Appian's *Roman History* (2 vols., 1899); *Life of Lyman Trumbull* (1913).

WHITE, Horatio Stevens (1852–). An American German scholar, born in Syracuse, N. Y. He graduated at Harvard in 1873, studied for several years in Europe, and was admitted to the New York bar in 1878. In 1876–78 he was assistant professor of Greek and Latin at Cornell, where he afterward taught German, becoming head of his department in 1891, and also dean of the university faculty in 1896. In 1902 he was appointed professor of German at Harvard. From Glasgow University he received the degree of LL.D. Besides writing a number of magazine articles, he edited: *Selections from Lessing's Prose* (1888); *Selections from Heine's Poems* (1890); *Selections for German Prose Composition* (1891); *Deutsche Volkslieder* (1892). He was also the general editor of Appleton's "Twentieth Century Series of German Classics" (1901–05), and editor of Fiske's *Chess Tales and Chess Miscellanies* (1912).

WHITE, Hugh Lawson (1773–1840). An American political leader, born in Iredell Co., N. C. He served against the Indians in Tennessee in 1792–93, and became private secretary to Governor Blount in the latter year, but soon went to Philadelphia to study. In 1796 he began the practice of law at Knoxville, Tenn. In 1801 he became judge of the Superior Court of Tennessee, and was a member of the State Senate in 1807 and 1809. From 1809 to 1815 he was judge of the Supreme Court, and from 1812 to 1827 was president of the Bank of Tennessee, which for a time was the only bank in the West which did not suspend specie payments. He was again a State Senator in 1817, and from 1821 to 1824 was a commissioner on the part of the United States to settle disputes growing out of the Spanish occupation of Florida. He succeeded General Jackson in the United States Senate in 1825, and served continuously until 1840, though offered the secretaryship of war in 1831. He soon became a leader in the Senate, opposed internal improvements by the Federal government, was instrumental in preventing the recharter of the United States Bank, and in 1829–30 was the author of the bill to remove the Indians west of the Mississippi. He was at first a strong supporter of Jackson, but by his independent course in favoring the bill to limit executive patronage, and especially by his opposition to Van Buren's succession to the presidency, the friendship was broken. In October, 1835, he was nominated for President by the Legislature of Tennessee, and in spite of President Jackson's vigorous personal efforts, carried the State in 1836 by more than 10,000 majority. He also carried Georgia and received altogether 26 electoral votes. He refused to vote for the resolution to expunge the Senate resolutions of censure against President Jackson, but was willing to rescind. By 1838 he declared himself a Whig. When the Democratic Legislature of Tennessee instructed him to vote for the sub-Treasury Bill, he refused and resigned. Judge White's stern sense of rectitude earned for him the appellation "The Cato of the United States." Consult Scott, *Memoir of Hugh Lawson White* (Philadelphia, 1856).

WHITE, Israel C(harles) (1848–). An American geologist. He was born in Monongalia Co., W. Va., and was educated at West Virginia University (A.M., 1872), where he was professor of geology from 1877 to 1892. He resigned to take charge of a large petroleum business. Earlier he had been assistant geologist of the Pennsylvania Geological Survey (1875–84), and of the United States Geological Survey (1884–88), and in 1897 was appointed State geologist of West Virginia. White became recognized as an authority on coal, petroleum, and natural gas. With Prof. Edward Orton (q.v.) he developed the anticlinal theory of gas accumulation (see Gas, Natural, *Mode of Occurrence*). In 1908 he addressed the Conference of Governors at the White House, Washington, D. C. He published many papers and reports, the more extended of which are included in the publications of the West Virginia Geological Survey.

WHITE, James (1863–). A Canadian geographer. He was born at Ingersoll, Ontario, and graduated at the Royal Military College, Kingston, in 1883. During 1884–94 he was engaged on government surveys in the Rocky Mountains and in Quebec and Ontario, and was geographer and chief draftsman of the Canadian Geological Survey (1894–99), and chief geographer of the Department of the Interior (1899–1912). In 1909 he was appointed secretary of the Royal Conservation Commission and in 1913 was promoted to assistant chairman and deputy head of the same. He edited the Canadian sections of numerous geographical works and published large scale maps and a relief map of Canada. His works include *Altitude in Canada* (1901), *Dictionary of Altitudes* (1903), *Maps and Map Making in Canada* (1905), *Atlas of Canada* (1906), *The Ashburton Treaty* (1907), *Oregon and San Juan Boundaries* (1908), *The Labrador Boundary* (1909), *Derivations of Place Names in Canada* (1912).

WHITE, James William (1850–1916). An American surgeon, born in Philadelphia. After graduating M.D. from the University of Pennsylvania in 1871, he was a member of Prof. Louis Agassiz's staff in the Hassler expedition to the West Indies, the Straits of Magellan, and both coasts of South America (1871–72). Settling in Philadelphia, he there held several hospital positions, and also was connected with his alma mater successively, till his retirement, as professor of genito-urinary surgery, of clinical surgery, and as John Rhea Barton professor of surgery. During the early part of the European War he was connected with the American Ambulance Hospital in Paris. Aberdeen gave him its LL.D. He published, with W. W. Keen (q.v.), *American Textbook of Surgery* (1896) and, with Edward Martin, *Genito-Urinary Surgery* (1897), both standard works, also many other contributions to medical literature. Dr. White left $400,000 to the University of Pennsylvania, $150,000 of this to establish the J. William White chair of surgical research.

WHITE, J(ohn) Campbell (1870–). An American religious leader and educator, brother of Wilbert W. White (q.v.). He was born in Wooster, Ohio, and graduated from the University of Wooster in 1890. After two years of experience as national college secretary of the Y. M. C. A. and as traveling secretary of the Student Volunteer Movement, he was general secretary of the Y. M. C. A. at Calcutta, India, till 1903, then secretary of the Ways and Means Committee of the United Presbyterian Church for three years. But he became particularly well known after 1907 as secretary of the Laymen's Missionary Movement. In 1916 he was chosen president of the University of Wooster.

WHITE, John Williams (1849–). An American classical scholar, born in Cincinnati, Ohio. He graduated at Ohio Wesleyan University in 1868 and took his Ph.D. in 1877 at Harvard, where he was assistant professor of Greek from 1877 to 1884, and then professor till his retirement in 1909. In 1879 he was one of the prime movers in organizing the Archæological Institute of America. Later, he helped to establish the American School of Classical Studies at Athens; he was first chairman of the Managing Committee of the School (1881–86), and twice annual professor. He received honorary degrees from various American universities and the Litt.D. of Cambridge. He was author of a number of philological papers and editor of Greek texts for schools; also supervising editor of the *College Series of Greek Authors* (30 vols.). He published also *The Verse of Greek Comedy* (1912); *The Old Scholia on the Aves of Aristophanes* (1915). He was

a prominent champion of the "New Metric," whose cardinal principle is that, in the interpretation of the metres of classical Greek and Roman poetry, the main reliance must be the statements of the ancient metricians. See VERSIFICATION, *Greek and Latin*.

WHITE, JOSEPH BLANCO (1775–1841). A British writer on theological themes He was born in Seville, Spain, of Irish and Spanish parentage. In 1800 he was ordained priest in the Roman Catholic church But his views changed, and in 1810 he went to England. He settled in London, where for some years he conducted a monthly Spanish paper called *El Español*. On the cessation of the Peninsular War (1814), this publication came to an end; but meanwhile its services to the government secured for its editor a life pension of £250 per annum. For some time White lived at Oxford, where he qualified (1814) for the English church, but finally declared himself a Unitarian. Though in literary circles recognized as a man of fine talent, and known as a contributor to the *Quarterly* and to the *Westminster*, and to other periodicals, he scarcely succeeded in making a permanent impression on the public by any of his more formal publications. Of these the most important were: *Letters from Spain* (1822); *Practical and Internal Evidence Against Catholicism* (1825), *Poor Man's Preservation Against Popery* (1825); and *Second Travels of an Irish Gentleman in Search of a Religion* (1833). He died on May 20, 1841, in Liverpool. In 1845 appeared, under the editorship of J. H. Thom, his most striking work, *The Life of the Rev. Joseph Blanco White, Written by Himself, with Portions of His Correspondence* White is likely to be longest remembered for a magnificent sonnet entitled "Night and Death."

WHITE, PEREGRINE (1620–1704). The first English child born within the limits of New England He was born on the *Mayflower*, in Cape Cod harbor. After his father's death his mother married Gov. Edward Winslow, this being the first marriage in New England. Josiah Winslow (q.v.), first native Governor of Plymouth Colony, was his half brother. He held several military and civil offices.

WHITE, RICHARD GRANT (1821–85). An American Shakespearean scholar and linguistic critic, born in New York. A graduate of New York University (1839), he studied medicine, then law, was admitted to the bar (1845), became a journalist, and during the Civil War wrote a remarkable series of letters for the London *Spectator*, signed A Yankee, and an influential satirical parody, *The New Gospel of Peace*. He was for many years chief of the United States Revenue Marine Bureau in the district of New York. His chief books were: *Shakespeare's Scholar* (1854); a critical edition of *Shakespeare's Works* (1857–65); *Essay on the Authorship of the Three Parts of Henry VI* (1859); *Memoirs of William Shakespeare* (1865); *Studies in Shakespeare* (1885); and in the field of linguistics, *Words and Their Uses* (1870); *Every-Day English* (1881); and *England Without and Within* (1881). He edited also *The Riverside Shakespeare* (1883), and contributed frequently to literary periodicals. His novel, *The Fate of Mansfield Humphreys*, appeared the year before his death. White was dogmatic and inclined to controversy, but as a critic and man of letters did substantial work. See also WHITE, STANFORD

WHITE, STANFORD (1853–1906). An American architect, son of Richard Grant White. He was born in New York City, was educated in private schools and by private tutors, studied architecture under Charles D. Gambrill and Henry H. Richardson (q.v.) and was chief assistant to the latter in the construction of Trinity Church, Boston. He continued his studies in Europe in 1878–80, and in 1881 united with Charles F. McKim and William R. Mead (qq.v.) to form the architectural firm of McKim, Mead & White. In association with this firm he designed, either wholly or in part, Madison Square Garden, the buildings of the Freundschaft, Century, and Metropolitan clubs, the Washington Arch, the Tiffany Apartments, the library of Columbia University, buildings for New York University, and the Madison Square Presbyterian Church (1906) in New York City; buildings for the University of Virginia; pedestals for a number of statues, including Saint-Gaudens's statue of Admiral Farragut, in Madison Square, New York, and numerous private residences. He was especially gifted in decorative design, having a keen sense of monumental as well as of picturesque effects and a remarkable taste in decorative detail and color effects. In June, 1906, he was killed, in the Madison Square Roof Garden, by Harry K. Thaw.

WHITE, STEWART EDWARD (1873–) An American author, born at Grand Rapids, Mich. He was educated at the University of Michigan, where he graduated in 1895, and at Columbia Law School. His stories, of which the setting, usually Western, is vividly sketched, include: *The Westerners* (1901); *The Claim Jumpers* (1901); *Conjurer's House* (1903); *The Forest* (1903); *Blazed Trail Stories* (1904); *The Mountains* (1904); *The Silent Places* (1904); *The Pass* (1906), with S. H. Adams; *The Mystery* (1907), with S. H. Adams; *The Rired man* (1908); *The Cabin* (1910); *The Land of Footprints* (1912); *African Camp Fires* (1913); *Gold* (1913); *Gray Dawn* (1915); *Rediscovered Country* (1915). Consult J. C. Underwood, *Literature and Insurgency* (New York, 1914).

WHITE, WILBERT WEBSTER (1863–). An American religious leader, born at Ashland, Ohio, brother of J. Campbell White (q.v.). He graduated from the University of Wooster in 1881, and in 1885 from Xenia Theological Seminary, where he was professor of Hebrew and Old Testament literature in 1890–95. For two years he taught at the Moody Bible Institute, Chicago, and then till 1900 was engaged in Bible work in India and England. Thenceforth he was president of the Bible Teachers Training School, New York City, which he built up to be one of the leading institutions of its kind. His writings include: *Thirty Studies in the Gospel by John* (1896); *Inductive Studies in the Minor Prophets* (1894); *Thirty Studies in Jeremiah* (1895); *Thirty Studies in the Revelation* (1897); *Studies in Old Testament Characters* (1900; 2d ed., 1904); *Availing Prayer* (1900); *Thirty Studies in the Gospel by Matthew* (1903).

WHITE, WILLIAM (1748–1836) An American bishop of the Episcopal church. He was born in Philadelphia and educated at what was then known as the College of Philadelphia. After making his theological studies, he went to England and was ordained deacon in 1770 and priest in 1772. Returning to America, he became rector of Christ Church and St. Peter's,

Philadelphia, and was chaplain to Congress in 1777. On the formal organization of the Episcopal church, he presided over the first General Convention (1785), and was the principal author of the constitution then adopted. In 1786 he was elected Bishop of Pennsylvania. During the rest of his life he held a commanding influence in the development of the church. His chief publications were *Memoirs of the Protestant Episcopal Church* (1820, revised 1880) and *Lectures on the Catechism* (1813). For his biography, consult B. Wilson (Philadelphia, 1839); and see EPISCOPAL CHURCH.

WHITE, WILLIAM ALANSON (1870–). An American neurologist and alienist. He was born in Brooklyn, N. Y., studied at Cornell from 1885 to 1889, and two years later graduated from the Long Island College Hospital. For nine years he was an assistant physician at the Binghamton (N. Y.) State Hospital, and from 1903 superintendent of the Government Hospital for the Insane at Washington. In the same year he accepted the post of professor of nervous and mental diseases at Georgetown University, and in 1904 a similar chair at George Washington University, lecturing besides at the Army Medical School. He published *Mental Mechanisms* (1911) and *Outlines of Psychiatry* (5th ed., rev., 1915), and also did important work in collaboration (see JELLIFFE, SMITH ELY).

WHITE, WILLIAM ALLEN (1868–). American journalist and author, born in Emporia, Kans., and educated at Emporia College and the University of Kansas. Upon leaving the university in 1890 he devoted himself to journalistic work, and in 1895 became proprietor and editor of the Emporia *Gazette* (daily and weekly), which he made one of the notable small papers of the country, distinguished for its editorials and its policies. An editorial published in August, 1896, entitled "What's the Matter with Kansas?" was reprinted throughout the country. For a time after 1906 he was a member of the staff of the *American Magazine*. In 1912 he became a member of the Progressive National Committee and chairman of its publicity committee. He was elected to the National Institute of Arts and Letters. His writings, for the most part collected stories or sketches, picture life in the mid-Western town with penetrating vision and broadly human outlook. They include: *The Real Issue* (1896); *The Court of Boyville* (1899); *Stratagems and Spoils* (1901); *In Our Town* (1906); *A Certain Rich Man* (1909); *The Old Order Changeth* (1910); *God's Puppets* (1916).

WHITE, SIR WILLIAM ARTHUR (1824–91). An English diplomat, born at Pulawy, Poland. He was educated at Trinity College, Cambridge, and in 1857 entered the British consular service as clerk to the consul general at Warsaw, was frequently acting consul general, and in 1861 became vice consul. In 1864 he was appointed consul at Danzig, and in 1875 was transferred to Belgrade as British agent and consul general. In this capacity he displayed wide knowledge of the Eastern question, and in 1879 was appointed Envoy Extraordinary and Minister Plenipotentiary at Bucharest, Rumania. In 1886 he was confirmed as Envoy Extraordinary at Constantinople. He exerted himself greatly to obtain the acceptance by the Great Powers of the annexation of eastern Rumelia to Bulgaria. At Constantinople his knowledge of languages and of Oriental diplomacy made him very successful. In 1888 he was made a G C B and a member of the Imperial Privy Council.

WHITE, WILLIAM HALE. See RUTHERFORD, MARK.

WHITE, SIR WILLIAM HENRY (1845–1913). An English naval constructor, born at Devonport. Graduating at the Royal School of Naval Architecture in 1867, he entered the construction department of the Admiralty, rising to the rank of chief constructor in 1881. From 1870 to 1881 he was professor in the Royal School of Naval Architecture, reorganizing it when it was merged into the Royal Naval College in 1873. In 1883 he left the Admiralty and organized the shipbuilding department of Sir W. Armstrong, Mitchell, and Company, remaining in charge of it for two years, during which time he designed, among other vessels, the *Takachiho* (Japanese) and the *Charleston* (United States). These were regarded as most important developments in cruiser design and attracted wide attention. In 1885 he returned to the Admiralty as director of naval construction and continued at the head of that department for 17 years, during which he developed the battleship type which for two decades was adopted in nearly all navies. He retired on account of ill-health in 1902 and Parliament made him a special grant in recognition of his distinguished services. During his later years he was largely responsible for the adoption of turbine engines in large passenger steamers and fast cruisers. He became a member of the Royal Society in 1888, a K C B. in 1895, and was president of several of the great British engineering societies. His works include: *A Manual of Naval Architecture* (5th ed., 1900); *Architecture and Public Buildings* (1884); and *A Treatise on Shipbuilding.*

WHITE, SIR WILLIAM THOMAS (1866–) A Canadian financial expert and cabinet minister. He was born at Bronte, Ontario, graduated at Toronto University in 1895, and was admitted to the Ontario bar in 1899. He did not practice his profession, but after several years' newspaper work on the staff of the *Evening Telegram,* was employed in the assessment department of the city government, Toronto. He developed an unusual ability in financial affairs, was president of the National Trust Company in 1900–11, and during the discussion on the Taft-Fielding reciprocity agreement took a prominent part against that proposal and substantially contributed to the downfall of the Laurier administration. White had previously been a Liberal in politics, but in October, 1911, after the return of the Conservatives to power under Sir Robert Laird Borden, he was appointed Minister of Finance. In 1915 he was knighted.

WHITE ANT. See TERMITE.

WHITEAVES, JOSEPH FREDERICK (1835–1909). A Canadian paleontologist. He was born at Oxford, England, was educated there, and at London and Brighton, and made a special study of zoölogy and invertebrate paleontology. In 1861 he removed to Canada. He was scientific curator and recording secretary of the Natural History Society of Montreal in 1863–74, and made five deep-sea dredging expeditions to the gulf and river of St. Lawrence in 1867–73. He became a member of the Canada Geological Survey in 1875, paleontologist and zoölogist to the survey in 1876, and subsequently an assistant director. His publications include important articles on marine invertebrates, on the inverte-

brate fossils of the upper Cretaceous rocks of Vancouver, and other similar subjects. He was one of the original fellows of the Royal Society of Canada

WHITEBAIT. The young of any kind of herring or related fish, much in request in Great Britain as a delicacy and sold in considerable quantity in the United States as well

WHITE BASS, or WHITE PERCH A striped bass (*Roccus chrysops*) of the Great Lakes and upper Mississippi region, which is silvery, tinged with golden below, and marked with narrow dusky lines on the sides It prefers deep waters, and is good food See Plate of BASS.

WHITE BAY. See MAGNOLIA

WHITEBOYS. The name given to peasant associations in Ireland, formed after 1760, for the purpose of visiting revenge on landlords, tax collectors, and the clergy The members committed many outrages on the property and persons of those against whom they entertained grievances Their depredations took place at night and those engaged in them were protected by blackened faces and white garments. Similar organizations of a somewhat later period assumed the names of "Hearts of Steel," "Hearts of Oak," and "Rightboys." This form of popular justice was personified under the name of "Captain Rock"

WHITE BRANT. See SNOW GOOSE.

WHITECAPS. A general name derived from their disguise, for bodies of men in the United States who assume the function of administering punishment for real or fancied offenses against the community.

WHITE CEDAR. See CEDAR; CHINA TREE; LIBOCEDRUS.

WHITECHAPEL, hwīt'chăp'el. An eastern Parliamentary district of metropolitan London, England, originally named from a certain chapel within its limits. In early times all distances east of London were measured from this chapel. It is one of the poorest and most congested districts of the city. It is traversed by Whitechapel Road, and London Hospital and the Tower of London are within its limits. Pop., 1901, 78,758; 1911, 96,346.

WHITE CINNAMON. See CANELLA.

WHITE COMPANY, THE. A name assumed by various bands of thirteenth and fourteenth century freebooters. The first was organized and led by Folquet, Bishop of Toulouse, for the purpose of slaughtering heretics in France. A second commanded by Du Guesclin received its name from the white cross worn upon each member's shoulder. In 1366 he led his marauding company into Spain to support Henry of Trastamara against Pedro the Cruel. A third crossed from France into Italy, and under the banners of Milan and Florence, or as independent freebooters under the command of Sir John Hawkwood (q.v.) plundered the country until disbanded in 1391. Conan Doyle's *White Company* (1890) describes the Spanish campaign under Du Guesclin.

WHITE CROAKER. See QUEENFISH.

WHITE DAMP. See COAL, *Mining.*

WHITE DEVIL, THE, or VITTORIA COROMBONA. A tragedy by Webster, originally performed in 1608, published in 1612.

WHITE DIARRHŒA OF CHICKENS. See DIARRHŒA, WHITE, OF CHICKENS.

WHITE EAGLE, ORDER OF THE. A Servian order with five classes commemorating the establishment of the Servian Kingdom, founded by King Milan I in 1882 The decoration is a double-headed eagle of white enamel surmounted by a crown. The oval medallion is red and bears a white cross with flames On the reverse are the initials M I crowned and the date of foundation See Plate of Orders, under ORDERS

WHITE ELEPHANT. An infrequent albino type of Asiatic elephant which from its rarity is highly esteemed. Owing to the costly honors paid to such an animal, the term has become proverbial with the meaning of an expensive or unwelcome possession The "Land of the White Elephant" is Siam

WHITE ELEPHANT, ORDER OF THE. A Siamese order with five classes, founded in 1861. The decoration, which varies slightly for the different classes, is a circular medallion with the elephant in white enamel, surrounded by three wreaths of yellow, red, and green lotus blossoms. See Plate of Orders under ORDERS

WHITE ESKIMOS, or BLOND ESKIMOS. The popular name for a group of Eskimo residing on both sides of Coronation Gulf between Canada and Victoria Island, discovered by Stefánsson in 1910. The peculiarity giving rise to this name is the frequent occurrence of light hair and gray or blue eyes in contrast to the universal black hair and dark eyes of all New World races. According to Stefánsson's data the form of head and face among these blond-like Eskimo inclined towards the European type, upon the basis of which he proposed the theory that the phenomenon was due to early mixture with Norse colonists from Greenland. Consult Stefánsson's *My Life with the Eskimo* (New York, 1912).

WHITE EYE, or GLASS EYE. The wall-eyed pike. See PIKE PERCH, and Plate of PERCHES.

WHITE EYE, or SILVER EYE. A general name for a large group of small, plainly dressed, titmouse-like birds of the genus *Zosterops*, the many species of which are scattered over the tropics of the Old World, especially in the East, where several species are confined to single islands. Nearly all are yellow on the under surface. They are somewhat doubtfully classified with the honey eaters (Meliphagidæ), and take their English name from the ring of white glistening feathers around the eye in most species. They go about in merry flocks, and have many interesting characteristics. Though mainly insectivorous, they feed upon fruits; some are known to the Australians as grape eaters. Consult Alfred Newton, *Dictionary of Birds* (New York, 1896), and authorities there. See Plate of WRENS, WARBLERS, ETC.

WHITE-EYED VIREO. See VIREO.

WHITE-EYELID MONKEY. See MANGABEY

WHITE FALCON, ORDER OF THE. A grand-ducal order of Weimar, founded by Duke Ernest Augustus in 1732, and renewed in 1815 by Charles Augustus. In its present form it has four classes and a silver cross, added in 1878. The decoration, a green star of eight points, with red stars between the arms, bears a white falcon, and the motto, *Vigilando Ascendimus*, on a blue ground.

WHITEFIELD, whīt'fēld, GEORGE (1714–70). An English evangelist and founder of the Calvinistic Methodists. He was born at the Bell Inn, Gloucester, and attended a classical school for three years, where he distinguished himself more by histrionic achievements than by studious zeal. In 1732 he was admitted as a servi-

tor at Pembroke College, Oxford, and graduated B A in 1736 At Oxford he met the Wesleys and with them founded the Holy Club He was ordained deacon in 1736, and soon went to London In 1738 he followed the Wesleys to the Georgia Plantations and remained four months, returning to England for his priest's orders and to collect money for an orphanage he had founded in the colony He found that his association with the Wesleys had raised prejudice against him nevertheless he was ordained priest by Bishop Benson (1739) Whitefield began open air preaching at Moorfields, Kensington, Blackheath, and elsewhere, and after this seems to have preached by preference in the open air Crowds came to hear him In 1739, having collected more than £1000 for his orphanage, he returned to America He landed at New York and proceeded to Georgia, preaching with great success on the way The first brick of the orphan asylum was laid in March, 1740, and the name of Bethesda was given to the institution He preached to large audiences in Savannah and also in Philadelphia and Boston, which he visited in 1740 His association with dissenters and unconventional ways of preaching and conducting services brought him into strained relations with the church, and about this time doctrinal differences separated him from Wesley. The two men differed widely in theology, Whitefield being a rigid Calvinist, but they continued friends nearly all their lives In 1741 Whitefield went to England and preached with his usual zeal and eloquence, making tours into Wales and Scotland He presided at the first conference of Calvinistic Methodists held at Watford in 1743, and at the second conference a few months later was chosen perpetual moderator in England

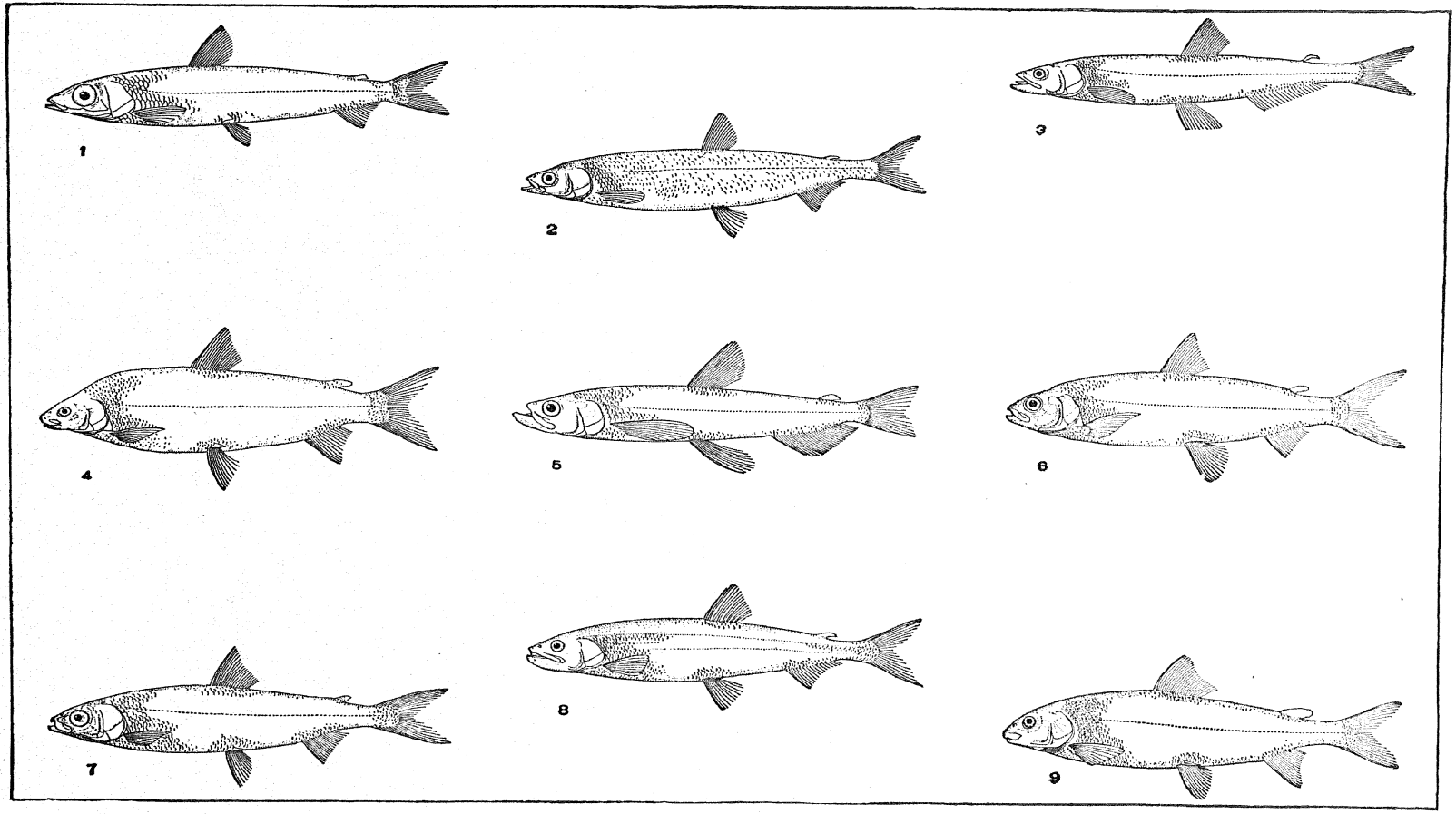
In 1744 he again sailed for New York, and was again enthusiastically received, although his irregular ways brought opposition In 1748 he visited the Bermudas for his health, and preached twice each day on the islands of the group On his return to England in 1748 he found his congregation scattered He was in pecuniary difficulties, as he had sold most of his property to help the Georgia orphanage With the aid of friends, however, he gradually paid his debts About this time the Countess of Huntingdon (q v) made him her chaplain and gave him the opportunity of preaching to certain of the nobility at her house She helped him materially in his enterprises and built and endowed chapels to maintain his doctrines In 1751 Whitefield visited Ireland and Scotland and made a fourth voyage to America On his return to London he took up the project of a new tabernacle, which was opened June 10, 1753 After preaching in it a few times he went on another evangelistic tour in England, traveling 1200 miles and preaching many times In 1754–55 he was again in America In September, 1756, he opened a new chapel at Tottenham Court Road He visited America for the sixth time in 1763–65 His health was failing and his power of preaching impaired In October, 1765, he dedicated the Countess of Huntingdon's chapel at Bath, opened her college at Trevecca in August, 1768, and dedicated the chapel at Tunbridge Wells in July, 1769 Two or three months later he sailed for the seventh time for America He went to Savannah, and preached much in Pennsylvania and New England. On Sept. 29, 1770, after preaching for two hours at Exeter, N H., he went to Newburyport, Mass, where he died the next morning He is buried in the Old South Church there Whitefield is said to have preached more than 18,000 sermons His great power was due to his delivery rather than to the matter of his discourses his writings do not sustain the impression derived from accounts of his preaching He was not an organizer, and his congregations soon scattered Many of his converts united with the Methodists A number of his sermons and journals were collected and published in six volumes (London, 1771–72) Many original letters of George Whitefield are in the Congressional Library Consult John Gillies, *Memoirs* (London, 1773), Luke Tyerman, *Life of George Whitefield* (2 vols, London, 1876–77), the most complete biography also *Cambridge Modern History*, vol vi (New York, 1909), containing a brief bibliography, L F Benson, *The English Hymn Its Development and Use in Worship* (ib, 1915), and references under METHODISM WESLEY, JOHN

WHITEFISH One of the many important fishes of the genus *Coregonus*, of the salmon family, of which about 15 species inhabit the lakes and streams of northern Europe, Asia, and America They have an elongated, compressed body, with a conical head, projecting snout, and a small, toothless mouth The scales are larger than in the other salmon, the caudal fin is deeply forked, and the dorsal fin is followed by an adipose dorsal They are bluish olivaceous above, silvery on sides and below The most familiar species is the common whitefish (*Coregonus clupeiformis*), which exists throughout the Great Lakes and adjacent waters, and is the most important fresh-water fish in America The annual catch of whitefish in Canada and the United States is over 30,000,000 pounds, representing a value of more than $1,500,000 Whitefish reach a size of 20 pounds in rare cases, the average weight being about four pounds They remain in deep water for the most part, but during the spawning season, which is in autumn, and at certain other times, for purposes which are not yet clear, they migrate to shallower water in great shoals They live mainly on small crustaceans, mollusks, insects, and larvæ A single fish will yield from 25,000 to 75,000 eggs, which are extensively propagated artificially by the United States Fish Commission

The Rocky Mountain whitefish, or mountain herring (*Coregonus williamsoni*), is an excellent species numerous in clear streams from the Rocky Mountains to the Pacific coast, it is a favorite of anglers, as it will take a fly The broad whitefish or muksun (*Coregonus kennicotti*) is the best known of several arctic species The humpback (*Coregonus nelsoni*) is Alaskan The Sault whitefish (*Coregonus labradoricus*) is a fine species numerous in all clear lakes and streams from Lake Winnipeg to Labrador and southward into the Adirondack and White mountains, where it is known as the "whiting of Lake Winnipiseogee" The lakes from New England northwestward to Alaska contain a valuable species of dark color (*Coregonus quadrilateralis*) called roundfish, shadwaiter, Menominee whitefish, pilot-fish, etc The ciscoes (q v) constitute another and closely related group (the genus *Argyrosomus*), containing several useful species, as the cisco, blackfin, tullibee, and others (qq v) The inconnu is another whitefish, of the genus *Stenodus*

Consult Jordan and Evermann, *Fishes of North and Middle America* (Washington, 1896),

WHITEFISH, SMELTS, ETC.



1. EUROPEAN ARGENTINE (Argentina silus).
2. SURF SMELT (Mesopus pretiosus).
3. CANDLE-FISH or OOLACHAN (Thaleichthys Pacificus).
4. COMMON WHITEFISH (Coregonus clupeiformis).
5. CAPELIN (Mallotus villosus).
6. BLACKFIN (Argyrosomus nigripinnis).
7. CISCO or LAKE HERRING (Argyrosomus Artedi).
8. AMERICAN SMELT (Osmerus mordax).
9. ROCKY MOUNTAIN WHITEFISH (Coregonus Williamsoni).

id., *American Food and Game Fishes* (new ed., New York, 1914). See FISHERIES, SALMON, and Plate of WHITEFISH, ETC.

WHITEFRIARS. A region in London near Fleet Street, where a monastery of the Carmelites (q.v.) dating from the thirteenth century, formerly stood. Until the end of the seventeenth century it formed a place of sanctuary for debtors and criminals. See ALSATIA.

WHITE GOAT. See ROCKY MOUNTAIN WHITE GOAT.

WHITE GUM. See EUCALYPTUS.

WHITE'HALL. A building, formerly a palace in London, once the residence of Hubert de Burgh, later (thirteenth century), of the archbishops of York, and known as York Palace. After the death of Wolsey, it became crown property, and was called Whitehall. After a fire in 1615, James I planned to replace it from designs by Inigo Jones, who conceived an enormous structure with seven courts, evidently inspired from Delorme's plans for the Tuileries (q.v.). Only the banqueting hall was built, the earliest specimen of Palladian architecture in England, and thus of great artistic importance despite its moderate size. The hall proper has ceiling paintings by Rubens representing the apotheosis of James I and scenes from the career of Charles I. The older parts of the palace were burned in 1691 and 1697. Whitehall was the scene of Wolsey's disgrace, Henry VIII's death, the execution of Charles I, who was led to the scaffold from the banqueting hall, and the deaths of Cromwell and Charles II. The hall now serves as a military and naval museum. The street leading from Trafalgar Square to Westminster, in which the palace stood, is known as Whitehall. It contains a number of public buildings, including the Horse Guards, Treasury, and new public offices.

WHITE HALL. A city in Greene Co., Ill., 66 miles north-northwest of St. Louis, Mo., on the Chicago and Alton, and the Chicago, Burlington, and Quincy railroads (Map: Illinois, D 7). There are flour mills, machine shops, a milk-condensing plant, and manufactories of sewer pipe, drain, tile, stoneware, etc. Pop., 1900, 2030; 1910, 2854.

WHITE'HALL. A village in Washington Co., N. Y., 78 miles north of Albany, at the head of Lake Champlain, on the Champlain Canal, and on the Delaware and Hudson Railroad (Map: New York, G 3). It has large lumber interests, and is engaged in the manufacture of silk. There are also railroad shops and several smaller industrial establishments. Pop., 1900, 4377; 1910, 4917. Whitehall was settled in 1761 by Major Philip Skene, at the head of about 30 families, and in November, 1763, it was incorporated by patent. On the approach of the Revolutionary War Skene became a Loyalist, and in 1775 the Americans took possession of his property, at the same time that they seized Ticonderoga. An American garrison was stationed here from 1776 until the approach of Burgoyne's army, when the fort was blown up and the houses, mills, etc., were burned to prevent their falling into the hands of the enemy. At the close of the war the whole Skene property was sold to the highest bidder for £14 10s. In the War of 1812 the fort and blockhouse were rebuilt. The Champlain Canal was built from here to Fort Edward in 1819 and completed to Troy in 1824.

WHITE HART, THE. An historic inn in Southwark, London. It is said to have been a resort of Dick Turpin and is mentioned in Act IV, Scene 8 of Shakespeare's *Henry VI*, part ii.

WHITE'HAVEN. A seaport in Cumberland, England, near the point where the estuary of the Solway Firth joins the Irish Sea, 36 miles southwest of Carlisle (Map: England, C 2). It has spacious streets, handsome shops and public buildings, and possesses a commodious harbor and docks. In the neighborhood are extensive collieries, iron and brass foundries, iron-smelting works, and manufactories for cordage, sail cloth, earthenware, etc. The town was founded in 1633. Pop., 1901, 19,325; 1911, 19,044.

WHITE'HEAD, ALFRED NORTH (1861–). A British mathematician. He was born on the Isle of Thanet, and attended Sherborne School. Later he held a fellowship at Trinity College, Cambridge, where he became mathematical lecturer, and at various times was a member of the councils of Trinity, Girton, and Newnham colleges, Cambridge. Whitehead lectured on applied mathematics and mechanics at University College, London, in 1911–14, and thenceforth was professor of applied mechanics at the Imperial College of Science. In 1903 he was elected a fellow of the Royal Society, and in 1915 was chosen president of the Mathematical Association. Besides contributions to journals his publications include: *A Treatise on Universal Algebra* (1898), and *An Introduction to Mathematics* (1911).

WHITEHEAD, JOHN (?1740–1804). An English Wesleyan clergyman and physician. He was born in London, studied medicine, and became physician to the Bethlehem Hospital, Moorfields. He traveled as a Methodist preacher, 1764–69. For some years he was a Quaker, but returned to the Methodists. He was chief physician to both John and Charles Wesley in their last illnesses, and preached the funeral sermon of John Wesley. With Bishop Coke and Henry More he was appointed by Wesley as literary executor, but had a long dispute with the other executors as to the possession of the Wesley papers. This led to his expulsion from the membership of the church. He retained the papers, however, and published the *Lives of John and Charles Wesley* (1793; new eds., Boston, 1844, Auburn, 1854). In 1797 he returned the papers and was reinstated in his position in the church. He died in London.

WHITEHEAD, WILLIAM (1715–85). An English poet laureate, born at Cambridge, where his father was a baker. He was educated at Winchester School and at Clare Hall, Cambridge, graduating B.A. in 1739. In 1742 he was elected a fellow of his college. For many years he lived in the households of the Earl of Jersey and the Earl of Harcourt, with whose sons he made the Continental tour (1754–56). He was appointed secretary and registrar of the Order of the Bath, and in 1758 he succeeded Colley Cibber in the poet-laureateship. He died in London. Whitehead's birthday odes and other official poems were justly ridiculed by the poet Churchill (q.v.). His best work is to be found in his verse tales after the manner of La Fontaine. He also composed two respectable tragedies, *The Roman Father* (1750), and *Creusa, Queen of Athens* (1754); a comedy, *The School for Lovers* (1762); and a farce, *The Trip to Scotland* (1770), all of which met with some success. Consult his *Works*, edited with memoir by William Mason (3 vols., York, 1788). William

Whitehead is sometimes confounded with Paul Whitehead, the satirist, and member of the dissipated circle of politicians known as the monks of Medmenham Abbey. This latter Whitehead was also furiously attacked by Churchill. Consult the *Poems and Miscellaneous Compositions of P. Whitehead*, edited by Capt. E. Thompson (London, 1777).

WHITEHILL, Clarence (1871–). An American dramatic bass, born at Marengo, Iowa. Having studied with H. D. Phelps of Chicago he sang in various churches until, upon the advice of Madame Melba, he went to Paris, where under Giraudet and Sbriglia he prepared himself for the stage. In 1900 he made his début at Brussels as Nilakantha in Delibes' *Lakmé*. His success led to his engagement, the following year, at the Opéra Comique in Paris. With Cosima Wagner he studied the great Wagner parts (Wotan, Amfortas, Hans Sachs, Telramund), and appeared with marked success at Bayreuth and Covent Garden. After 1909 he sang with the Metropolitan and Chicago Opera companies, chiefly in Wagnerian rôles, and also sang in concert.

WHITE HOUSE. The official residence of the President of the United States, in Washington. The building is a two-story white freestone edifice, painted white, 170 by 86 feet, of dignified appearance, with an Ionic portico. It contains the private apartments of the President on the second floor and reception rooms on the first floor. Among the latter are the famous East Room, 80 by 40 feet, used for public receptions; the Blue Room, used for diplomatic and social functions, and the Red and Green rooms. The original executive mansion was begun in 1792 and first occupied by President Adams in 1800. It was burned by the British in 1814, and rebuilt in 1818. Plans for enlargement of the building have frequently been proposed. In 1903 the pressure of space was relieved by the erection of executive offices in the grounds, connected with the main building. The White House is surrounded by an attractive park, in which the Marine Band plays during the summer. Consult Esther Singleton, *Story of the White House* (2 vols., New York, 1907).

WHITE HOUSE OF THE CONFEDERACY. A house in Richmond, Va., the former residence of Jefferson Davis. It contains a collection of Confederate relics.

WHITEING, hwīt'ing, Richard (1840–). An English journalist and novelist, born in London. He began his career as journalist in 1866 with a series of satirical sketches contributed to the London *Evening Star*, afterward published as *Mr. Sprouts—His Opinions* (1867). Subsequently he served as editorial writer and correspondent on several of the English dailies, including the Manchester *Guardian* and the London *World*. He was for a while a leader writer on the London *Daily News*. In 1876 appeared his first novel, *The Democracy*, which was followed 12 years later by *The Island*. But he is best known for *No. 5 John Street* (1899), a vivid description of life in the London slums. Later he published: *The Life of Paris* (1900); *The Yellow Van* (1903); *Ring in the New* (1906); *All Moonshine* (1907); *Little People* (1908); *A Little Book about London* (1912); *My Harvest* (1914), autobiographical.

WHITE LADY. A spirit that, according to popular legend, appears in certain castles of German princes and nobles either by night or by day, when any important event is imminent, particularly the death of a member of the family. She is regarded as the ancestress of the race, appears always robed in white, and carries a bunch of keys at her side. The Hohenzollern family possesses a white lady. A similar legend was current in Scotland, where it was believed that many chiefs had some kind spirit to watch over their fortunes. The entire cycle may be traced back to a goddess of German mythology who influences birth and death, and presides over the household. Still more distinctly the appellation "white lady" as well as the name "Bertha" point back to the Germanic nature goddess Berchta (q.v.). Consult Minutoli, *Die weisse Frau* (Berlin, 1850); Kraussold, *Die weisse Frau und der Orlamunder Kindermord* (Erlangen, 1866); and Schrammen, *Die Schicksals- oder Totenfrau im Hause Hohenzollern* (Cologne, 1888).

WHITE LEAD. A name applied to the hydrated basic carbonate of lead [$2PbCO_3$, $Pb(OH)_2$] used in the manufacture of paints. White lead is usually made by one of the following processes, although there are many patented modifications: Dutch or Stack Process, German or Chamber Process, French or Thenard Process, and the Electrolytic Process.

Dutch Process. First used in 1622 and still regarded as yielding the best product. In this method thin spirals or grids of pure sheet lead are placed in small, glazed earthen pots containing a little weak acetic acid (wood vinegar). The charged pots are placed in a brick shed and packed in moist spent tanbark; the building is eventually filled with tiers of pots separated by loose flooring. Soon after filling active fermentation sets in accompanied by rise of temperature (55°–60° C.—131°–140° F.), water and acetic-acid vapors attack the lead producing the basic acetate, which in turn yields to the carbon dioxide arising from the fermenting bark and slowly changes it into the basic carbonate form. The regenerated acetic acid again attacks the metallic lead producing a fresh supply of acetate.

About three months are required for the operation, but the time may be shortened by using horse manure mixed with the tanbark, but there is danger in this case of developing hydrogen sulphide which discolors the product. When the corrosion period is completed, the grids are bulky, grayish-white, and porcelain-like in appearance. By crushing and screening the grids any unchanged lead is separated and may be used in a new corrosion operation. The coarse white powder is ground wet under an edge-runner mill and levigated. Any neutral lead acetate present is removed by the wash liquid, which is used until it becomes saturated and finally precipitated with soda ash or carbon dioxide. The moist white powder from the settling tanks is dried on unglazed tiles at 80° C. (176° F.). The yield is usually 1¼ tons of white lead from 1 ton of metal. For making the paste with linseed oil it is best to start with somewhat moist white lead, and during the grinding the oil gradually forces the water out of the mass.

German or Chamber Process. This consists in producing the same conditions existing in the Dutch process by artificial means. Use is made of brick chambers arranged with shelves for supporting the sheet lead, provided with steam pipes and means of introducing acetic-acid vapor and carbon dioxide. Corrosion takes place best at 38° C. (100° F.), but there is difficulty in

regulating the flow of water vapor and gas, consequently the product is inferior to that of the older process.

French Process. This depends on the precipitation of the basic carbonate from a solution of basic acetate by carbon dioxide The basic acetate is made by boiling neutral-lead acetate solution with litharge until saturated, the cloudy liquid is clarified by settling and the clear part drawn off into another vessel where carbon dioxide is introduced through pipes. White lead separates as a heavy precipitate and neutral-lead acetate is left in solution After filtering off the liquid which returns to the process the precipitate is washed, drained, and dried. The lead made by this process is cheaper but inferior to that of the Dutch process.

Electrolytic Process. On decomposing sodium-nitrate solution in a wooden cell, provided with a lead anode, a copper kathode, and a porous diaphragm, nitric acid is freed at the anode and forms lead nitrate, while the sodium liberated at the kathode produces caustic soda. The net result of these changes is the production of insoluble lead hydroxide and sodium nitrate. The former is treated with sodium bicarbonate and yields basic carbonate of lead, while the latter returns to the decomposing cell.

Microscopic examination of high-grade white lead shows it to be composed of minute amorphous particles; granular or crystalline forms are a sign of inferiority and disclose a lack of covering power and opacity. There are a number of white-lead substitutes, but none of any value except sublimed white lead, a sulphate form with nonpoisonous qualities and fair covering power but inferior lasting quality. The most frequent adulterant of white lead is barium sulphate, either in the natural form of barytes, or the artificial blanc fixe. Both are distinctly inferior to white lead in covering power and combining capacity with oil. Other cheap white minerals, such as gypsum and china clay, are sometimes used in water-color mixtures. A sure sign of purity in white lead is the complete solubility of the dry powder in acetic acid.

WHITE LEG. See PHLEGMASIA.

WHITELOCKE, hwīt'lōk, BULSTRODE (1605–75). An English lawyer and statesman, born in London. He was educated at St. John's College, Oxford; read law in the temple, and in 1626 was called to the bar and elected member of Parliament for Stafford. In 1640 he was elected to the Long Parliament from Marlow, and, as chairman of the Impeachment Committee, conducted the prosecution of the Earl of Strafford. He was also one of the Oxford commissioners appointed to treat with Charles I; an opponent of Presbyterianism in the Westminster Assembly, 1643; Governor of Windsor, 1644; Commissioner of the Great Seal, 1649; and in 1653 went as Ambassador to Sweden. He refused to take part in the trial of the King. In 1656 he was Speaker of the House of Commons; was one of Cromwell's lords, and after Cromwell's death Commissioner of the Great Seal to Richard Cromwell. He left the manuscripts of an autobiography and other works, the most noteworthy of which are *Memorials of the English Affairs from the Beginning of the Reign of King Charles I to the Happy Restoration of King Charles II* (1682; new ed., 4 vols., 1853); *Journal of the Swedish Embassy in 1653 and 1654* (1772; new ed., 1855); and *Memorials of the English Affairs from the Supposed Expedition of Brute to this Island to the End of the Reign of James I.* Consult R. H. Whitelock, *Memoirs, Biographical and Historical, of Bulstrode Whitelocke* (London, 1860).

WHITE MOUNTAIN BUTTERFLY. A delicate, brownish, satyrine butterfly (*Œneis semidea*), which occupies a very restricted range above 5000 feet elevation in the White Mountains of New Hampshire, most abundantly about half a mile from the summit of Mount Washington It also occurs in the Rocky Mountains of Colorado, and some of its varieties or close relatives in Alaska and on Mount Katahdin, Me. Its larvæ feed upon a species of sedge during midsummer, and pupate, it is believed, for two years. A closely allied butterfly (*Œneis aello*) occurs in the Alps in Switzerland. Consult S. H Scudder, *The Butterflies of New England* (Cambridge, 1889).

WHITE MOUNTAINS. A rugged group of monadnocks occupying the north-central part of New Hampshire, where they cover an area of about 1300 square miles (Map: New Hampshire, G, H 4). They belong to the older or crystalline belt of the Appalachian system, and represent the only part of this mountain axis that has not been reduced to a lowland, then uplifted, dissected, and glaciated. The White Mountains proper extend from Squam Lake in the south to the transverse valley of the Androscoggin and Ammonoosuc rivers on the north. North of that depression there is another highland region which belongs rather to the Green Mountain system of Vermont. Several small and distant outlying monadnocks are, however, regarded as belonging to the White Mountain group, such as Mount Kearsarge and Mount Monadnock in south New Hampshire, and Saddleback Mountain and Mount Katahdin in Maine.

The group is divided into two main portions by a grand and rugged defile known as the Crawford Notch, the valley of the Saco River. West of this notch the principal group is called the Franconia Mountains, whose highest point, Mount Lafayette, has an altitude of 5269 feet. The highest peaks, however, rise to the east of the notch in the Presidential Range, so called because its chief summits are named after Presidents of the United States. The culminating peak is Mount Washington (q.v.), 6293 feet high. Other summits with their altitudes are Mount Adams, 5805 feet; Mount Jefferson, 5725 feet; Mount Clay, 5554 feet; Boot Spur, 5520 feet; Mount Monroe, 5390 feet; and Mount Madison, 5380 feet high. The White Mountains are composed largely of igneous rocks and are bordered on the eastern side by Carboniferous sediments. The soil is poor and gravelly, but the slopes and lower peaks are forest-covered, only the higher peaks raising their bare, rocky summits above the timber line. Besides the main notch there are several other deep river valleys which give the group a more rugged character than that of the average Appalachian mountain scenery; indeed, east of the Rocky Mountains the White Mountains are equaled in height and ruggedness only by the Black and Unaka Mountains of North Carolina. Of the narrow waterways the best known is the Flume at Franconia Notch. The varied scenery has for over a century attracted large numbers of visitors. One of the most celebrated natural features of the region is the "Old Man of the Mountain," a remarkably regular human profile 80 feet high formed by three outjutting rocks on Profile Mountain. The White

Mountains are noted as a resort of hay-fever sufferers. Among the towns and resorts of the region are Lancaster, Littleton, Bethlehem, Gorham, North Conway, and Berlin

WHITE PLAINS. A city and the county seat of Westchester Co, N. Y., 22 miles northeast of the centre of New York City, on the New York Central and the New York, Westchester and Boston railroads (Map: New York, B 2). It has many attractive residences, a public library, the Westchester County Law Library, White Plains Hospital, the Burke Foundation, and a fine county courthouse. Bloomingdale Asylum for the Insane occupies a fine site overlooking the city. Pop., 1900, 7899; 1910, 15,949; 1915 (State census), 19,287; 1920, 21,031.

Here on Oct. 28, 1776, during the Revolutionary War, was fought the battle of White Plains, or Chatterton Hill. On October 12 General Howe occupied Throggs Neck in Westchester County, but was held here for six days by an American force on the mainland, while Washington rapidly evacuated all of Manhattan Island, except Fort Washington, and on the 23d concentrated his forces at White Plains. Howe, unable to make a rear attack, sent 4000 men against the outpost on Chatterton Hill, west of the Bronx River, and compelled the 1400 Americans stationed here under General McDougall to withdraw to Washington's camp, the English losing 229 men, and the Americans about 140. Howe delayed his attack on the main American army, and on the evening of the 31st Washington took up an unassailable position at North Castle. White Plains was incorporated as a town in 1788. Consult Shonnard and Spooner, *History of Westchester County* (New York, 1900).

WHITE POWDER. See EXPLOSIVES.

WHITE PRECIPITATE. Mercur-ammonium chloride, NH_2HgCl. A white, pulverulent compound, prepared by precipitating mercuric chloride with ammonium hydroxide in a cold solution. It is regarded as ammonium chloride in which two hydrogen atoms are placed with one of mercury. As an officinal compound in the pharmacy it is used externally in the form of an ointment for skin diseases.

WHITE RIVER. A river of Arkansas (Map: Arkansas, D 2, 3). It rises in the Boston Mountains near the west border of Arkansas, about 50 miles south of the Arkansas-Missouri line, flows northward into Missouri, then turns southeastward and continues that course to the southeast corner of Arkansas County, Ark., where the channel divides, one stream entering the Arkansas River and the other the Mississippi. It is about 400 miles long.

WHITE RIVER. The chief tributary of the Wabash in Indiana (Map: Indiana, B, C 7). It is formed by the confluence of the East and West Branches. The West Branch rises near the Ohio-Indiana line, flows west, then southwest to its junction with the East Branch. The latter is formed by the union of several streams in Bartholomew County, and flows south and west. From the confluence, near Petersburg, the main stream continues the southwest direction 50 miles to its junction with the Wabash above Mount Carmel, Ill. Total length, including the West Fork, 350 miles. The river is navigable only to Martinsville, some distance below Indianapolis, and on the East Fork to Rockford.

WHITE RIVER. A tributary of the Missouri. It rises in northwest Nebraska, and after a northeasterly and then easterly course through South Dakota, empties into the Missouri near Oacoma (Map: South Dakota, D, E 4). It flows through the Bad Lands. Length, 325 miles.

WHITERUMP, or SPOT RUMP. The Hudsonian godwit. See GODWIT

WHITE RUSSIA. A term indefinitely used of portions of western Russia, and indicating only a general ethnographic division. The name was given by Catharine II to the governments of Vitebsk and Mohilev, but was abolished as a political designation by Nicholas I.

WHITE SEA (Russian *Bieloye More*). A large arm of the Arctic Ocean extending southwestward into north Russia as far as the Sixty-fourth parallel of latitude (Map: Russia, E 1). It is irregular in shape, ranging from 35 to 150 miles in width and about 500 miles long and is frequently conceived as having an inner and outer part. The inner portion consists of three large bays or sections, Kandalak Bay in the northwest, and Dvina and Onega bays in the southeast. The principal rivers entering the White Sea are the Dvina, the Mezen, and the Onega, all from the southeast but the sea receives the surplus waters of a large number of lakes dotting the low and level coast region to the west. In the north and east the country is higher and the coasts are bolder. In spite of the fact that the White Sea is ice-bound from September to June, while dense fogs are frequent, the volume of trade and navigation is considerable. Russia has recently developed the use of the White Sea. Already Petrograd is connected with Archangel, the chief port on the Dvina delta and with Soroka on the west shore. By means of canals connecting the Dvina with the Volga and the latter with the Dnieper a continuous waterway is established between the White Sea and the Caspian and Black seas.

WHITE SHARK. See MAN-EATER SHARK

WHITESIDE, JAMES (1804–76). An Irish judge, born at Delgany, County Wicklow. He graduated B.A. at Trinity College, Dublin, in 1832. Called to the Irish bar in 1830, he was made a queen's counsel in 1842. An eloquent speaker, he distinguished himself in the defense of Daniel O'Connell (q.v.) in 1843 and of William Smith O'Brien (q.v.) in 1848, and in the Yelverton case in 1861. Elected a Conservative member of Parliament in 1851, he represented Dublin University in 1859–66, became Solicitor-General for Ireland in 1852, and held the attorney generalship in 1858–66. In the latter year he was appointed Chief Justice of the Queen's Bench in Ireland. Whiteside was author of *Italy in the Nineteenth Century* (3 vols., 1848), and *Early Sketches of Eminent Persons* (1870).

WHITE SKIN. See LUNGWORM.

WHITE SLAVERY. The terms "white slave" and "white slavery" have been used occasionally for some decades and very frequently in recent years to designate enforced prostitution. In the United States the term "commercialized vice" is sometimes used, though this is synonymous with white slavery only in that it signifies prostitution for gain. White slavery does not include individual voluntary prostitution whether professional or occasional. It signifies the business of procuration by whatever means effected and the enforced service of the prostitute, for the profit of her procurer, protector, or "owner." It implies the transportation and the transfer of control of procured women. Investigations have shown that the

traffic is extensive throughout Europe and America and parts of Asia, Africa, and Australia: and while certain regular methods and channels have been revealed the existence of a closely organized system for its promotion has not been proven

The earliest notable attacks upon the traffic in women were made in the seventies in England through the addresses of Mrs Josephine Butler and in France and Switzerland through the vigorous appeal of Pastor T. Borel in his *The White Slavery of Europe*. In 1877 was held at Geneva the first congress of the International Abolitionist Federation, which since has held regular sessions seeking to destroy state regulation of vice. Such regulation and the regular traffic in women are believed to be mutually dependent In the late seventies at Brussels occurred revelations of scandalous complicity of the police in the traffic and subsequent investigations have uniformly shown that a proportion of the profits of the business are regularly used to secure police protection.

Efforts to secure international agreement to repress the trade were first successful in 1886 when Belgium and Holland entered upon such an agreement. Two years later Holland and Austria-Hungary signed a similar treaty. Then came in 1899, at London, the first session of the Congress for the Suppression of the White-Slave Traffic. It maintains an International Bureau and various national committees; it has held congresses at Frankfort in 1902, at Paris in 1906, at Madrid in 1910, and at London in 1913. The Bureau publishes, monthly, *La Traite des Blanches*. These congresses formulated an international treaty designed for the suppression of the commerce in women, which was signed in May, 1904, by the representatives of France, Germany, Great Britain, Italy, Russia, Sweden, Denmark, Belgium, Holland, Spain, Portugal, Norway, and Switzerland. In 1908 the United States signified its adherence to this treaty.

In the United States investigations of the Committee of Fifteen in 1901, in New York, revealed the existence of white slavery. Similar conditions were disclosed by the Committee of Fourteen, formed in 1905, whose Research Committee published a very notable report *The Social Evil in New York City* (1910). Meanwhile had occurred, in 1907–08, inquiries by the Commissioner-General of Immigration and the New York State Commission on Immigration The interest of the entire country was deeply stirred by the astonishing evidence secured by the Federal Immigration Commission, which published *Importing Women for Immoral Purposes* (1909). The consequence of these investigations was the enactment by Congress in 1910 of the White Slave Traffic Act, or Mann Act, regulating both foreign and interstate traffic in women. Under this act there had been 1203 convictions up to December, 1915. Subsequently various States enacted similar laws prohibiting any such transportation within their borders.

Consult. E. R. A. Seligman (ed.), *The Social Evil* (New York, 1912); Jane Addams, *A New Conscience and an Ancient Evil* (ib., 1912); G. J. Kneeland, *Commercialized Prostitution in New York City* (ib., 1913); William Burgess, *The World's Social Evil* (Chicago, 1914). From 1912 to 1915 reports of vice commissions in Chicago, Syracuse, Baltimore, New Orleans, and other cities were published. See PROSTITUTION.

WHITE SLAVE ACTS. See PROSTITUTION; WHITE SLAVERY.

WHITE SULPHUR SPRINGS. A health and pleasure resort in Greenbrier Co., W. Va., 142 miles southeast of Charleston, on the Chesapeake and Ohio Railroad (Map: West Virginia, D 4). It is surrounded by picturesque mountain scenery, in a region noted for its numerous mineral springs. The popularity of White Sulphur Springs as a watering place dates from the Revolutionary period, and thousands of visitors are attracted there annually.

WHITE SWELLING. See JOINTS, DISEASES OF THE.

WHITE TERROR. A name given to the reign of violence initiated in southern France by the returned émigrés, after the second restoration of the Bourbons, in revenge for their sufferings during the Red Terror of Revolutionary times and under the Empire. In Marseilles, Nîmes, Toulouse, and Avignon a number of Protestants who were looked upon as the special adherents of Napoleon were murdered. Judicial persecutions were also of frequent occurrence. See FRANCE.

WHITETHROAT. A European warbler (*Sylvia communis*, or *cinerea*), plentiful during summer in the greater part of England and Ireland, which has an energetic song, and is very lively and amusing as a cage bird, and very easily tamed. Its plumage is brown, of various shades, the breast and belly are brownish white, tinged with rose color in the male. Other closely allied species are the lesser whitethroat (*Sylvia curruca*) and the garden whitethroat or orphean warbler (*Sylvia hortensis*). In the United States the name usually refers to the white-throated sparrow. See SPARROW.

WHITE TOWER. The oldest portion of the Tower of London, a massive square structure 116 by 96 feet, 92 feet high, with walls 13 to 15 feet thick. Its site was once occupied by bastions built by King Alfred in 885. The present tower was built in 1078 by William the Conqueror. The White Tower has many historical associations. In it Richard II abdicated in 1399. It contains the fine Norman Chapel of St. John, and an important collection of old armor.

WHITE VITRIOL. See ZINC.

WHITE WALNUT. See BUTTERNUT.

WHITEWASH. See CHALK.

WHITEWATER. A city in Walworth Co., Wis., 50 miles southwest of Milwaukee, on the Chicago, Milwaukee and St. Paul Railroad (Map: Wisconsin, E 6). It is the seat of a State normal school, and has a public library and a fine city hall. There are manufactures of condensed milk, dairy supplies, flour, beer, lumber, brick, tiling, machine-shop products, etc. Pop., 1900, 3405; 1910, 3224.

WHITEWAY, SIR WILLIAM VALLANCE (1828–1908). A Newfoundland statesman, born at Totnes, Devonshire, England. He went to Newfoundland in 1843, and was admitted to the bar in 1852. In 1858 he entered the Newfoundland Legislature as a Liberal, from 1865 to 1869 was Speaker of the Assembly, and in the latter year was a delegate to Ottawa in an unsuccessful attempt to arrange terms for the entrance of Newfoundland into the Canadian Confederation. In 1873–78 he was Solicitor-General, and in 1878–85 was Premier and Attorney-General. He was again returned as Prime Minister and Attorney-General in 1893 and 1895, and retired in 1897. He was later identified with the forma-

tion of a new political party favoring the union of Newfoundland with Canada.

WHITE WHALE, or BELUGA. An Arctic cetacean (*Delphinapterus leucas*), of the family Delphinidæ, and closely allied to the narwhal. It is pure white in color, 12 to 18 feet long, whalelike in form, with a rather swollen muzzle and a mouth filled with numerous conical teeth. The animal swims rather slowly, but easily captures fishes in the tide rips of rivers and bays. They are gregarious, and may be seen in herds of 40 or 50, which often gambol around boats; they abound in most parts of the Arctic seas, and are found as far south as Great Britain and Nova Scotia. The Greenlanders take this whale with harpoons or with nets. Its flesh affords them a valuable supply of food, and is eaten by most of the inhabitants of Arctic coasts; it affords also a considerable quantity of the very finest oil, and the skin is made into leather, known to the trade as porpoise hide. Living specimens have occasionally been exhibited in public aquariums. See WHALE.

WHITEWOOD. See CANELLA, LIME TREE; TULIP TREE.

WHIT'FIELD or **WHITFELD**, HENRY (c.1597–?1660). An English clergyman. The place and date of his birth are not known with certainty. He took orders and is said to have been appointed minister of Ockley, Surrey, in 1616. He defended the nonconformist divines during Laud's persecution, and finally joined them. He emigrated to New Haven in 1639, and was one of the founders of Guilford, Conn. He returned to England (1650) and was minister at Winchester. He wrote: *Some Helpes to Stirre up to Christian Duties* (3d ed., 1636); *The Light Appearing More and More Toward the Perfect Day, or a Farther Discovery of the Present State of the Indians in New England Concerning the Progress of the Gospel Among Them* (1651; in Sabin's *Reprints*, New York, 1865); *Strength Out of Weakness*, on the same topic (1652, also in Sabin's *Reprints*).

WHITFIELD, ROBERT PARR (1828–1910). An American geologist, born at New Hartford, N. Y. From 1856 to 1876 he was an assistant in the New York State Geological Survey. He was appointed to the United States Geological Survey in 1872 and was instructor in geology at the Rensselaer Polytechnic Institute (1872–75), and professor (1875–78). He was appointed curator of the geological department of the American Museum of Natural History, New York, in 1877.

WHIT'GIFT, JOHN (c.1530–1604). An Archbishop of Canterbury. He was born at Great Grimsby, according to one account in 1530, according to another in 1533. He was educated at Cambridge, and in 1555 he was elected a fellow of Peterhouse. He took orders in 1560, and was made chaplain to the Bishop of Ely and rector of Teversham, Cambridgeshire. In 1563 he was appointed Lady Margaret professor of divinity. In 1567 he became master of Pembroke Hall; in the course of the same year was appointed to the mastership of Trinity College, and soon afterward obtained the regius professorship of divinity. He was appointed dean of Lincoln in 1571, Bishop of Worcester in 1577, and Archbishop of Canterbury in 1583.

On becoming master of Trinity he revised the statutes of the university so that the heads of houses were able to eject Thomas Cartwright from the Lady Margaret professorship on the score of his Puritanism. After becoming primate, Whitgift labored assiduously to secure uniformity of discipline in the Church. He had the full confidence of Queen Elizabeth, who placed all the Church patronage of the crown, including the bishoprics, at his disposal, and he was armed with full powers for carrying out his design. He required the clergy to subscribe not only to the royal supremacy, the liturgy, and the Thirty-nine Articles, but also to a set of additional articles framed mainly with the view of purging the Church of Puritanism. He was made a Privy Councilor in 1586, and in that capacity drew up a set of statutes for cathedral churches, to make their services conform to the principles of the Reformation. On the accession of King James he seems to have been much alarmed for the stability of the system which he had spent his life in rearing. Anxiety upon this account is said to have hastened his end, in his palace at Lambeth, London. He founded a magnificent hospital and a grammar school at Croydon. His works were edited by John Ayre and published by the Parker Society (Cambridge, 1851–53). Consult: his *Life*, written by Sir George Paule (London, 1612), and by Strype (ib., 1718, new ed., Oxford, 1822); also W. F. Hoak, *Lives of the Archbishops of Canterbury*, vol. v (London, 1895), W. H. Frere, *The English Church, 1558–1625* (ib., 1904).

WHITING, hwīt'ing. A city in Lake Co., Ind., 17 miles south-southeast from the centre of Chicago, on the Elgin, Joliet and Eastern, the Indiana Harbor Belt, the New York Central, the Pere Marquette, the Baltimore and Ohio, and the Pennsylvania railroads (Map: Indiana, C 1). It has manufactories of oilcloth and linoleum, asphalt pavement, and chemicals, and has an important station of the Standard Oil Company. Whiting contains a Carnegie library and a fine park. It was first incorporated in 1897. Pop., 1900, 3983; 1910, 6587; 1920, 10,145.

WHITING. A fish of the genus *Merlucius*, family Merluciidæ, closely related to the cods, but differing among other characters in the absence of a barbel on the lower jaw. The common whiting (*Merlucius vulgaris*) is abundant in the seas of northern Europe, and particularly on the west coasts of Great Britain, where it frequently attains a weight of four pounds. In the United States the name is applied to the silver hake (*Merlucius bilinearis*); to the sand or deep-water whitings of the genus *Menticirrhus* (see KINGFISH); and to the harvest fish and certain whitefish (qq.v.). See SAND SUCKER.

WHITING. See CHALK.

WHITING, hwīt'ing, ARTHUR (1861–). An American pianist and composer, born at Cambridge, Mass. He studied pianoforte with W. H. Sherwood and afterward with Chadwick and J. C. D. Parker, finishing at the Munich Music School under Rheinberger. In 1895 he settled in New York. From 1907 he gave annually five university concerts of an educational character at various leading universities and colleges. His compositions include: *Bagatelle; Fantasy with Orchestra;* two concertos for piano and orchestra; *Concert-étude; Valse-caprice;* pianoforte pieces, a church service in A, songs, anthems, and organ music.

WHITING, LILIAN (1859–). An American journalist and author, born at Niagara Falls, N. Y. She was literary editor of the Boston *Traveller* from 1880 to 1890, was editor of

the Boston *Budget* in 1890–93, and afterward spent much of her time in Europe. Her publications include: *The World Beautiful* (3 series, 1894, 1896, 1898); *A Study of the Life and Character of Elizabeth Barrett Browning* (1899); *Kate Field: A Record* (1899), *The World Beautiful in Books* (1901); *Boston Days* (1902); *The Florence of Landor* (1905); *Land of Enchantment* (1906); *Italy* (1907); *Paris, the Beautiful* (1908), *Louise Chandler Moulton: Poet and Friend* (1909); *The Brownings* (1911); *Athens* (1913); *The Lure of London* (1914); *Women Who Have Ennobled Life* (1915).

WHITING, WILLIAM HENRY CHASE (1825–65). An American soldier, born in Mississippi. He graduated first in his class at West Point in 1845, entered the corps of engineers, was employed for several years in constructing defenses and in directing internal improvements, and was promoted captain in 1858. He resigned from the army in February, 1861, and on the outbreak of the Civil War entered the Confederate service, and as chief engineer joined the Army of the Shenandoah, then under Joseph E. Johnston. On July 21, 1861, during the first battle of Bull Run (q.v.), he commanded, after the death of General Bee, the Third Brigade of Johnston's army, whose timely arrival was instrumental in determining the fortune of the day. In August, 1861, he was promoted brigadier general, and in the spring of 1862 took a conspicuous part in the campaign against McClellan. He was placed in command of the Military District of Cape Fear, Department of North Carolina, in December, 1862; was promoted major general in February, 1863, commanded a division of Beauregard's army at Petersburg in June, 1864; was present during both the attacks on Fort Fisher (though his subordinate, Colonel William Lamb, exercised the actual command), and in the second, on January 15, 1865, was mortally wounded, dying as a prisoner in Fort Columbus, New York harbor, on March 10.

WHITING POUT. See BIB POUT.

WHITLOCK, BRAND (1869–). An American municipal reformer, diplomat, and author. He was born at Urbana, Ohio, and was educated in the public schools and by private tutors. He was early a reporter for Toledo papers and for three years was political correspondent for the Chicago *Herald*. Between 1893 and 1897 he served as secretary to Governor Altgeld and then as clerk in the office of the Secretary of State (Ill.). He had also studied law under Senator J. M. Palmer and had been admitted to the bar in 1894. Settling in Toledo in 1897, he established a successful practice, and at the same time became known as a writer of prose and verse. His books describing corrupt political and unfair economic conditions attracted wide notice. Between 1905 and 1911 he was four times elected mayor of Toledo on an independent ticket, but he declined a fifth nomination. His administration was remarkably successful and progressive; a new charter was obtained, having provisions for the initiative, referendum, recall, and direct nominations. In 1913 Whitlock was appointed Minister to Belgium by President Wilson. When the European war broke out his burdens were increased by the assumption of representation for seven additional countries and his position was made delicate by the German occupation of Belgium. By the way that he carried through his task he won an international reputation for tact, zeal, and efficiency. His efforts greatly facilitated the Belgian relief efforts of the United States. He published: *The Thirteenth District* (1902); *Her Infinite Variety* (1904), *The Happy Average* (1904); *The Turn of the Balance* (1907); *Abraham Lincoln* (1908); *The Gold Brick* (1910); *On the Enforcement of Law in Cities* (1910 and 1913); *Forty Years of it* (1914), an autobiography.

WHITLOW, or PARONYCHIA. See FELON; NAIL.

WHITMAN. A town in Plymouth Co., Mass., 21 miles south by east of Boston, on the New York, New Haven, and Hartford Railroad (Map: Massachusetts, F 4). It is primarily an industrial place, having manufactures of boots and shoes, tacks and nails, steel and wooden shanks, paper and wooden boxes, foundry products, fuse plugs, etc. There are a public library, the Rogers Home for Aged Women, and Whitman Park. Pop., 1900, 6155; 1910, 7292; 1915 (State census), 7520.

WHITMAN, CHARLES OTIS (1842–1910). An American zoölogist, born at Woodstock, Maine, and educated at Bowdoin College (A.B., 1868) and at Leipzig (Ph.D., 1878). In 1880–81 he was professor of zoölogy at the Imperial University, Tokyo, Japan. In 1882 he studied at the Naples Zoölogical Station. He was assistant in zoölogy at Harvard University from 1883 to 1885; director of the Allis Lake Laboratory at Milwaukee from 1886 to 1889; professor of zoölogy at Clark University from 1889 to 1892; and subsequently head professor of zoölogy in the University of Chicago. In 1887, in connection with Edward Allis, he founded and afterwards edited the *Journal of Morphology*. From 1888 to 1908 he was director of the Marine Biological Laboratory at Woods Hole, Mass. In 1897 he held the presidency of the American Society of Naturalists. His work in embryology is shown in memoirs on the development and anatomy of certain leeches, worms, fishes, etc. He did much to advance methods of microscopical technique, by publishing *Methods of Research in Microscopical Anatomy and Embryology* (1885). Among his more general researches are those entitled: *The Kinetic Phenomena of the Egg During Maturation and Fecundation* (*Oökinesis*) (1887); *The Seat of Formative and Regenerative Energy* (1888); *Spermatophores as a Means of Hypodermic Impregnation* (1891); *The Inadequacy of the Cell Theory of Development* (1893); *Evolution and Epigenesis* (1895); *Animal Behavior* (1898). His latest work was an elaborate study of heredity in pigeons, which was unfinished at his death but was continued under the auspices of the Carnegie Institution.

WHITMAN, CHARLES SEYMOUR (1868–). An American lawyer and Governor, born at Norwich, Conn. He was educated at Amherst (A.B., 1890) and at New York University, from which he graduated in law in 1894. Settling in New York City, he built up a successful practice as a criminal lawyer. In 1901–03 he was assistant corporation counsel of New York and in 1904–07 was a city magistrate, part of this time being Republican president of a Democratic Board of Magistrates. As magistrate he effected many reforms, including the creation of the night courts. In 1907 Governor Hughes appointed him a judge of the Court of Special Sessions to fill an unexpired term, and in 1909 he received the nomination for dis-

trict attorney of New York county on a Fusion ticket. His election was remarkable in that the head of the ticket was defeated. A great success in this office led to his being reelected in 1913 without opposition. Probably the most important trial conducted by him was that which concerned Police Lieutenant Charles Becker, charged with the murder of a gambler named Rosenthal. The conviction of Becker in 1912 was regarded throughout the nation as a great blow to the conspiracy between criminals and certain grafting members of the New York police, and Whitman received high praise for his courage and ability. In 1914 he won the Republican nomination for Governor and was elected despite the opposition of Roosevelt, the Democrats, the Progressives, and Sulzer. His success as a prosecutor was hardly repeated as chief executive of the State. His administration was criticized because of his taxation programme, his apparent indifference to the legal promotion of social justice, and his failure to lead the Legislature. In 1916 he supported Justice Hughes for the Republican presidential nomination.

WHITMAN, FRANK PERKINS (1853–). An American physicist. He was born at Troy, N. Y., graduated from Brown University in 1874, and studied also at the Massachusetts Institute of Technology and at Johns Hopkins. He taught in the English and Classical School at Providence, R. I., in 1874–78, and served as professor of physics in the Rensselaer Polytechnic Institute in 1880–85, and in Western Reserve University after 1886. In 1898 he was a vice president of the American Association for the Advancement of Science. His contributions to scientific journals deal mainly with color, color vision, and physiological optics.

WHITMAN, MARCUS (1802–47). An American pioneer and missionary, born at Rushville, N. Y. He studied medicine at the Berkshire Medical Institution at Pittsfield, Mass., and practiced for four years in Canada. In 1834 he offered himself for missionary work to the American Board of Commissioners for Foreign Missions. In 1835, with Samuel Parker, he was sent to explore the Oregon country, but turned back at Green River. In 1836 he married, and with three other missionaries, H. H. Spalding and his wife, and W. H. Gray, started westward. The party took the first wagon across the Rocky Mountains, reached the Columbia River on May 21, and located near the site of the present Walla Walla, Wash. Other missionaries came out and four stations were organized. Friction ensued, and numerous quarrels were reported to the board, which voted in 1842 to discontinue the southern branch of the work. Whitman immediately started East, and after suffering much inconvenience reached Boston, March 30, 1843, and secured a reversal of the board's resolution. On Nov. 29, 1847, the Cayuse Indians attacked the station, murdered Whitman, his wife, and 12 other persons, and took the other residents prisoners. The prisoners were afterwards released by the influence of the chief factor of the Hudson's Bay Company. In 1864–65 the statement was made by H. H. Spalding that Whitman's visit to the East in 1842–43 was made for political reasons, and that by a visit to Washington and interviews with President Tyler, Secretary Webster, and others, he prevented the cession to England of the American claim to Oregon (q.v.), and prevented Oregon from being traded for a codfishery on Newfoundland. This belief has gained wide circulation, but Prof. E. G. Bourne, in *Essays in Historical Criticism* (New York, 1901), presented an elaborate documentary study which seems to disprove the claim. Consult: W. A. Mowry, *Marcus Whitman and the Early Days of Oregon* (Boston, 1901); E. G. Bourne, "Legend of Marcus Whitman," in *Essays in Historical Criticism* (New York, 1901); Myron Eells, *Marcus Whitman: Pathfinder and Patriot* (ib., 1909); W. J. Marshall, *The Acquisition of Oregon and the Long Suppressed Evidence about Marcus Whitman* (2 vols., Seattle, 1911).

WHITMAN, SARAH HELEN POWER (1803–78). An American poet, born in Providence, R. I. Her *Hours of Life, and Other Poems* appeared in 1853, and a posthumous volume of verse in 1879. She became best known, however, for her association with Poe, with whom, about 1848, she entered into a conditional engagement of marriage, soon broken off. In 1860 she published a work in his defense, entitled *Edgar Allan Poe and His Critics*. In 1828 she had married John W. Whitman, who died in 1833.

WHITMAN, SIDNEY (?–). An English journalist and political writer, born in London. He was educated at King's College School, and in Germany and Belgium. He represented the New York *Herald* at Constantinople during the Armenian outbreak in 1896, and at the Turkish headquarters at Elassona in 1897, and accompanied the Turkish mission from the Black Sea through Kurdistan, Anatolia, and Syria to the Mediterranean in 1897–98. Whitman also represented the *Herald* at Moscow during the Revolution in 1905–06. His publications include: *Metrical Translation of Grillparzer's Medea* (1878); *Fetish Worship in the Fine Arts* (1885); *Conventional Cant* (1887); *Imperial Germany* (1888); *The Realm of the Hapsburgs* (1893); *Teuton Studies* (1895); *Story of Austria* (1898); *Reminiscences of the King of Roumania* (1899); *Conversations with Prince Bismarck* (1900); *Life of the Emperor Frederick* (1900); *My Reminiscences of Prince Bismarck* (1902); *German Memories* (1912); *Turkish Memories* (1914); *The War on German Trade* (1914).

WHITMAN, WALT (originally WALTER) (1819–92). An American poet, born at Westhills, L. I., May 31, 1819, and educated in public schools at Brooklyn and New York. He learned carpentry, and also printing, forming in the composing room associations with printers and journalists that continued through life. At 17 he was teaching in Long Island and writing for newspapers and magazines. In 1839 he was editor and publisher of a weekly at Huntington, L. I. This enterprise failing, he spent some years in printing offices, contributing to periodicals, making long pedestrian tours, generally following the great western rivers, and going into Canada. That he wrote fiction we know only by the preservation of a title, *Frank Evans*, a temperance tale. For a year he edited the Brooklyn *Eagle*. This varied life acquainted him with all sorts and conditions of men, and he seems to have fraternized with what he calls "powerful uneducated persons" of every kind, being by instinct a democrat, and entering heartily into the life of the people. It is said he drove an omnibus for a time, though more from charity than liking, and he achieved local success as a political stump speaker. In 1850,

returning from wanderings that had carried him to New Orleans, he started in Brooklyn *The Freeman*, a short-lived organ of the Free-Soil party. Then for three years he tried carpentry, building and selling workingmen's houses, and gradually accumulated the materials that made up the first collection of *Leaves of Grass* (1855). This was a modest little book of 94 pages, and, so far as it attracted attention, seems to have provoked mirth, until Emerson made it the occasion of praise and challenged for it the attention of the thoughtful public, which it has since held increasingly throughout the English-speaking world, in editions that grew to several times the bulk of its humble beginning. The remainder of Whitman's life was given to the elaboration of this book. The incidents of the remaining 37 years of his life are these. During the second year of the Civil War the wounding of his brother in the battle of Fredericksburg led him to volunteer as an army nurse, and he served until the close of the war, in Washington and Virginia. The immediate literary result of this is *Drum Taps* (1865), best described in his own words as "a little book containing life's darkness and blood-dripping wounds and psalms of the dead." This is now incorporated in the *Leaves of Grass*. In 1867 he published *Memoranda During the War*, made up chiefly of letters written to the New York *Times*, from which he drew his chief support. His letters to his mother during the war were posthumously printed as *The Wound Dresser* (1898). His labors in the field brought on a serious illness in 1864, from which it is believed he never recovered completely. In recognition of his services, he was given a clerkship in the Treasury Department (1865–73), after having been dismissed by the Interior Department, on account of his *Leaves of Grass*. His Washington life was terminated by a slight paralytic stroke (1873). He moved to Camden, N. J., the residence of his brother George, and remained there until his death (March 27, 1892) in honorable poverty and serene cheerfulness, much sought by literary pilgrims, especially Europeans who discerned in him a distinctively American quality. He was never married. The works of this period, many of them incorporated in successive editions of the *Leaves*, were, notably: *Passage to India* (1871); *Democratic Vistas* (1870), prose; *After All Not to Create Only* (1871); *As Strong as a Bird on Pinions Free* (1872); *Two Rivulets* (1876); *Specimen Days and Collect* (1882), prose; *November Boughs* (1888); and *Goodby My Fancy* (1891). In 1892 appeared the *Autobiographia*. William Rossetti published in England a selection of his poems in 1868, which began his influence there, the work being continued by Dowden, Symonds, Stevenson, and others. Definitive editions of the prose works and of the *Leaves of Grass* were issued in 1892 in two volumes. Ten years after Whitman's death an elaborate, complete edition was published in New York in 10 volumes.

The intense individualism of Whitman's nature was strengthened rather than modified by environment. He knew little of the life that came through books, but much of that life of the masses which to most of his literary contemporaries was as foreign as classical culture was to him. Perhaps he was sometimes willfully eccentric. Certainly, in laboring to be natural, he stripped himself sometimes of more than the garment of convention. There was some excuse for those who found that he became indecent in his endeavors not to be smug. In subject, the *Leaves of Grass* were from the beginning distinctively American, dealing with moral and social conditions and with political questionings. "These United States themselves are essentially the greatest poem," he had said in the preface, and he finds elsewhere that his country's crowning glory is to be spiritual and heroic. It is then the glorification of democracy, of the average man, the assertion of his right to be himself, the freedom of the individual, and at the same time the ideal of democratic brotherhood which this freedom implies, that are his themes and his inspiration. With this passionate devotion to human nature goes a hatred like that of Rousseau for conventions, and parallel with this, in the style, there is a feeling for poetic beauty and a hatred for conventionality of expression. He has an instinct of rhythm, words come in felicitous collocations, but when they do not come he does not seek them. The result of his efforts was one of the ironies of literary history. The democratic reader, for whom Whitman wrote, made of it nothing at all, for him poetry must needs be conventional to be comprehensible. So Whitman writing of and for the multitude finds himself the admiration of a cultured coterie, appreciated only by a literary aristocracy. Yet more people are coming to understand and to enjoy him. He was willing to wait to be understood through the growth of the taste for himself and what he represented. His cult has been mainly confined to a small group of open-minded lovers of poetry and to those in search of new literary sensations. It may be added that only the pruriency against which he protests could find his work immoral. It is often indelicate and totally frank, but it is as lacking in sensuality, even in its most crude and unconventional expression, as was the poet's own life. Although as a whole his unmetrical matter comes under no present definition of poetry, and although a large portion of it has no possible poetic significance, yet there remains a small body of his verse that reveals a richness of poetic imagination unexcelled in America and that promises to last as long as anything in existing American poetry.

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W. E. Walling, *Whitman and Traubel* (lib., 1916); Frank Shay, *Walt Whitman. Bibliography* (lib., 1916).

WHITMAN COLLEGE. An institution for higher learning founded in 1859 at Walla Walla, Washington, by Rev. Cushing Eells, as a memorial to Dr. Marcus Whitman (q.v.). The institution was opened for students in 1866, and was originally under the control of the Congregational denomination, but for many years it has been free of denominational control. The curriculum embraces only the liberal arts, and the degrees conferred are A.B., B.S., in addition to the corresponding master's degree for resident graduate work. The value of the grounds and buildings is $500,000, there is a productive endowment of about $800,000 and an annual income of $85,000. The Conservatory of Music is controlled by the board of trustees of the college, but has its own faculty and is under separate administration. The student enrollment in 1916 was 257 in the college and 190 in the conservatory. The library contains about 26,000 bound volumes. The president is Steven B. L. Penrose, A.M., D.D.

WHITNEY, Adeline Dutton Train (Mrs. A. D. T. Whitney) (1824–1906). An American author, born in Boston, Mass. She was married at 19 to Seth D. Whitney, of Milton, Mass. She was a cousin of George Francis Train (q.v.). Mrs. Whitney was the author of many popular books for girls, including *Faith Gartney's Girlhood* (1863), *A Summer in Leslie Goldthwaite's Life* (1866), etc.

WHITNEY, Asa (1791–1874). An American mechanical engineer and manufacturer. He was born in Townsend, Mass., and in his youth learned the trade of blacksmith and machinist. After engaging in the manufacture of machinery in several States he became master machinist (1830) and superintendent (1833) of the Mohawk and Hudson Railroad. From 1839 to 1841 he was a canal commissioner of the State of New York, and in 1842 went into partnership with Matthew Baldwin in the manufacture of locomotives at Philadelphia. In 1847 he patented a process for making cast-iron annealed car wheels, and engaged in their manufacture on a large scale, subsequently introducing other improvements which increased the strength of the wheels and contributed materially to the safety of railway travel. Mr. Whitney served for a year as president of the Reading Railroad. He left $50,000 to the University of Pennsylvania for the founding of a chair of dynamical engineering.

WHITNEY, Caspar (1862–). An American sportsman and editor. He was born in Boston, and graduated from St. Matthew's College in California. For ten years he devoted his time to exploring, hunting, and traveling in North and South America, and in Asia. Between 1888 and 1900 he served on Harper's staff at different times as war correspondent and as writer on outdoor sports. Later he was editor of the *Outing Magazine* (1900–09), *Collier's Outdoor America* (1909), and the *Outdoor World* (after 1913). He published *A Sporting Pilgrimage* (1895); *On Snow Shoes to the Barren Grounds* (1896); *Hawaiian America* (1899); *Jungle Trails and Jungle People* (1905); *The Flowing Road* (1912).

WHITNEY, Eli (1765–1825). An American inventor, famous for his invention of the cotton gin. He was born at Westboro, Mass., and was educated at Yale College, where he graduated in 1792. He then went to Georgia as a teacher, where he found a generous patron in the widow of General Nathanael Greene, of the Revolutionary army, on whose estate he resided, and studied law. While here he had opportunity to display his inventive genius, and at the request of some neighbors of Mrs. Greene he attempted to devise a machine for separating the seed from the fibre of the green seed cotton. He set to work under great disadvantages, having to make his own tools, and even to draw his own wire, while rumors of his success led some lawless people to break into his workshop and steal his machine before he could obtain a patent for it. Forming a partnership with one Miller in 1793, he went to Connecticut to manufacture cotton gins, but litigation in defense of his rights consumed all his profits and $50,000 voted him by the State of South Carolina. Finally, in 1798 he got a government contract for the manufacture of firearms, which he carried out with ingenious machinery so arranged as to secure absolute interchangeability of parts. His manufactory of firearms was located at Whitneyville, Conn., and was maintained with success. Whitney had but little material reward from the gin, which immediately proved one of the most important inventions connected with the cotton manufacture. See Cotton; Cotton Gin.

WHITNEY, Gertrude Vanderbilt (Mrs. Harry Payne Whitney) (?–). An American sculptor. She was born in New York City, the daughter of Cornelius Vanderbilt (1843–99) (q.v.), and in 1896 was married to Harry Payne Whitney, son of William C. Whitney (q.v.). After a distinguished social career, she studied sculpture with James E. Fraser and Andrew O'Connor. Her work is characterized by energetic and realistic workmanship and good decorative feeling, but shows a certain heaviness of treatment. Good examples are the well-known "Titanic Memorial," to be erected in Potomac Park, Washington, D. C.; the "Aztec Fountain" (Pan-American Union, Washington); the Arlington Hotel fountain (Washington), and the "Fountain of El Dorado," exhibited at San Francisco in 1915. A member of the Association of Women Painters and Sculptors, Mrs. Whitney inaugurated competitions for women sculptors, and she did much to encourage young artists through the Society of Friends of Young Artists, which she organized. During the European War she established and maintained a hospital for the wounded at Neuilly, France, for which she was awarded a gold medal by the French Foreign Office in 1915.

WHITNEY, Sir James Pliny (1843–1914). A Canadian lawyer and public official. He was born at Williamsburg, Ontario. Admitted to the bar in 1876, he practiced his profession at Morrisburgh and was made king's counsel in 1890. He was elected a Conservative member of the Ontario Legislature in 1888, was leader of the Conservative Opposition therein in 1896–1905, and in 1905–14 was Premier of Ontario. He was chairman of the Ottawa Interprovincial Conference in 1910. In 1908 he was knighted.

WHITNEY, Josiah Dwight (1819–96). An American geologist, born at Northampton, Mass., the brother of William D. Whitney (q.v.). He was educated at Yale College, and in 1840 was employed on the New Hampshire geological survey. After serving in similar surveys of Ohio, the Lake Superior region, Iowa, and Wisconsin, he became State geologist of California, occupy-

ing this office from 1860 to 1874. In 1865 he was called to the chair of geology at Harvard University Through his travels and studies in the principal mining regions of the United States, Whitney became the foremost authority of his day on economic geology, and he was able to perform a great service in the development of the mineral resources of the country. The best known of his writings are: *The Mineral Wealth of the United States* (1854); *A Report on the Upper Mississippi Land Region* (1862); *The Geological Survey of California* (1864–70); *The Yosemite Guide-Book* (1869); with J. W. Foster, *Report on the Geology of the Lake Superior Land District* (1851–52); and with James Hall, *Geological Report on Ohio* (1858).

WHITNEY, MOUNT. A peak of the Sierra Nevada (q v), in eastern California, in about lat. 36° 35′ N., and long. 113° 17′ W. (Map: California, G 6). It is the highest mountain in the United States, exclusive of Alaska, having an altitude of 14,502 feet. Its east slope, which rises nearly 11,000 feet above the valley, is very precipitous The mountain was named in honor of Prof. Josiah Dwight Whitney

WHITNEY, WILLIAM COLLINS (1841–1904). An American politician and Cabinet officer, born in Conway, Mass., and educated at Yale and at Harvard He settled in New York City, where he was admitted to the bar. In 1871 he was prominent in organizing the Young Men's Democratic Club, and was active in the movement against the Tweed Ring. From 1875 to 1882 he was Corporation Counsel of the City of New York, and during his administration of the office the work of the city's Law Department was completely reorganized and simplified in such a manner as to save thousands of dollars annually. He was active in 1882 in the State campaign which resulted in the election of Grover Cleveland as Governor, and from 1885 to 1889, during Cleveland's first administration as President, was Secretary of the Navy. Under his control considerable progress was made in building the new navy. He afterward engaged in extensive financial enterprises in New York, and in 1892 successfully managed the Cleveland presidential campaign.

His sons Harry Payne Whitney and Payne Whitney inherited their father's large capitalistic interests. The former married Gertrude Vanderbilt (see WHITNEY, GERTRUDE VANDERBILT) and the latter married Helen Hay, a daughter of John Hay and a writer of verse.

WHITNEY, WILLIAM DWIGHT (1827–94). An American Sanskrit scholar and philologist, brother of Josiah D. Whitney (q.v.). He was born at Northampton, Mass, and graduated at Williams College in 1845. During the next few years he was clerk in the Northampton Bank, but began to show a marked interest in natural science and in languages. In 1849, as assistant subagent, he accompanied the United States Geological Survey to Lake Superior, and on this expedition he began the study of Sanskrit in his leisure hours. On his return in the autumn of the same year he studied Sanskrit at Yale under Salisbury. In 1850 he went to Germany and spent three winters at Berlin under Weber, the summers being devoted to work under Roth at Tübingen. In 1853 he returned to America, and in 1854 was appointed to a chair of Sanskrit and comparative philology at Yale where he remained as professor until his death. The American Oriental Society owes much to him for his prolonged services as corresponding secretary, editor of the society's journal, and president. He was also first president (1869) of the American Philological Association In 1881, because of his services to scholarship, he was admitted to the Prussian order Pour le Mérite, succeeding Carlyle. Among his publications are: *Language and the Study of Language* (1867, 7th ed, 1910); *German Grammar* (1867, 6th ed, 1888); *Oriental and Linguistic Studies* (1872–74); *The Life and Growth of Language* (1875; new ed, 1902); *Essentials of English Grammar* (1877; new ed, 1892), *Compendious German and English Dictionary* (with A. H Edgren, 1877; new ed., 1905), *Sanskrit Grammar*, the best work on the subject up to that time (1879; 3d ed, 1896; Ger. trans. by Zimmer); *Roots, Verb-forms, and Primary Derivatives of the Sanskrit Language* (1885; Ger trans. by Zimmer); *Practical French Grammar* (1886); and translations with commentaries of the *Sûrya Siddhânta*, *the Atharva Veda Prâtiçâkhyâ* and the *Taittirîya Prâtiçâkhya* (in vols. vi, viii, and ix, of the *Journal of the American Oriental Society*). With Roth he edited the *Atharva Veda* (1856), and made a translation of this work, edited after his death by C. R. Lanman (2 vols., 1905). He also made noteworthy contributions to the *Sanskrit Dictionary* of Böhtlingk and Roth (St. Petersburg, 1852–76), and an *Index Verborum to the Published Text of the Atharva Veda* (1881). He was editor in chief of the *Century Dictionary* (1889–91). In his work on *Max Müller and the Science of Language* (1892) Whitney attacks Muller's views regarding this subject. (See PHILOLOGY.) A complete bibliography of his writings is given in the *Journal of the American Oriental Society*, vol. xix (New Haven, 1897), a memorial in his honor.

WHITNEY, WILLIS RODNEY (1868–). An American chemical engineer. He was born in Jamestown, N. Y, and graduated at the Massachusetts Institute of Technology in 1890, and then studied at Leipzig (Ph.D., 1894). Meanwhile he had become an instructor in the Institute of Technology, where in 1904 he was appointed nonresident associate professor of theoretical chemistry and in 1908 nonresident professor of theoretical chemistry. His gifted faculty for research, especially in electrochemistry, led to the perfection of the metallic electric-lamp filaments and the development of wrought tungsten. In 1904 he became director of the research laboratory of the General Electric Company in Schenectedy, N. Y., where with unique equipment he carried on his investigations. He was president in 1909 of the American Chemical Society, whose *Journal of Industrial and Engineering Chemistry* he helped to edit, and in 1911 of the American Electrochemical Society. In 1915 he was appointed to the Naval Consulting Board. Besides contributing to technical journals and publishing scientific addresses he translated Le Blanc's *Electro-Chemistry* (1896).

WHITON, hwī'ton, JAMES MORRIS (1835–1920). An American Congregational clergyman and author. He was born in Boston, and graduated at Yale in 1853. He was rector of the Hopkins Grammar School, New Haven (1854–64), principal of Williston Seminary, Easthampton, Mass. (1876–78), and professor of ethics at Meadville Theological School (1893–94). At other times he held various Congregational pastorates, in Lynn, Mass, Newark, N. J., New York City, and Haworth, N. J. In 1896 he be

came a member of the staff of the *Outlook*. His principal publications are an edition of select orations of Lysias (1875), *Is "Eternal" Punishment Endless?* (1876), *Beyond the Shadow* (1884), *Gloria Patri*, a dialogue on the Trinity (new ed., 1901); *Miracles and Supernatural Religion* (1903); *Interludes in a Time of Change* (1909); *Getting Together—Essays by Friends in Council* (1915).

WHITRIDGE, FREDERICK WALLINGFORD (1852–1916). An American lawyer, publicist, and capitalist, born at New Bedford, Mass. After graduating from Amherst (1874) and from Columbia Law School (1878), he settled in New York City in the practice of law, eventually becoming head of the firm of Whitridge, Butler, and Rice. At Columbia he was a lecturer from 1883 to 1894, first on administrative law and later on constitutional and political history. He also became president of several important electric traction lines in New York and its suburbs, and a director in other enterprises. On the occasion of the marriage of King Alfonso XIII in 1906, he was selected as special ambassador to Spain. Besides contributing to leading reviews on political and economic subjects, he wrote *One American's Opinion of the European War: In Answer to Germany's Appeals* (1914).

WHIT'SUNTIDE'. The English name of the season of Pentecost (q.v.).

WHITTAKER, EDMUND TAYLOR (1873–). A British mathematician, born at Birkdale, Lancashire. He was educated at Trinity College, Cambridge, of which he was a fellow from 1896 to 1907. He served as secretary to the Royal Astronomical Society in 1901–06, and was Royal Astronomer of Ireland in 1906–12. Thenceforth he held the chair of mathematics at Edinburgh University. In 1905 he was elected a fellow of the Royal Society. Besides various memoirs his publications include: *A Course of Modern Analysis* (1902), *Treatise on Analytical Dynamics* (1904); *The Theory of Optical Instruments* (1907); *A History of the Theories of Æther and Electricity* (1910).

WHIT'TIER. A city in Los Angeles Co., Cal., 17 miles southeast of Los Angeles, on the Southern Pacific and the Pacific Electric railroads (Map: California, G 9). It is the seat of Whittier College, and has a Carnegie library. Oil is produced extensively, and there are important walnut and citrus fruit-growing interests. Whittier was founded in 1887 by a colony of Friends. Pop., 1900, 1590; 1910, 4550.

WHITTIER, JOHN GREENLEAF (1807–92). An American poet, born in Haverhill, Mass. He was a descendant of an emigrant to New England in 1638, whose children became members of the Society of Friends. His life as a youth was spent on his father's farm. He early showed a talent for verse and published his first poem at the age of 18, in the *Free Press*, an antislavery paper edited by William Lloyd Garrison. To obtain a better education, he learned the art of making slippers, and supported himself during two terms at the Haverhill Academy (1827–28), and then for a short time taught school. In 1829 he became editor of the *American Manufacturer*, published in Boston, and from January to June of the following year was editor of the Haverhill *Gazette*. In July, 1830, he was made editor of the *New England Review*, at Hartford, Conn., a post which he held till ill health obliged him to resign in January, 1832. Here he published his first volume of prose sketches and poems, *Legends of New England* (1831), and was active as a supporter of the great Whig, Henry Clay. On his return to Haverhill he worked on his father's farm, contributed to the Haverhill *Gazette*, wrote *Justice and Expediency* (1833), an antislavery pamphlet, and was a delegate to the antislavery convention in Philadelphia, in December, 1833. He represented his district in the Massachusetts Legislature in 1835 and 1836. In 1836 he removed to Amesbury, Mass., a small town east of Haverhill, and here he lived many years. He was well known as a leading antislavery man and did much work in aid of the movement. In 1836–37 he served for a few months as one of the secretaries of the Antislavery Society in New York, and in 1838 went to Philadelphia, where, until 1840, he edited the *Pennsylvania Freeman*. In May, 1838, his printing office was sacked and burned by a mob. On his return to Massachusetts he published poems designed to arouse public sentiment against slavery, and in addition to these spirited lyrics wrote many poems descriptive of simple New England life. Many verses of this sort had from time to time appeared from his hand, but these, published in 1843 as *Lays of My Home*, were the first that brought him any money. He edited also, at Lowell, Mass., for six months (1844–45), the *Middlesex Standard*. In 1849 he published a volume of antislavery verses entitled *Voices of Freedom*. From 1847 to 1859, while living at Amesbury, he contributed editorial articles to the *National Era* of Washington, the antislavery paper in which Mrs. Stowe's *Uncle Tom's Cabin* first appeared, and on the establishment of the *Atlantic Monthly* in 1857 he became a frequent contributor. He was a member of the Massachusetts Electoral College in 1860 and 1864, but thereafter took little active part in public life. His later years were spent with relatives at Oak Knoll, Danvers, Mass., but he died at Hampton Falls, N. H., while on a visit. He never married. Aside from his poetry, Whittier was a real force in the practical antislavery politics of Massachusetts.

Whittier's literary work, though never abundant, was very constant. It usually appeared in periodicals, and few years of his life were unmarked by literary production. The following are titles of his separate works in prose, aside from those already cited and collected editions: *The Stranger in Lowell* (1845); *Supernaturalism in New England* (1847); *Leaves from Margaret Smith's Journal* (1849); *Old Portraits and Modern Sketches* (1850); *Literary Recreations and Miscellanies* (1854). In verse notable titles are: *Moll Pitcher* (1832); *Mogg Megone* (1836); *Songs of Labor* (1850); *A Sabbath Scene* (1853), a poem descriptive of the workings of the Fugitive Slave Law; *The Chapel of the Hermits* (1853); *The Panorama* (1856); *Home Ballads and Poems* (1860); *In War Time* (1863); *National Lyrics* (1865); *Snow-Bound* (1866), probably his best work; *Maud Muller* (1866); *The Tent on the Beach* (1867); *Among the Hills* (1868); *Miriam* (1871); *The Pennsylvania Pilgrim* (1872); *Hazel Blossoms* (1874), including poems by his sister, Elizabeth Whittier; *Mabel Martin* (1875); *The Vision of Echard* (1878); *The King's Missive* (1881); *The Bay of Seven Islands* (1883); *Poems of Nature* (1886); *Saint Gregory's Guest* (1886); and *At Sundown* (1892). These were collected into the *Complete Poetical and Prose Works* (1888–89),

revised and annotated by the poet, in seven volumes He ranks as one of the foremost American poets—a writer of simplicity, sincerity, directness, and fervor His verse is often disfigured by faulty rhyming, and much of it is merely occasional, but even this body of poetry is redeemed by his unfailing sincerity and earnestness In poems dealing with New England life Whittier may be said to have achieved permanence. No American poet has better depicted the scenes of rural life, with finer eye for truth of detail or more impressive delicacy of sentiment, than has Whittier in such scenes as those of *Snow-Bound*, a poem which has caused him to be regarded as a sort of American Burns, though in respect to lyrical quality the similarity of the two poets is not striking A selection of his verses which would show his quality, lyric, descriptive, and moral, most characteristically and at its best, would include such poems as "Ichabod," "Barbara Frietchie," "Skipper Ireson's Ride," "The Pipes at Lucknow," "Laus Deo," "The Eternal Goodness" (a psalm), "In School Days," "Maud Muller," "The Barefoot Boy," "The Swan Song of Parson Avery," and "Snow-Bound."

Bibliography. S T. Pickard, *Life and Letters of John Greenleaf Whittier* (2 vols., Boston, 1894), the authoritative work on Whittier; also F H. Underwood, *John Greenleaf Whittier: A Biography* (ib, 1884); W S. Kennedy, *John Greenleaf Whittier. His Life, Genius, and Writings* (new ed., ib, 1892), id., *John Greenleaf Whittier: The Poet of Freedom* (ib., 1892); M. P. Claflin, *Personal Recollections of John G. Whittier* (New York, 1893), Mrs. J T. Fields, *Whittier: Notes of his Life and of his Friendships* (ib., 1893); W. J. Linton, *Life of John Greenleaf Whittier* (London, 1893); Richard Burton, *John Greenleaf Whittier*, in "Beacon Biographies" (Boston, 1901); T. W. Higginson, *Whittier*, in "English Men of Letters" (New York, 1902); P. E More, in *Shelburne Essays*, Third Series (ib, 1907); Bliss Perry, "Whittier for To-Day," in *Park Street Papers* (Boston, 1908); G. R. Carpenter, *John Greenleaf Whittier* (ib., 1914); I. K. Eastburn, *Whittier's Relation to German Life and Thought*, published by the University of Pennsylvania (Philadelphia, 1916).

WHIT'TINGHAM, Charles (1795–1876). An English printer, born at Mitcham, Surrey. He was taken into partnership with his uncle, Charles Whittingham, founder of the Chiswick Press, in 1824. During the next four years the press issued Irving's *Knickerbocker's History of New York* (1824), Pierce Egan's *Life of an Actor* (1825), and Singer's *Shakespeare* (10 vols., 1825). In 1829 the younger Whittingham began to issue independently a series of books distinguished for excellence and beauty of workmanship. The first to appear was *A Sunday Book* This was followed by Bacon's and Peele's works, *The Canterbury Tales*, *The Compleat Angler*, Holbein's *Dance of Death*, and others. Upon the death of the elder Whittingham in 1840 both businesses devolved upon the nephew. He began block-color printing in 1840, and in 1843 introduced the old-fashioned style of book production. *The Diary of Lady Willoughby* (1844) is an example of the latter innovation. Other works of this later period were: Shaw's *Elizabethan Architecture* (1843); the notes to Samuel Rogers's *Italy* (1843); and Lord Vernon's *Dante* (1854). In 1869 Whittingham retired.

WHIT'TINGHAM, William Rollinson (1805–79) An American bishop of the Episcopal church. He was born in New York City, and graduated at the General Theological Seminary there in 1825 Two years later he was ordained, and a little later became rector of St. Luke's Church, New York. In 1835 he became professor of Church history in the seminary, and in 1840 Bishop of Maryland. He was universally considered the most learned bishop of the time in his church, especially in Church history and canon law, and his uncompromising adherence to principle, even on an unpopular side, won him further respect. He was generally a supporter of the High Church party. Consult William Francis Brand, *Life of William Rollinson Whittingham* (New York, 2 vols., 1883).

WHIT'TINGTON, Richard ("Dick") (c 1359–1423) An English merchant, mayor of London. He was the third son of Sir William Whittington, who was probably a native of Gloucestershire. Nothing is known of his early life. In 1379 Whittington was a mercer in London, in 1393 he was an alderman, and in 1397, 1398, 1406, and 1419 mayor of London. He advanced large sums of money to the crown and enjoyed the King's confidence. His liberality appears to have been unbounded. At his death he left the bulk of his property to charity and for completing those works which had been begun under his own superintendence. But his fame is due mainly to the popular romance of which he became the hero. According to this legend the lad Whittington went to London and found employment as a scullion. To the freight of an outgoing vessel he contributed his cat, which was sold for a large sum in Barbary. Meanwhile the boy, wearying of ill-usage, started from the city, but hearing the Bow bells, which seemed to say

> Turn again, Whittington,
> Lord Mayor of London,

he went back to his work, soon, from the returning ship, received the price of his cat, married his lady fair, and, living happily, rose to the prophesied post. There is, however, no foundation for this tale nor for the accounts of his being made a knight and of his burning the King's bonds for large sums due him. The *Lives* by Lysons (1860) and Besant and Rice (1881 and 1894) are uncritical and treat the legends as facts. Both the facts and the legends can be found in H. B. Wheatley's edition of the *History of Sir Richard Whittington* (published for the Villon Society, London, 1885).

WHITTREDGE, hwĭt'rĕj, Worthington (1820–1910). An American landscape and portrait painter. He was born in Springfield, Ohio, and studied with James Beard in New York, and at first practiced portrait and landscape painting in Cincinnati. In 1849 he went to Düsseldorf, where he studied for three years under Andreas Achenbach. He also worked in Belgium and Holland, and in 1855 he went to Rome, residing there until his return to the United States in 1859. In 1866, with Sandford Gifford and Kensett, he accompanied General John Pope on his western tour of inspection, and brought back many sketches. His work shows a sincere and sympathetic feeling for nature and is good in color. Although detailed and somewhat constrained in construction, he invested all that he saw with a wholesome charm, and some of his landscapes are the very best of the Hudson River school (q.v.). His paintings include: "Old Hunting

Ground" (1864), "View of the Rocky Mountains from the River Platte" (1868, Century Club, New York); "Trout Brook" (1875); "House on the Hudson River" (1863, New York Public Library), "Over the Hill" (1906); "Evening in the Woods" and "Camp Meeting" (both in the Metropolitan Museum). In 1861 he was elected a member of the National Academy of Design, of which he was president in 1875–76. The latter part of his life was spent in Summit, N. J.

WHITWORTH, Sir Joseph (1803–87). An English mechanical engineer, born at Stockport. He settled in Manchester in 1833 as a toolmaker, made numerous and valuable inventions in metal working and other machinery, and while thus engaged learned to construct absolutely plane surfaces of metal and to determine surface and other inequalities by micrometric methods. The result was to raise the standard of workmanship. Whitworth played an important part in the securing of uniformity of screw threads, and his system of standard threads by which interchangeability and ready reproduction of parts was secured was widely employed. (See Screw.) The request of the government that Whitworth should design the machinery for the manufacture of military rifles was declined, but he was induced to undertake a series of experiments to determine the most efficient construction of such weapons. He evolved a rifle with hexagonal barrel and small calibre (.45 inch) which fired an elongated projectile; but in spite of satisfactory tests it did not meet with the approval of the War Office, though 10 years later a somewhat similar weapon was adopted. From small arms, Whitworth turned his attention to larger ordnance, and made numerous improvements, many of which also failed at the time to meet with the approval of the British authorities. His invention of compressed cast steel for ordnance (q.v.) has been generally utilized in the construction of heavy guns. In 1869 Whitworth was made a baronet, after having received in the previous year the Albert medal of the Society of Arts and the Legion of Honor of France. His large works at Manchester were made into a stock company in 1874, and in 1897 the company was united with the Elswick Works, founded by Sir William Armstrong (q.v.). Whitworth was a liberal benefactor of education; in 1868 he provided 30 scholarships in mechanics, and after his death his executors carried out his expressed wishes and turned over to Whitworth Park and Institute, Owens College, and other charitable and educational institutions in Manchester and elsewhere, funds aggregating about $2,900,000. Whitworth was the author of papers in the journals of the engineering societies; of (with Wallis) *The Industry of the United States in Machinery, Manufactures, and Useful and Ornamental Arts* (1854); *Miscellaneous Papers on Mechanical Subjects* (1858); *Miscellaneous Papers on Practical Subjects;* and *Guns and Steel* (1873). Consult *Memoirs,* in *Proceedings of the Institution of Civil Engineers* (London, 1889), and contemporary volumes of proceedings of other learned societies and scientific journals.

WHITWORTH GUN AND PROJECTILE. An obsolete muzzle-loading system of cannon in which the cross sections of the oblong projectile and of the bore of the gun were corresponding twisted hexagons. By this device the muzzle-loading projectile was given a motion of rotation around its longer axis, thus securing greater accuracy than that obtained with spherical projectiles. This idea was first applied to the infantry bullet. See Guns, Naval; Projectiles.

WHOOPER. 1. A swan. 2. A crane.

WHOOPING COUGH, or Pertussis. An infectious and sometimes epidemic disease, mostly attacking children, especially in the spring and autumn. Its earliest symptoms, which usually appear five or six days after exposure to infection, are those of a common cold, as hoarseness, a watery discharge from the eyes and nose, oppression of the chest, a short, dry cough, and more or less feverishness. This stage, which is called the catarrhal, lasts a week or 10 days, when the fever remits, and the cough begins to be followed by the peculiar whoop which characterizes the disease, and which is caused by the inspiration of air through the contracted cleft of the glottis. (See Larynx.) The disorder may now be regarded as fully developed, and consists of paroxysms of severe coughing, which usually terminate in the expectoration of glairy mucus, or in vomiting. During the fit of coughing the face becomes red or livid, the eyes project, and the child seizes some person or object for support. These paroxysms occur at uncertain intervals, but usually about every two hours, and between them the child returns to play, takes food with good appetite, and exhibits little or no sign of illness. The disease reaches its height at about the end of the fourth week, after which the paroxysms diminish in frequency, and the patient shows signs of improvement. The second stage may last from two to eight weeks, and is succeeded by what may be termed the convalescent stage, the duration of which is variable.

Pathology has failed to throw any direct light upon its seat. In 1906 Bordet and Gengou, Belgian bacteriologists, discovered a bacillus which is regarded as the cause of whooping cough. The organism resembles the influenza bacillus, but it is somewhat larger and is obtained from the sputum of pertussis patients in the catarrhal stages, or in the first week of the paroxysmal stage of the disease. The sputum must be planted on a special blood, agar, glycerin, potato medium, and the bacilli isolated from other organisms having similar morphological and staining characteristics. The proportion of death to recoveries in cases of whooping cough has not been satisfactorily determined, although it is known that the affection is a very dangerous disease and a scourge of childhood. When there is a severe epidemic the mortality is often very great; the deaths in the majority of cases occur among the poorer classes. This mortality is, in reality, due rather to the bronchitis and pneumonia, which are frequent complications of whooping cough, than to the disease itself. In adults, whooping cough with its threatening complications is sometimes dangerous.

A number of vaccines have been prepared, but the reports as to their value are conflicting. They are said to have prophylactic as well as curative properties. Proper nourishment, if necessary supplemented with olive or codliver oil, plenty of fresh air, and sanitary surroundings are powerful aids in treatment. An abdominal bandage or support will prevent injury during the paroxysm, and very often shortens the attack. Patients should not come in contact with other children.

WHORTLEBERRY. See Huckleberry.

WHYDAH or **WHIDAH** (hwid'ä) **BIRD.** Mistaken spellings of *widow bird* (q.v.).

WHYMPER, hwĭm'pĕr, EDWARD (1840–1911). An English traveler, born in London He was trained as a draftsman on wood. In 1860 he was sent by a London publisher to sketch the Alpine peaks. In 1861 he reached the summit of Mount Pelvoux, and in 1864 ascended the Point des Ecrins. In 1865 he scaled the Matterhorn, until then found inaccessible In 1867 and 1872 he visited Greenland One result of his explorations was the collection of rare fossil plants now in the British Museum His discovery of magnolia cones demonstrated the former existence of luxurious vegetation in Greenland. He visited the Ecuadorian Andes in 1879–80, and succeeded in reaching the summit of Chimborazo. During this journey he discovered the Andean glaciers and made further collections of fossil, plant, and animal specimens. In 1901–05 he explored the mountains of the Great Divide region in Canada. In addition to his *Scrambles amongst the Alps in the Years 1860–69* (1871, illustrated by himself; 5th ed., 1900), he described his travels in *Travels among the Great Andes of the Equator* (1892); *Chamonix and Mont Blanc* (1896; 15th ed, 1910), *Zermatt and the Matterhorn* (1897; 14th ed., 1910).

WHYTE, ALEXANDER (1837–1921). A Scottish Free Church clergyman and theologian, born at Kirriemuir (Thrums), Forfarshire. He was educated at Aberdeen University, and at New College, Edinburgh. Installed as colleague in Free St. John's, Glasgow, in 1866, he was transferred in 1870 to Free St. George's, Edinburgh, where he was colleague and successor to Dr. R. S. Candlish (q.v.). After 1909 he was also principal of New College, holding, besides, the chair of New Testament literature. His publications include: *Characters and Characteristics of William Law* (1893); *Bunyan Characters* (3 vols, 1894); *Samuel Rutherford and Some of his Correspondents* (1894); *Appreciation of Jacob Behmen* (1895); *Lancelot Andrewes and his Private Devotions* (1895); *Santa Teresa* (1897); *Father John of Cronstadt* (1898); *An Appreciation of Browne's Religio Medici* (1898); *Cardinal Newman* (1901); *Bishop Butler* (1904); *Thomas Shepard, Pilgrim Father and Founder of Harvard* (1909).

WHYTE, VIOLET. See STANNARD, HENRIETTA ELIZA VAUGHAN.

WHYTE'-MEL'VILLE, GEORGE JOHN. See MELVILLE, GEORGE JOHN WHYTE-.

WIARTON. A town in Bruce County, Ontario, Canada, situated on Georgian Bay, and on the Grand Trunk Railway, 140 miles northwest (direct) of Toronto (Map: Ontario, D 4). The town has a variety of manufactures. Pop., 1901, 2433; 1911, 2266.

WIBERT OF RAVENNA. See GUIBERT.

WICHERN, vĭK'ĕrn, JOHANN HEINRICH (1808–81). The founder of home missions in Germany. He was born at Hamburg, studied theology at Göttingen and Berlin, and, settling in his native city, devoted himself to missionary work among the poor. He started a Sunday school which proved very successful, and in 1833 opened his *Rauhes Haus* (q.v.). Wichern traveled through Germany, preaching and establishing hospitals, schools, homes, and rescue stations. Through his exertions the Protestant synod at Wittenberg in 1848 appointed a central committee for home missions. In 1851 the Prussian government made him inspector of prisons and houses of correction, and in 1858 general superintendent. In 1872 he retired because of illness. He published: *Die innere Mission der deutschen evangelischen Kirche* (1849); *Die Behandlung der Verbrecher und entlassenen Sträflinge* (1853), *Der Dienst der Frauen in der Kirche* (1858).

WICHERT, vĭK'ĕrt, ERNEST (1831–1902). A German dramatist and novelist, born at Insterburg. With his play *Unser General York* (1858) Wichert won his first success, and from that time produced both plays and novels which established his reputation as a sound playwright and interesting story teller. Among his numerous dramas *Ein Schritt vom Wege* (1871), *Der Freund des Fürsten* (1879), and *Post Festum* (1890) may be mentioned as the best. His fiction, ranking for the most part higher than his comedies, includes: *Ein hässlicher Mensch* (1868); *Die Arbeiter* (1873); *Die Taube auf dem Dache* (1892); and *Die Schwestern* (1896). Perhaps his best work is seen in his *Litauische Geschichten* (1881). His collected works were published in 18 vols. (1896–1902).

WICHITA, wĭch'ĭ-tą. A tribe of Caddoan stock (q.v.), formerly ranging over the country between the Washita and Upper Red rivers, including the Wichita Mountains, in southern Oklahoma, and now gathered in a reservation on the north side of Washita in the vicinity of Anadarko. According to tradition, they, as well as their confederates, the Waco (q.v.) and Tawaconi, are direct offshoots of the Pawnee (q.v.), all these tribes speaking the same language with but slight dialectic differences. They call themselves Kitikitĭsh and sometimes Tawéhash, of which their popular name may be a derivative. By the French they were called Pani Piqué, Tattooed Pawnee, their common designation among other tribes being Tattooed People, in allusion to the tribal custom of tattooing upon the face, arms, and breast, particularly among the women. Like all the Caddoan tribes, the Wichita were agricultural and semisedentary, occupying villages of large dome-shaped houses built of grass laid over a framework of poles. On temporary outings they used the ordinary skin tipi. They had a number of interesting ceremonials, most of which they still retain, including a gift dance, a thanksgiving or green-corn dance, and a great ceremonial foot race in which every one able to run participated. They were peaceable and industrious and are one of the few tribes which have always kept peace with the whites.

They are identical with the people of Quivira visited by Coronado in 1542. About 1780 they were living about the present Wichita Falls, Tex. At a later period they fixed their village on the north fork of Red River, in the Wichita Mountains, where they were visited by a government expedition in 1834, resulting in a treaty of friendship the next year, soon after which they removed to the site of the present Fort Sill. In 1859 they were assigned to their present reservation, but on the outbreak of the Civil War were compelled to take refuge in Kansas, camping about the present site of Wichita on the Arkansas, where they remained until 1867. They are now citizens. From an estimated total of over 3000 in 1804 the confederated bands have decreased to 692 in 1872 and 318 in 1910.

WICHITA. A city and the county seat of Sedgwick Co., Kans., 213 miles by rail southwest of Kansas City, on the Arkansas River, and on the Atchison, Topeka, and Santa Fe, the Missouri Pacific, the Chicago, Rock Island, and

Pacific, the St. Louis and San Francisco, the Midland Valley, the Arkansas Valley Interurban, and the Kansas City, Mexico, and Orient railroads (Map: Kansas, E 7). It has attractive residences, imposing business blocks, and fine public buildings. The city is the seat of Fairmount College (Congregational), opened in 1892, and the Friends' University. Other educational institutions include the Mount Carmel Academy, a handsome high school, 28 elementary public schools, and four parochial schools, three business colleges, and several schools of art and music. Prominent institutions include the State Masonic Home, Children's Home, Y. M. C. A. and Y. W. C. A., and the Wichita, Wesley, and St. Francis hospitals. The city contains the Kansas sanitarium. The Forum, maintained by the city, is a large meeting hall with a seating capacity of nearly 8000 persons. The Carnegie library, with some fine mural paintings, the First Presbyterian Church, St. Mary's Cathedral (Catholic), and the Scottish Rite Masonic Cathedral are noteworthy. Riverside Park, the most prominent of the public parks, contains 146 acres, and has a fine zoo. Wichita is favored with excellent transportation facilities, and has considerable commercial and industrial importance. The large stock yards and packing houses, which occupy the northern end of the city, handled in 1915, 201,836 head of cattle, 104,000,000 pounds of pork, and 8000 head of horses and mules. Wichita is also one of the greatest broom corn markets in the world, and in addition carries on an extensive trade in poultry and poultry products, lumber, flour, and alfalfa. In recent years oil and gas have been found in abundance and the fields are being developed rapidly. There are extensive flouring and alfalfa mills, foundries and machine shops, stove works, grain elevators, farm implement manufactories, automobile works, car shops, etc. A large wholesale and jobbing trade is carried on here. In 1915 there were 320 industrial establishments, with a capital of about $15,000,000 and products valued at nearly $35,000,000. The city has adopted the commission form of government; the mayor is commissioner of public safety, and is assisted by four other commissioners. Wichita was settled in 1870, and was incorporated the following year. Pop., 1900, 24,671; 1910, 52,450; 1915 (U. S. est.), 67,847; 1920, 72,128.

WICHITA (wĭch'ĭ-tȧ) **FALLS.** A city and the county seat of Wichita Co., Tex., 114 miles northwest of Fort Worth, on the Missouri, Kansas, and Texas, the Wichita Valley, and the Fort Worth and Denver City railroads (Map: Texas, C 3). It is an important manufacturing centre, having flour mills and elevators, an oil refinery, and manufactories of automobile trucks, window glass, fruit jars, brooms, candy, stoves, pottery, etc. Pop., 1900, 2480, 1910, 8200; 1915 (U. S. est.), 11,499; 1920, 40,079.

WICHITA MOUNTAINS. A group of mountains in the southern part of Oklahoma between the Washita and Red rivers (Map: Oklahoma, C 4). They form a western outlier of an interrupted system of ancient, denuded rock masses extending across Oklahoma into south Arkansas, and rise abruptly from the surrounding plain to a height of nearly 1000 feet above it. The group consists of a number of isolated conical granite peaks surrounded by outcrops of folded Paleozoic strata.

WICK. A seaport, capital of Caithness, Scotland, at the mouth of Wick Water, and at the head of Wick Bay, 18½ miles south of John o' Groat's House (Map: Scotland, E 1). Wick is the headquarters of the herring fishery and its kindred industries in Scotland. There are two harbors and an extensive breakwater. Pop. (parliamentary borough), 1901, 7881; 1911, 7326.

WICKED BIBLE. See BIBLE, CURIOUS EDITIONS OF.

WICK'ERSHAM, GEORGE WOODWARD (1858–). An American lawyer and cabinet officer, born in Pittsburgh. He studied at Lehigh University, and graduated in law from the University of Pennsylvania in 1881. He practiced his profession at Philadelphia (1880–82) and after 1882 in New York City, where he gained success as a corporation lawyer in the firm of Strong & Cadwallader. He was counsel for the companies which reorganized and partly constructed the traction lines of Chicago, for those which built the New York subways, and for the contractors who drilled the Pennsylvania Railroad tunnels under East River. As legal adviser he participated in the reorganization of the Mexican railway system and in much litigation respecting railway management in the United States. From 1909 to 1913, while Attorney-General in the cabinet of President Taft, he applied the administration's trust policy with ability and success. The most important cases prosecuted under him before the Supreme Court were the Standard Oil Company and the American Tobacco Company cases, decided in favor of the government in 1911. (See TRUSTS, UNITED STATES, *History.*) Other important prosecutions were against the electric lamp, bathtub, beef, sugar, and powder trusts. Wickersham believed in federal regulation of industrial combinations and considered the Sherman Antitrust Law sufficient, without further amendment, to prevent restraint of trade through monopoly.

WICK'LOW. A maritime county of the province of Leinster, Ireland (Map: Ireland, E 6). Area, 781 square miles. The land rises abruptly from the sea, and a large part of the county is mountainous and barren. About one-half is pasture land, and cattle raising is the chief occupation, though some oats and potatoes are raised. Pop., 1901, 60,824; 1911, 60,603. County town, Wicklow.

WICKRAM, vĭk'rȧm, JÖRG (?–c.1560). A German author, born probably at Colmar, in Alsatia, where he founded in 1549 a Meistersinger school. The only other event of his life of which we have definite record is that in 1555 he became town clerk at Burgheim in the Breisgau. The best of his dramas are *Der verlorne Sohn* (1540) and *Tobias* (1551). He is better known, however, as the first writer of prose fiction in the German Reformation period, and in his tales he expressed the new social ideas which were prevalent. Aside from his novels, *Ritter Galmy aus Schottland* (1539), *Der Knabenspiegel* (1554), *Der irrereitende Pilger* (1556), and *Der Goldfaden* (1557), his most important work and one of the first German novels, he published a collection of witty tales entitled *Das Rollwagen-Büchlein* (1555), which contains his best-known and most interesting work. Consult Erich Schmidt, *Zu Jorg Wickram,* in *Archiv für Litteraturgeschichte,* vol. vii (Leipzig, 1876), and Scherer, *Die Anfange des deutschen Prosaromans und Jorg Wickram von Colmar* (Strassburg, 1877).

WICK'STEED, PHILIP HENRY (1844–1927),

An English Unitarian clergyman, lecturer, and author, born at Leeds. He was educated at University College, Manchester, and at New College, London, and in 1874–97 had charge of the Little Portland Street Chapel, London. In 1887 he began to lecture for the University Extension movement, speaking principally on poetry and economics. His publications include: *Dante: Six Sermons* (1880); *The Alphabet of Economic Science* (1888); *Henrik Ibsen* (1892); translation and notes to Dante's *Paradiso* (Temple edition); *The Common Sense of Political Economy* (1910); *Dante and Aquinas* (1913).

WICKY. See KALMIA.

WIC'LIF, JOHN (c.1320–84). A noted English reformer, often styled the Morning Star of the Reformation. He was born probably near Richmond, in Yorkshire. The known facts of his life are singularly few and meagre. He seems to have belonged to a well-to-do family of the lower nobility and to have been sent as a youth to the University of Oxford. He became a fellow and not long before 1360 master of Balliol College. He was made rector of the neighboring parish of Fillingham (1361–69), of Ludgarshall (1369–74), and of Lutterworth (1374–84). In 1365 he appears as King's chaplain, if this is the proper translation of *peculiaris regis clericus*, and from this date he enters into close relations with the government, especially with the King's son John (of Gaunt), defending the right of the state to deprive unrighteous clergy of their goods. In 1375 he was a member of a royal commission to confer with legates of the Pope at Bruges. Attention was first called to his views on theological questions in the year 1376, and in 1377 he was summoned to give account of his teaching at St. Paul's in London by Bishop Courtenay, but popular riots resulted and nothing was done. At a second hearing at Lambeth in 1378 he was protected by the Queen Mother and allowed to withdraw with only a gentle admonition. From this time until two years before his death in 1384 he continued to write and teach at Oxford, elaborating his views with more clearness and winning many supporters. His doctrines were carried to Prague and served there as the basis of the revolt under John Huss. They were formally condemned at the Council of Constance (1415) and repudiated by all parties down to the Reformation. In accordance with a decree of the Council of Constance, his body, buried at Lutterworth, was disinterred in 1428 by Richard Fleming (q.v.), burned, and the ashes thrown into the river Swift.

The activities of Wiclif may be classified as political, theological, and evangelical, but these are all closely connected by a common principle of thought. The one creative idea which governed all his action, and which may be regarded as Wiclif's contribution to the Reformation, is the right of the individual to form his opinions on the basis of Scripture and reason, and then to carry out these opinions in association with other individuals as seems best to him and them. Although he describes himself as a realist and worked according to the formal methods of the mediæval realistic school of thought, his conclusions are largely tinged by the new nominalistic writing of William of Ockham and Marsiglio of Padua. The essence of this new thought was the comparative unimportance of traditions in church or state, and the corresponding right of the members of the body politic or religious to govern themselves as they saw fit. Such ideas fell in naturally with the newly developed nationalistic feeling in all countries, and more especially in England. If it was true that Englishmen owed their first duty to England, then there must be some way of showing that such national loyalty was consistent with fidelity to the Christian faith. Wiclif's first public service was in furnishing to the government just such a demonstration as this. In 1365 the Pope, then living in France, had renewed a long-neglected claim on England for the tribute promised by King John 150 years before as a part of his bargain with Rome. Money given to the papacy seemed to be money taken from England to serve her enemy, France, and the government sought a valid excuse for refusing the demand. Wiclif's pamphlet, *Determinatio quædam de Dominio*, supplied the need. In it he showed that a nation had the same rights of self-preservation as an individual, that the papacy, being a spiritual power, could not lawfully exercise sovereignty over an independent country, and, finally, that King John had had no right to make any such bargain without the consent of the people of England. The same points are clearly seen in another pamphlet written 11 years later in reply to an inquiry from Parliament whether the nation would be justified in refusing to pay "Peter's pence" during a time of domestic need. Wiclif takes here the broad ground that all such contributions were acts of charity, and hence not subject to demand, they might rightfully be withheld when the nation had need of the money to provide for the maintenance of religion at home. On both these occasions Wiclif was led on to express opinions on the nature and the present perversions of the papal office which could not be overlooked, and in 1377 Pope Gregory XI issued bulls against him. This placed Wiclif fairly in the position of a condemned heretic, but there was no power in England strong enough to enforce them against a man who had made himself the champion of national rights as against all foreign aggression. They fell flat and unquestionably weakened the papal cause in England. Though the attitude of the government changed with the shifting of parties consequent upon the death of Edward III and the accession of Richard II, Wiclif continued to enjoy the protection that had carried him so far and was allowed to end his days in peace.

The principles governing Wiclif in these political questions are laid down by him chiefly in his two great treatises, *De Dominio Divino* and *De Civili Dominio*, in which he tried to show the limits of human lordship and especially of the lordship of the Church over temporal things. In these, as in his other writings, the appeal is throughout to Scripture as the highest expression of the divine law, and in opposition to the man-made statutes of the Roman church. From this supreme authority of Scripture Wiclif went on naturally to the importance of teaching it to every Christian, and so to the duty of giving it to the world in the common tongue. It seems now to be clear that before Wiclif's time there had been no systematic attempt to translate the whole Bible into English, and hence the vast importance of the version known as Wiclif's Bible, though it is not probable that he did more than a fragment of the work of translation himself. Aside from its value as a contribution to the growing standard of English prose, this English Bible was the chief agency in spreading the ideas that form the practical side of Wiclif's

activity. He tried to meet the need of the times by sending out the Bible in the hands of young men not in clerical orders, nor even, so far as we know, equipped with any professional learning, though probably often youths who had listened to his teaching at Oxford. These "poor priests" were to imitate as far as possible the conditions of the Apostles. They went forth on foot, in a russet gown, with scrip and staff, and, according to the reports of friends and enemies alike, the people heard them gladly. They were instructed to preach only the plain, straightforward word of God. The description of the "persone of a town" in the prologue to the *Canterbury Tales* corresponds to his ideal.

What the heresies of Wiclif were is shown by the charges brought forward at the several trials. They may all be regarded as growing out of the one fundamental notion of a divine law—*lex Christi*—superior to all earthly laws and not intrusted to any human person or institution. It is obvious that in the last resort this divine law is only to be found in the individual conscience using all the means, intellectual, spiritual, and emotional, that it can command. This was Wiclif's real and sufficient offense. In speculative theology the test came, as throughout the Reformation period, on the question of the sacramental observances, and especially of the Eucharist. Realist as he claimed to be, Wiclif could not accept the doctrine that in the consecration of the elements the accidents were separated from the substance they represented, and he therefore had to deny the doctrine of transubstantiation. He claimed to believe in an actual presence of the body of Christ in the Host, but it was somewhat like Luther's later conception of consubstantiation. His view of the Church was that it consisted of the body of the followers of Christ, and that therefore it could not be controlled by any person or group of persons, such as the Pope and the cardinals. Authority in the Church could only be claimed by righteous men. It was the business of temporal authorities to see to it that Christ's law be obeyed, and to recall the rulers of the Church to obedience if they failed. The control of the temporalities of the Church lay in the hand of the civil rulers, who ought to withdraw them if they were abused.

However subversive of existing institutions these principles of Wiclif might be, they would, perhaps, have been overlooked if he had not aroused the bitterest personal enmities by his unsparing application of them to the evils of society. Both the mendicant orders and the Episcopal Order felt themselves threatened by the growing contempt for organized authority, and were only too ready to connect the social upheavals of the time (1381) with this religious agitation. The sympathy of the ruling classes was diverted from Wiclif in his last years, but it is clear that his teaching was held in reverence by many of the lower and middle classes. "Lollardry," as the following of Wiclif came to be called, was doubtless very widely spread and maintained itself for about a generation after Wiclif's death as a powerful religious and political factor in the English people.

Bibliography. The definitive edition of Wiclif's Latin works is being published by the Wyclif Society (London, 1883 et seq., 34 vols. issued up to 1912); also *Select English Works of John Wyclif*, edited by T. Arnold (3 vols., Oxford, 1869–71); *English Works of John Wyclif, Hitherto Unprinted*, edited by F. D. Matthew for the Early English Text Society (London, 1880); *Wyclif's Translation of the Bible*, edited by Forshall and Madden (4 vols., Oxford, 1850); *New Testament, with Glossary*, edited by W. W. Skeat (Cambridge, 1879). For his life, etc., consult: G. V. Lechler, *John Wycliffe and his English Precursors*, English translation by Peter Lorimer (2 vols., London, 1878; new ed., abridged, ib., 1904); Augustus Jessopp, *Coming of the Friars* (8th ed., ib., 1889); J. A. A. J. Jusserand, *English Wayfaring Life in the Middle Ages*, English translation by L. T. Smith (New York, 1891), Lewis Sergeant, *John Wyclif: Last of the Schoolmen and First of the English Reformers* (ib., 1893); R. L. Poole, *Wycliffe and Movements for Reform* (new ed., London, 1896); G. M. Trevelyan, *England in the Age of Wycliffe* (3d ed., ib., 1900); H. B. Workman, *The Dawn of the Reformation*, vol. i (ib., 1901); F. A. Gasquet, *English Monastic Life*, in "The Antiquary's Books" (ib., 1904); J. C. Carrick, *Wycliffe and the Lollards*, in "World's Epoch-Makers" (Edinburgh, 1908); J. N. Figgis, *Typical English Churchmen* (London, 1909); H. B. Workman, *Evolution of the Monastic Ideal* (ib., 1913); S. P. Cadman, "John Wycliffe and Later Mediævalism," in *Three Religious Leaders of Oxford and their Movements* (New York, 1916).

WICOPY, wīk'ō-pī. See LEATHERWOOD.

WIDAL, vē-dàl', (GEORGES) FERNAND ISIDORE (1862–). A French bacteriologist, born at Dellys, Algiers. He studied in Paris, where he became a hospital physician in 1893 and in 1895 professor agrégé in the medical faculty. In 1906 he was elected a member of the Academy of Medicine. Widal became known especially for his work on bacterial agglutination and its application to the diagnosis of typhoid fever. He also was the first in France (with André Chantemesse) to advocate vaccination against typhoid fever (see TYPHOID FEVER). He published *Etude sur l'infection puerpérale* (1889); *La cure de déchloruration dans le mal de Bright* (1906); *Maladies des veines et des lymphatiques* (1911).

WIDAL REACTION. See TYPHOID FEVER; WIDAL, FERNAND.

WIDDIN, or **WIDIN**, vīd-ēn'. An ancient town and the capital of a department in the Kingdom of Bulgaria, situated on the right bank of the Danube, about 100 miles north-northwest of Sofia (Map: Balkan Peninsula, D 2). It is surrounded by marshes and its inaccessibility formerly gave it great strategical importance. There are still preserved the ancient walls and the citadel. A new quarter is growing up along the river. Widdin manufactures gold and silverware, tobacco, and spirits. Pop., 1905, 16,183. Widdin was a very strong Turkish fortress, and constituted an important strategic point in the last Russo-Turkish War.

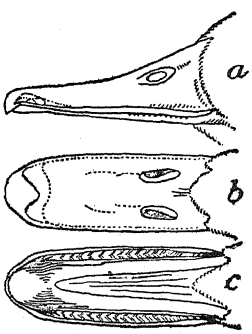
WIDENER, wīd'nĕr, PETER A. BROWN (1834–1915). An American capitalist, born in Philadelphia. He started life as a butcher and later owned a chain of markets. Engaging in Republican politics he was elected treasurer of Philadelphia in 1874. He became interested in street railways, and was associated with William L. Elkins in the early development of American electric traction systems. Later he acquired large holdings in the United States Steel Corporation, the American Tobacco Company, and the Standard Oil Company. He endowed the Widener Memorial School for Crippled Children

at Philadelphia and Longport, N. J., and gave the building for the Free Public Library of Philadelphia. Widener housed in his home at Elkins Park, near Philadelphia, one of the finest private art collections in the United States. His fortune was estimated at about $35,000,000 at the time of his death.

WIDERSPENSTIGEN ZÄHMUNG, vē'dĕr-shpĕn'stĭ-gen tsā'mụng, DER (Ger. *The Taming of the Shrew*). An opera by Götz (q.v.), first produced in Mannheim, Oct. 11, 1874; in the United States, Jan. 4, 1886 (New York).

WIDE, WIDE WORLD, THE. A popular novel by Susan Warner (q.v.), written under the name of Elizabeth Wetherell (1850).

WIDGEON, or **WIGEON** (from OF. *vigeon*, widgeon, from Lat. *vipo*, sort of small crane). One of two river ducks of the genus *Mareca*, allied to the gadwall and teal, and common throughout the Arctic regions. The European widgeon (*Mareca penelope*) is seen in temperate latitudes only in winter, when it flies in large flocks, and is a favorite with gunners. Its whole length is about 19 inches. The forehead and top of the head in the male are white; the cheeks and hind part of the neck reddish chestnut; the upper parts grayish white, crossed with irregular zigzag lines of black; the tail nearly black; the wing coverts white, tipped with black; the primaries dark brown; speculum green, edged with black; the throat pale rufous; the breast and belly white. The female is very different, the head and neck rufous brown, speckled with dark brown; the back varied with two shades of brown, darker in the centre, and paler in the edges of the feathers. Widgeons feed during the daytime, and chiefly on water plants. The note is a shrill whistle, whence its French name *siffleur*, and the English names, "whew duck" and "whewer." The American widgeon or baldpate (*Mareca americana*) is much like the European, but the upper parts are finely waved transversely with black and reddish brown; the under parts are mostly white; the top of the head is almost white; the wing coverts are white, the greater tipped with black. It is common in winter in the interior of the United States, and its flesh is highly esteemed. It breeds regularly from Minnesota northward, and occasionally much farther south. See DUCK.



BILL OF A WIDGEON.

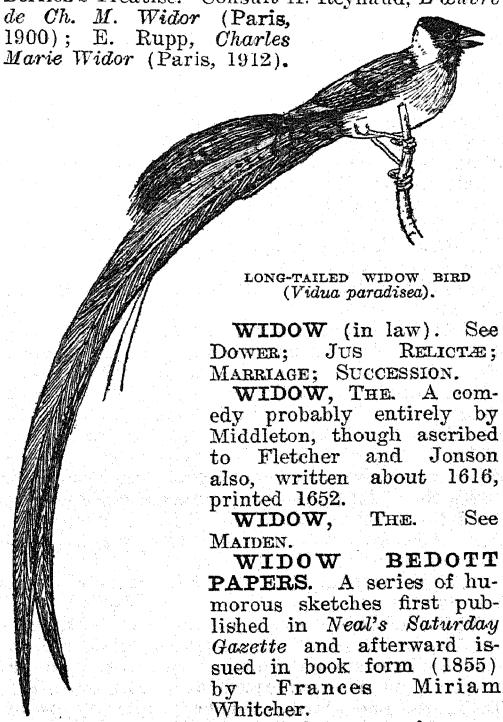
a, profile; *b*, upper side; *c*, under side; showing serrations. (*Mareca americana.*)

WIDIN. See WIDDIN.

WIDMANN, vĭt'män, JOSEPH VIKTOR (1842–1911). A Swiss author, born at Nennowitz, Moravia, and educated at Heidelberg and Jena. He became director of a girls' boarding school at Bern in 1868, but left this work in 1880, when he was made literary editor of the *Berner Bund*. His writings include verse, dramas, and novels. His best works are the dramatic epic poems *Maikäferkomödie* (1897; 12th ed., 1912) and *Die Heilige und die Tiere* (1905; 10th ed., 1912). Among others may be named *Erasmus von Rotterdam* (1865); *Arnold von Brescia* (1867); *Buddha* (1869); *Spaziergänge in den Alpen* (1885); *Jenseits von Gut und Böse* (1893); *Die Muse des Aretin* (1902); and *Du schöne Welt* (Frauenfeld, 1907).

WID'NES. A municipal borough in Lancashire, England, at the head of the Mersey estuary, 13 miles southeast of Liverpool (Map: England, D 3). It is a great chemical manufacturing centre and also has iron foundries and copper works. Pop., 1901, 28,580; 1911, 31,541.

WIDOR, vē'dôr', CHARLES MARIE (1845–). A French organist and composer, born at Lyons. He studied at home under his father, and at Brussels under Lemmens on the organ and Fétis for composition, and in 1860 succeeded his father as organist at St. François. In 1870 he became organist at St. Sulpice, Paris. He succeeded César Franck as organ professor in 1890, and Dubois in 1896 as professor of counterpoint, fugue, and composition at the Paris Conservatory. Under the pen name "Aulétès" he was the musical critic of *L'Estafette*. He was also director and conductor of the society La Concordia. He is an acknowledged virtuoso on the organ and a skillful improviser, and his compositions for the organ rank high. His compositions include the two-act ballet *La Korrigane* (1880); music to the play *Conte d'Avril* (1885); to *Les Jacobites* (1885); the operas *Maître Ambros* (1896); *Nerto* (not produced), and *Les Pêcheurs de St. Jean* (1905); the pantomime *Jeanne d'Arc* (1890); masses; anthems; *La Nuit de Walpurgis* for chorus and orchestra (1880); two symphonies for orchestra (F, A); two series of symphonies for organ; and considerable chamber music. He wrote *Technique of the Modern Orchestra* (1906) as a supplement to Berlioz's Treatise. Consult H. Reynaud, *L'œuvre de Ch. M. Widor* (Paris, 1900); E. Rupp, *Charles Marie Widor* (Paris, 1912).



LONG-TAILED WIDOW BIRD (*Vidua paradisea*).

WIDOW (in law). See DOWER; JUS RELICTÆ; MARRIAGE; SUCCESSION.

WIDOW, THE. A comedy probably entirely by Middleton, though ascribed to Fletcher and Jonson also, written about 1616, printed 1652.

WIDOW, THE. See MAIDEN.

WIDOW BEDOTT PAPERS. A series of humorous sketches first published in *Neal's Saturday Gazette* and afterward issued in book form (1855) by Frances Miriam Whitcher.

WIDOW BIRD. One of the group of weaver birds (subfamily Viduinæ), dwelling in western Africa, and remarkable for the gay plumage

and long tails of the males, the females being plain brown. The name was given originally by the Portuguese settlers to a species (*Chera progne*) which, excepting a buff and scarlet wing tail, is wholly black, the color and long train suggesting the garb of a widow. One of the most remarkable species is illustrated herewith. Its body is not larger than that of a small finch. The head, throat, back, and wings are greenish brown, the nape and under parts dark yellow, and the breast deep red. The long tail is curious. The middle pair of feathers have the webs greatly widened, and through the twisting of the shafts of their inferior surfaces are vertically opposed, the next pair are produced to the length of about a foot, and droop in a graceful curve, each has attached to its base a long hairlike filament. This and other species are often kept in Europe as cage birds for their song as well as their plumage. Erroneous spellings of this name are "whydah bird" and "vida bird."

WIDOW'S QUARANTINE. See QUARANTINE.

WIDOW'S TEARS, THE. A coarse but humorous comedy by Chapman (1612). Its source is Petronius' story of the Ephesian widow.

WIDUKIND, wid'u-kĭnd. See WITTEKIND.

WIECK, vēk, FRIEDRICH (1785–1873). A German musical instructor, born at Pretzsch, near Wittenberg. Having at first studied theology at Wittenberg, he turned to music, established a piano factory and music store at Leipzig, but soon devoted himself entirely to teaching the pianoforte according to a rational method of his own, which presently brought him considerable reputation and was successfully put to the test by the brilliant achievements of his daughters KLARA (wife of Robert Schumann) and MARIE (1832–). In 1840 he removed to Dresden, where he also gave vocal instruction. Most of his extensive pedagogical experiences may be found incorporated in the publication *Klavier und Gesang* (3d ed., 1878). Consult A. von Meichsner, *Friedrich Wieck und seine Tochter* (Leipzig, 1875), A. Kohut, *Friedrich Wieck* (Dresden, 1888); V. Joss, *Friedrich Wieck und sein Verhaltnis zu Robert Schumann* (ib., 1900); id., *Der Musikpadagoge Friedrich Wieck und seine Familie* (ib., 1902).

WIED, HERMANN, COUNT OF. See HERMANN, COUNT OF WIED.

WIED, vēt, MAXIMILIAN, PRINCE OF (1782–1867). A German naturalist, born at Neuwied. He undertook two journeys of scientific investigation, one through Brazil (1815–17) and one through the United States (1832–34). These he described in *Reise nach Brasilien in den Jahren 1815–17* (2 vols., 1819–20), with atlas; *Abbildungen zur Naturgeschichte Brasiliens* (15 parts, 1823–31); *Beitrage zur Naturgeschichte von Brasilien* (4 vols., 1824–33); *Reise in das innere Nord-America in den Jahren 1832 bis 1834* (2 vols., 1839–41), with maps.

WIED, WILLIAM OF. See WILLIAM OF WIED, PRINCE.

WIEDEMANN, vē'de-măn, (KARL) ALFRED (1856–). A German Egyptologist, son of Gustav Wiedemann (q.v.). He was born in Berlin, and was educated at Berlin, Leipzig, Tübingen, and Paris. He became professor of Egyptology at Bonn in 1891. He wrote: *Aegyptische Geschichte* (1884, supplement, 1888); *Die Religion der alten Aegypter* (1890; Eng. trans., 1897); *Die Toten und ihre Reiche im Glauben der alten Aegypter* (1900, 3d ed., 1910), translated from first edition under the title *The Ancient Egyptian Doctrine of the Immortality of the Soul* (1895); *Unterhaltungslitteratur der alten Aegypter* (2d ed., 1903), *Altagyptische Sagen und Marchen* (1906), *Der Tierkult der alten Aegypter* (1912).

WIEDEMANN, GUSTAV HEINRICH (1826–99). A German physicist and chemist. He was born in Berlin and studied at the university in that city, where in 1851 he became a privatdocent. In 1854 he was appointed professor at Basel; in 1863 he was called to the Polytechnic School at Brunswick, in 1886 he went to Karlsruhe, and in 1871 he became professor of physical chemistry at Leipzig, taking the chair of physics in 1887. He carried on many researches in magnetism and electricity and studied the conduction of heat and electricity by solids, electrolysis, magnetic properties of bodies, and devised a number of species of original apparatus. He was the author of *Die Lehre vom Galvanismus und Elektromagnetismus*, the third edition of which was published in four volumes under the title of *Lehre von der Elektricitat* (1881–85), and a fourth edition in 1893. Wiedemann, at the death of Poggendorff (q.v.) in 1877, assumed the direction of the *Annalen der Physik und Chemie*, to which he added the *Beiblatter* as a supplement. This publication, which soon became known as *Wiedemann's Annalen*, is a classic in physical science.

WIEDERSHEIM, vē'dērz-hīm, ROBERT ERNST EDUARD (1848–). A German comparative anatomist, born at Nurtingen, Wurttemberg. He studied at Lausanne, Tübingen, Wurzburg, and at Freiburg, where in 1877 he became professor of anatomy. His most important works are his textbooks of vertebrate comparative anatomy, *Lehrbuch der vergleichenden Anatomie der Wirbelthiere* (1882; 2d ed., 1886). In 1884 he published a *Grundriss*, which passed through four editions, and in 1902 appeared as *Vergleichende Anatomie der Wirbeltiere* (2d ed., 1906). His *Grundriss* was translated by Parker (1886; 2d ed., 1897) as *Comparative Anatomy of Vertebrates*, of which the third edition (1907) was prepared from the 1906 and 1907 editions of Wiedersheim's *Vergleichende Anatomie*. Among his other important works are *Der Bau des Menschen als Zeugniss fur seine Vergangenheit* (1887; 4th ed., 1908); *Das Gliedmassenskelett der Wirbelthiere* (1892).

WIEGAND, THEODOR GERHARD (1864–). A German classical scholar, born at Bendorf. He studied at the universities of Munich and Freiburg. At various times he traveled in Belgium, England, Denmark, Italy, Greece, and Turkey. In 1896 and later he took part in the excavations at Priene (q.v.). In 1899 he conducted excavations at Miletus and in 1910 at Samos. In 1912 he became director of the Collection of Ancient Statues in Berlin. His works, besides numerous papers in the learned periodicals, include: *Die Puteolanische Bauinschrift sachlich erlautert* (1894); *Milet, Ergebnisse der Ausgrabungen und Untersuchungen* (1890), with others; *Die archaische Porosarchitektur der Akropolis von Athen* (1904); *Priene* (1904), with H. Schrader.

WIELAND, vē'länt, CHRISTOPH MARTIN (1773–1813). A German epic poet, one of the most important authors of the classic period of German literature, born at Oberholzheim, near

Biberach, in Wurttemberg. He went to Tubingen (1750) to study law, but was more interested in literature and the classics, and returned to his family much affected by the mystical piety of Klopstock, as he tells us in his *Empfindungen eines Christen*, but also under the spell of the skeptical French philosophy of the time. At Zurich he was welcomed (1752) by Bodmer (q.v.), who called his attention to biblical epical themes and enlisted his aid in a controversy with the Anacreontic school of Gleim (q.v.). In the course of this occupation Wieland was attracted to Greek literature and in poetic contributions to the psychology of modern love broke irretrievably with the Puritans of Zurich. In 1759 he went to Bern to accept a position as private tutor. Here his light heart betrayed him into love adventures; but in 1760 he obtained an office in Biberach. In intimate association with the fascinating Sophie von La Roche, who played an important part in Goethe's life, Wieland hovered for a time on the brink of thoughtless hedonism, but presently outgrew this, married a homekeeping wife (1765), and later became a model paterfamilias amid his 14 children. During these years Wieland was writing fiction that made him a favorite with the German nobility and an Ichabod to his former associates. The versified *Nadine* (1769) is Greek in its joy of life, the prose *Don Silvio von Rosalva* (1764) is a satire on idealism, and the *Comic Tales* (*Komische Erzahlungen*, 1766) pass the border line of frivolity. The study of Fielding and other English novelists appears in *Agathon* (1767) and the versified tale *Musarion* (1768); and the influence of Shakespeare is also unmistakable. After obtaining a professor's chair in the University of Erfurt (1769), Wieland now attempted in *Der goldene Spiegel* a description of an ideal state (1772), which so pleased the Duchess Anna Amalia, that she invited him in 1772 to Weimar to become tutor to the young Prince Karl August and his brother. At Weimar he remained honored and respected till death. The added dignity naturally produced greater literary seriousness. His critical quarterlies, *Der Deutsche Merkur* (1773–95), *Attisches Museum* (1796–1804), and *Neues Attisches Museum* (1808–09), spread and confirmed his influence, now toward a serene optimism, purer taste, and the diffusion of culture. Thus he moderated with discriminating sympathy the excesses of the writers of the period of Storm and Stress (q.v.). The first important work of the Weimar period was *Die Abderiten* (1774), a satirical novel in the interest of political cosmopolitanism. Then Goethe, and soon afterward Herder, came to Weimar and gave new wings to Wieland's genius, leading him back to verse and to the unworked mine of mediæval Germany, whence he drew the inspiration of *Geron der Adelige* and of his best-known epic, the romantic *Oberon* (1780). His later romances, *Peregrinus Proteus* (1791) and *Aristipp* (1800), are of inferior interest, and his most valuable contributions to literary culture in the last 30 years of his life were his translations of the *Satires* and *Epistles* of Horace (1782–86), the *Letters* of Cicero (1808–12), the *Dialogues* of Lucian (1788), and parts of Xenophon, Aristophanes, and Euripides. He took an active part in critical journalism up to 1809, and from 1794 to 1802 superintended an edition of his *Works* (45 vols.). His death was that of a calm Epicurean. Of all the Weimar galaxy he is the most recreative, delightful, and genial, though others be more philosophical, serious, versatile, or profound. Wieland first called German attention generally to Shakespeare, 22 of whose dramas he translated (1762–66), and to the Middle Ages, he first made stylistic elegance and refinement natural to German verse and prose.

Bibliography. Wieland's complete *Works* are edited by Gruber (53 vols., Leipzig, 1818–28, and in 40 vols., Berlin, 1867–75). A critical edition under the auspices of the Prussian Academy of Sciences was issued in 1909–15. Of selections the editions are numerous. His *Letters* are collected in *Ausgewahlte Briefe an verschiedene Freunde* (Zurich, 1815–16); *Auswahl denkwurdiger Briefe* (Vienna, 1815), *Briefe an Sophie von La Roche* (Berlin, 1820); and Hassencamp, *Neue Briefe Wielands, vornehmlich an Sophie von La Roche* (Stuttgart, 1894). The *Abderiten* is translated by Christmas as *The Republic of Fools* (London, 1861); the *Oberon* by Sotheby (3d ed., ib., 1826). Consult also: J. G. Gruber, *Christoph Martin Wieland* (2 vols., Leipzig, 1827–28); L. E. Hallberg, *Wieland* (Paris, 1869); H. C. F. Prohle, *Lessing, Wieland, Heinse* (Berlin, 1877); L. F. Ofterdingen, *Christoph Martin Wielands Leben und Wirken in Schwaben und in der Schweiz* (Heilbronn, 1877); Ernst Ranke, "Zur Beurtheilung Wielands," in *Festgabe zum neunzigsten Geburtstag Leopolds von Ranke* (Marburg, 1885); Ludwig Hirzel, *Wieland und Martin und Regula Kunzli* (Leipzig, 1891); Karl Walter, *Chronologie der Werke C. M. Wielands, 1750–1760* (Griefswald, 1904); E. Stadler, *Wielands Shakespeare* (Strassburg, 1910).

WIELICZKA, vyĕ-lĭch'kȧ. A town in the Crownland of Galicia, Austria, 7 miles southeast of Cracow, on a branch of the Austrian state railway (Map: Austria, F 2). The population is Polish, and in 1910 numbered 6724. The town is important only for its rock-salt mines, which are the most famous in the world, and in large part supply the Austro-Hungarian monarchy. These mines, reaching a depth of 982 feet, form a subterranean town, extending about 2½ miles from east to west and about 4000 feet from north to south. The galleries traverse seven levels and aggregate 77 miles in length. Some of the halls are very large and contain statues and other decorations carved from the salt. There are several ponds. Eleven shafts lead down to the mines. About 1400 workmen are employed. There were produced, in 1912, 79,874 metric tons of rock salt. It is not known how long the mines have been in operation, but there is evidence that they were worked as early as 1044. From the possession of the Poles the mines fell to Austria in 1772; in 1809 they were shared by Austria and the Dukedom of Warsaw, and in 1814 went again to Austria alone. There were inundations in 1868 and 1879. The land on which the town of Wieliczka stands has settled somewhat. Consult Eduard Windakiewicz, *Das Steinsalz-Bergwerk in Wieliczka* (Freiberg, 1896).

WIEN, Max (1866–). A German physicist. He was born at Königsberg, where he attended the university, and he also studied at Freiburg and Berlin. In 1891 he became an assistant to W. C. Röntgen at Würzburg, was appointed a privatdocent there in 1893, and in 1898 was called to the Aachen Technische Hochschule. He accepted a professorship in the Danzig Technische Hochschule in 1904, but after

1911 held the chair of physics at Jena His investigations deal particularly with acoustics. In 1888 he constructed a resonator for measuring the strength of tones.

WIEN, WILHELM (1864–). A German physicist, born at Gaffken, near Fischhausen, East Prussia He was educated at Gottingen, Heidelberg, and Berlin, served as an assistant in the Imperial Physical-Technical Institute at Charlottenburg in 1890–96, and in 1892 became also a privatdocent at Berlin. Afterward he was professor successively in the Technische Hochschule at Aachen, at Giessen, and at Wurzburg (from 1900). He lectured at Columbia University in 1913. His investigations deal largely with theories of radiation, and for his work in this field he received the Nobel prize in physics in 1911. Wien published *Lehrbuch der Hydrodynamik* (1900) and *Neuere Probleme der Theoretischen Physik* (1913).

WIENBARG, vēn'bärk, LUDOLF (1802–72). A German author, born at Altona. He studied theology and philosophy at the universities of Bonn and Kiel, taught at The Hague, and was instructor in aesthetics and literature at Kiel University. Afterward he devoted himself to literature and became associated with the Young Germany party, giving it its name. His writings on aesthetics and literary history were a great power in their time. Among his publications are: *Esthetische Feldzuge* (1834), his best work; *Holland in den Jahren 1831 und 1832* (1833); *Die neueste Litteratur* (1835); *Geschichtliche Vortrage iiber altdeutsche Sprache und Litteratur* (1838); and *Geschichte Schleswigs* (1862). Consult Victor Schweizer, *Ludolf Wienbarg: Beitrage zur jungdeutschen Aesthetik* (Leipzig, 1896).

WIENER, vē'nēr, LEO (1862–). An American Slavic scholar. Born at Bielostok, Russia, he studied medicine at Warsaw University, attended the Polytechnic in Berlin, and came to the United States in 1882. He was a teacher of languages in Missouri and at the New England Conservatory of Music, Boston, until 1896 and afterward at Harvard, where he became professor of Slavic languages and literatures in 1911. Besides translating and editing the *Complete Works* of Count Leo Tolstoy (24 vols., 1904–05), he published Morris Rosenfeld's *Songs from the Ghetto* (1898; enlarged ed., 1900), with prose translation; *The History of Yiddish Literature in the Nineteenth Century* (1899); *Anthology of Russian Literature* (2 vols., 1902–03); *An Interpretation of the Russian People* (1915); *Commentary to the Germanic Laws and Mediæval Documents* (1915).

WIENER-NEUSTADT, vē'nēr-noi'shtät. A town of Lower Austria, situated 28 miles south of Vienna (Map: Austria, D 3). The town is overlooked by the old castle of the dukes of Babenberg, now occupied by the military academy, founded by Maria Theresa in 1762. The castle contains a fine Gothic chapel of the fifteenth century. There are extensive manufactures of machinery, flour, brass goods, locomotives, bells, glycerin, sugar, pottery, paper, leather, and ammunition. Pop., 1900, 28,438; 1910, 32,869.

WIENIAWSKI, vē-nyäf'skĭ, HENRI (1835–80) A Polish violinist, born in Lublin. He was a pupil of Clavel and of Massart at the Paris Conservatory, and his progress was so rapid that when only 11 years old he won the first prize. In 1848 he went with his mother to Russia and gave his first concerts in St. Petersburg and Moscow In 1849 he returned to Paris, reentered the Conservatory, and took up the study of harmony under Colet, obtaining the second prize for that subject in 1850. At the age of 18 he went on a tour through Poland, Russia, Belgium, Holland, Germany, and England, and was everywhere received with enthusiasm. In 1860 he was appointed solo violinist to the Emperor of Russia, and two years later professor at the Conservatory of St Petersburg Together with Anton Rubinstein he toured the United States in 1872 After his return to Europe he succeeded Vieuxtemps as professor at the Brussels Conservatory in 1875. He died in Moscow Most of his compositions remain in manuscript His published works consist of two concertos, several fantasias, salon pieces, and violin studies.

WIENIAWSKI, JOSEPH (1837–1912). A Russian pianist and composer, born at Lublin. At the age of 10 he entered the Paris Conservatory, where he studied for three years under Zimmermann and Marmontel. From 1865 to 1869 he was professor at the Moscow Conservatory, from which he resigned to establish his own music school. In 1876 he accepted a professorship in the Brussels Conservatory, which he held till his death. He made extensive tours with his brother Henri, the famous violinist. Among his works the more important are an overture, *Guillaume le Taciturne;* a piano concerto; a string quartet; *Fantaisie et Fugue;* 24 études

WIERSBITSKI, OTTO VON CORVIN-. See CORVIN-WIERSBITSKI.

WIERTZ, vērtz, ANTOINE JOSEPH (1806–65). A Belgian painter, born at Dinant. He showed a wonderful precocity in art, and at 14 he began to study at the Academy of Antwerp under Herreyns and Van Brée, making Rubens his model. In 1832 he won the Prix de Rome. At Rome he modeled his art upon Michelangelo, and as the fruit of his assiduous reading of Homer he produced, in 1835, an enormous canvas, the "Combat Over the Body of Patroclus," 30 feet in length, with more than a dozen life-size figures. The picture produced a deep impression, and Thorvaldsen pronounced the young artist a giant. On his return Wiertz settled first at Liége, supporting himself by portrait painting, and in 1848 went to Brussels. There he painted his masterpiece, "The Triumph of Christ." In 1850 the government built for him after his own design a gigantic studio, now known as the Musée Wiertz, in which all his historical, allegorical, and ideal pictures are united, and which he bequeathed to the nation. There he executed the most remarkable of his purely ideal creations and his realistic pictures, the most original and interesting of all his works. There he also carried on chemical experiments, resulting in the discovery of a new process of painting, combining the advantages of oil and fresco, which he called *peinture mate,* or painting with a dull surface. Always seeking to give visible expression to an idea, Wiertz's undisciplined imagination often indulged in morbid representations, the mere titles of which will indicate their character: "A Second after Death," "The Child Burned," "Precipitate Inhumation," "The Suicide," "Hunger, Folly, and Crime," "A Scene in Hell," "Thoughts and Visions of a Head Cut off." Among his many literary productions, brought out in swift suc-

cession, may be cited *L'éloge de Rubens* (1840), and *L'école flamande de peinture* (1863), which was crowned by the Royal Academy of Belgium. For his biography consult: Watteau (Brussels, 1865) and Labare (ib., 1867); and Atkinson, in the *Portfolio* (London, 1875).

WIESBADEN, vēs'bä'den; *locally*, commonly vīs'bä'den. A city of Prussia, in the Province of Hesse-Nassau, previous to 1866 the capital of Nassau, 6 miles north of Mainz (Map Germany, C 3). Altitude, 385 feet. It is a charming city and one of the most fashionable and popular summer resorts of Europe, with 29 saline springs whose temperature ranges from 104° to 156° F. The number of visitors in 1907 was 180,000. The climate is moderate.

Wiesbaden lies for the most part in a fan shape, the streets of the town proper stretching away from the Wilhelmstrasse, which, in a straight line nearly north and south, separates the town proper from the Kurhaus, the adjacent pleasure grounds, and the attractive residence section on the east. The Wilhelmstrasse is the leading boulevard and the centre of local life. Here, towards its northern end, on the right, is the fine Kursaalplatz, containing two cascades, with the Old Colonnade on the north, the New Colonnade and the splendid modern Royal Theatre on the south, and the Kurhaus on the east. The Kurhaus was erected in 1809–10. It is dignified by Greek colonnades combining both Doric and Ionic features, and contains a handsome main room. In the rear are a large fountain and basin marking the entrance to the beautiful Kurhaus Park. Northwest of the Kursaalplatz is the modern Trinkhalle, with a pavilion and colonnades. Here is the celebrated Kochbrunnen (temperature 156° F.). Southwest, in the old part of the town, may be seen the fragment of a Roman wall—the Heidenmauer—over 60 feet long. The adjacent Michelsberg is now crowned by a sightly modern synagogue. Eastward and adjacent to the Wilhelmstrasse are the market place, where are to be found the modern brick Markt-Kirche (Protestant), a striking Gothic structure (1853–62); the royal palace (1837–40), with interesting statuary by Schwanthaler; and the fine modern late-Renaissance town hall (1884–88). The last contains the Fischbach Textile Museum.

The museum, situated near by on the Wilhelmstrasse towards its southern end, contains antiquities, natural-history specimens, the royal collections of paintings, and a library. The antiquities include Roman, Alemannian, and Frankish relics. Its noteworthy Jupiter Column dates from 221 A.D. To the southeast of the museum are the splendid Renaissance Augusta Victoria Baths. On the extreme western edge of the city is the new conspicuous Ring Kirche (Protestant). Not far distant, to the southeast of the Neroberg on the north, is a striking Greek chapel—a mausoleum completed for a Russian grand duchess in 1855.

There are in the city an agricultural institute and experiment station, music and architectural schools, special medical schools, and a chemical laboratory. The Nassau Art Union has a permanent display of paintings. Wiesbaden is provided with a municipal hospital, several celebrated eye institutions, and a military hospital (in a modern building in the Italian style). There is a large trade in wine. Pop., 1900, 86,111; 1910, 109,002, about one-third Roman Catholics.

Wiesbaden is the Mattiacum of the Romans—a fortress said to have dated from the time of Drusus. Its waters were known to Pliny (*Hist. Nat.*, xxi, 2). Consult Heyl, *Wiesbaden und seine Umgebungen* (27th ed., Wiesbaden, 1908).

WIESELER, vē'ze-lēr, Friedrich (1811–92). A German archæologist and philologist, born at Altencelle, Hanover, and educated at Göttingen and Berlin. In 1854 he was appointed professor of archæology and philology at Gottingen. Here he became known for his archæological seminar, the first of its kind in Germany (1847). His researches took him through many parts of Europe, as well as Asia Minor, and he was the first to date correctly the silver objects discovered at Hildesheim (q.v.). His publications include: *Conjectanea in Æschyli Eumenides* (1839); *Ueber die Thymele des griechischen Theaters* (1847); *Das Satyrspiel* (1848); and *Theatergebaude und Denkmaler des Buhnenwesens bei den Griechen und Romern* (1851); but his most comprehensive and valuable contribution to literature is his new adaptation and continuation of Karl Otfried Müller's *Denkmaler der alten Kunst* (1854–56). Consult *Biographisches Jahrbuch* (Berlin, 1900).

WIESNER, vēs'nēr, Julius (1838–). An Austrian botanist, born at Tschechen, near Brunn, and educated there and at Vienna. He was professor of the anatomy and physiology of plants and director of the institute of plant physiology at the University of Vienna from 1873 to 1909, when he retired. He became known through his investigations of chlorophyll, of vegetable cell tissue, of the relation between light and vegetation, of the laws of plant growth, and the possibilities of plant movement. He wrote: *Die Rohstoffe des Pflanzenreiches* (2 vols., 1873; 3d ed., 1914), *Die naturliche Einrichtung zum Schutze des Chlorophylls* (1876); *Die Entstehung des Chlorophylls in der Pflanze* (1877); *Das Bewegungsvermogen der Pflanzen* (1881); *Elemente der wissenschaftlichen Botanik* (3 vols., 1881–89; later eds.); *Pflanzenphysiologische Mitteilungen aus Buitenzorg* (1894); *Studien über den Einfluss der Schwerkraft auf die Richtung der Pflanzenorgane* (1902); *Der Lichtgenuss der Pflanzen* (1907); *Natur-Geist-Technik* (1910); *Biologie der Pflanzen* (3d ed., 1913).

WIFE. See Husband and Wife.

WIFE FOR A MONTH. A comedy by John Fletcher, produced before 1623, printed in 1647.

WIFE-HATER BIBLE. See Bible, Curious Editions of.

WIFFEN, wif'en, Benjamin Barron (1794–1867). An English editor and biographer. A younger brother of Jeremiah Holmes Wiffen, known for a translation of Tasso's *Jerusalem Delivered* (1824), he was born of Quaker parentage at Woburn, Bedfordshire. Having become interested in Spanish literature, he visited Spain in 1839 and again in 1842, and did much to rescue from oblivion the works of early Spanish reformers. With the assistance of Don Luis de Usóz y Río he published the collection of *Obras antiguas de los Españoles Reformados* (20 vols., 1847–65). He also wrote the *Life and Writings of Juan de Valdés* (1865) to accompany the English translation of the works of Valdés by J. T. Betts, besides other biographical sketches. Consult Eduard Boehmer, *Bibliotheca Wiffeniana* (2 vols., London, 1874 and 1883), and S. R. Pattison, *The Brothers Wiffen* (ib., 1880).

WIG (abbrev. of *periwig*, a variant of Eng *peruke*, Fr. *perruque*, It *perucca*, Sp. *peluca*, from Lat. *pilus*, a hair). A close-fitting skull-cap of false hair worn to conceal baldness or to adorn the head. The custom dates from remote antiquity Many wigs have been found on Egyptian mummies, and in the British Museum is one, probably a woman's, dating from about 1500 B.C., found near the small temple of Isis at Thebes According to Xenophon, Astyages wore an immense wig. Several of the Roman emperors wore wigs. That of the entirely bald Otho could not be distinguished from natural hair. Domitian, who boasted of his early baldness, appears on all his medals with a fine and perfectly fitting head of hair Caracalla, during his campaigns on the Danube, had his hair cut close, and wore a blond wig in order to please the Germans The fashionable women of Rome preferred the fine, blond hair of the Gauls and Germans to their own coarse black locks, and it was a blond wig that Ovid describes the Empress Messalina as wearing on her nocturnal escapades. In the sixteenth century false hair began to be extensively used by the ladies of Europe, and Queen Elizabeth is said to have had 80 different coiffures, or *transformations* as they are called to-day. The violent protest of the clergy against long hair whether false or natural banished wigs for a time, but they came in again under Louis XIII, who wore one to hide his baldness. During the reign of Louis XIV, wigs assumed monumental proportions and about 1660 even ecclesiastics began to wear them. King and courtiers alike had their heads clipped in order to display the huge manes characteristic of the period. For more than a century no gentleman of fashion could appear without a wig, and as much as $15 an ounce was paid in England for fine qualities of hair, and wigs were made at a cost of six or seven hundred dollars Towards the end of the eighteenth century they began to be superseded by the queue with hair powder (q.v.). Clergymen and military officers long clung to the style and it has not yet been discarded on the English bench. The full-bottomed wig is worn by the Speaker of the House of Commons. The wig of English judges has flaps formed of precise curls hanging down in front and resembles the wig of Queen Anne. The undress wig of the judges and that of barristers and advocates are relics of the old tie wig, in which the lower part of the wig is tied In Queen Anne's reign the fashion became most extreme in England. She patronized the full-bottomed wig, an immense headdress which parted into two bunches of ringlets, one on each breast, and floated down the back and shoulders. See HAIRDRESSING; HAIR MANUFACTURES.

WIGAN, wig'an. A manufacturing town and parliamentary borough in Lancashire, England, on the Douglas, 15½ miles south-southeast of Preston (Map: England, D 3) An ancient town, irregularly built, Wigan has made rapid architectural and municipal progress The twice restored parish church of All Saints is a stately edifice, dating from the fourteenth century There are fine modern public buildings. The Mining and Technical College is educationally important. It has extensive collieries and important iron and cotton industries, while screws, nails, railroad wagons, and lubricants are extensively produced. Pop, 1901, 60,770; 1911, 89,152

WIGEON. See WIDGEON.

WIGFALL, LOUIS TREZEVANT (1816–74). An American soldier and politician, born in Edgefield District, S. C. He was educated at the College of South Carolina, but served as lieutenant of volunteers in the Seminole War before graduating Later he was admitted to the bar and removed to Marshall, Tex., in 1846 He served in the Lower House of the Texas Legislature in 1849–50, and in the Senate in 1857–58 and 1859–60. In 1860 he was elected to the United States Senate and became at once a defiant advocate of secession. He was expelled July 11, 1861, when he did not appear at the extra session. Meanwhile he had served as an aid to General Beauregard at the bombardment of Fort Sumter, and on April 13 made his way to the fort to counsel surrender, as further resistance was useless He became colonel of the Second Infantry in the Confederate army August 28, and at the same time served as Representative in the Confederate Congress He was promoted brigadier general in October, 1861, but resigned Feb 20, 1862, to take his seat in the Confederate Senate, of which he remained a member until the end of the war. Then he lived in England for several years and on his return took up his residence in Baltimore.

WIGGIN, wig'in, KATE DOUGLAS (1859–1923). An American author, whose maiden name was Smith. She was born in Philadelphia, whence her family removed to Hollis, Me. After graduating from Abbott Academy (Andover, Mass.) in 1878, she went to California, where she studied kindergarten methods and gained success as a teacher, organizing the first free kindergartens on the Pacific coast. In 1880 she was married to S. B. Wiggin, a California lawyer. He died in 1889 and six years later she became the wife of George C. Riggs. They lived in New York and at Hollis, Me *The Birds' Christmas Carol*, a story published in 1888, was the first to attract attention to Kate Douglas Wiggin, and it continued to be very popular. Her other chief successes were *Rebecca of Sunnybrook Farm* (1903) and *New Chronicles of Rebecca* (1907) and the Penelope series—*A Cathedral Courtship* (1893); *Penelope's English Experiences* (1893), *Penelope's Progress* (1898), *Penelope's Experiences in Ireland* (1901), and *Penelope's Postscripts* (1915). Other stories were widely read. They include: *The Story of Patsy* (1889); *Timothy's Quest* (1890); *Marm Lisa* (1896); *Diary of a Goose Girl* (1902); *Mother Carey's Chickens* (1911); *The Story of Waitstill Baxter* (1913). With her sister, Nora Archibald Smith, well known as a kindergartner, she edited various books for children, and wrote *Froebel's Gifts* (1895), *Froebel's Occupations* (1896), and *Kindergarten Principles* (1896). Bowdoin College honored her with the degree of Litt.D. Consult F. T. Cooper, *Some American Story Tellers* (New York, 1911).

WIGGINS, CARLETON (1848–). An American landscape and cattle painter He was born in Orange Co., N. Y., and studied in New York at the National Academy of Design and with George Inness, and in Paris, and settled in New York. His landscapes are executed in broad flowing lines, with a rich low-toned color scheme, and often contain cattle, solidly and realistically portrayed. Good examples are: "Young Holstein Bull" (Metropolitan Museum,

New York); "Cattle in Pond" and "Sheep and Landscape" (Brooklyn Museum); "Lake and Mountains" and "Moonrise on the Lake" (Art Institute, Chicago), "October" (Corcoran Art Gallery, Washington); "Evening after a Shower" (National Gallery, Washington); also "The Plow Horse" (Lotos Club, New York). Wiggins was elected to the National Academy of Design in 1906. For his son, see WIGGINS, GUY CARLETON.

WIGGINS, GUY CARLETON (1883–) An American landscape painter, son and pupil of Carleton Wiggins (q.v.). He was born in Brooklyn and made his residence in New York, a city which often provides subjects for his paintings, as "The Metropolitan Tower" (Metropolitan Museum, New York); "Columbus Circle, Winter" (National Gallery, Washington); and "Riverside Drive" (1915). His work shows the influence of Impressionism, as may be seen especially in "Berkshire Hills, June" (Brooklyn Museum)

WIGGINS, JOSEPH (1832–1905). An English mariner, born at Norwich. He rounded out a successful career as a sea captain by utilizing a portion of the Northeast Passage (q.v.). He was the pioneer in demonstrating the practicability of trade relations by sea between the North Sea countries and the northern portions of Siberia. Beginning his voyages in 1874, he twice reached the Ob River, and five times carried cargoes to the Yenisei River, up which stream he once navigated his ship 2000 miles. He facilitated the construction of the Trans-Siberian railway by carrying to that country a large cargo of rails. He was honored by the Czar for his pioneer work, which Baron Nordenskiöld described as an "Event rivaling in importance the return of the first fleet loaded with merchandise from India." Consult H. Johnson, *Life and Voyages of Joseph Wiggins* (London, 1907).

WIGGLESWORTH, wĭg'lz-wĕrth, MICHAEL (1631–1705). A New England clergyman and poet, born in England. He was brought to Charlestown at the age of seven, but was soon taken to New Haven. He graduated at Harvard (1651), served as tutor there (1652–54), preaching occasionally in Charlestown, and afterward in Malden, where he was settled as pastor from 1657 till his death. In 1663 he went to Bermuda in search of health. During this time he studied medicine, and, having resumed preaching in 1686, practiced both professions thereafter. He is best known for his *Day of Doom* (1662), a poem on the Day of Judgment, according to views of his time. This poem was popular for more than 100 years in America, but is now regarded chiefly as a literary curiosity. Wigglesworth wrote also *God's Controversy with New England* (1662; first published 1871 by the Massachusetts Historical Society), and *Meat Out of the Eater, or Meditations Concerning the Necessity, End, and Usefulness of Affliction to God's Children* (1669), also very popular. Minor poems were usually appended to the *Day of Doom*, and are in a modern edition (1867). Consult the *Life* by John Ward Dean, with letters of Wigglesworth and a catalogue of his library (Albany, 1871).

WIGHT, wīt, ISLE OF. An island in the English Channel, included in Hampshire, and separated from the mainland of England by the Solent (q.v.) (Map: England, E 6). It is 56 miles in circuit, and has an area of 145 square miles. Pop., 1901, 82,387; 1911, 88,186. The soil of the northern half of the island is for the most part a stiff clay, growing oats, of the southern, a red loam which produces crops of barley. Red wheat is grown in other parts of the island. The chalk downs afford admirable pasturage for sheep, celebrated for the pureness of their wool. They furnish the London market with spring lamb. The chief exports are wool, corn, flour, cement stones (septaria), and white glass-house sand. Newport is the capital; the other towns are Ryde, Cowes, and Ventnor, all exceedingly popular summer resorts. Near Cowes is Osborne, formerly a favorite residence of Queen Victoria, and after her death presented to the nation by Edward VII. It is now used as a college for naval cadets. Cowes is noted as the great English yachting centre. There is railway communication between Ryde and Ventnor, and between Cowes and Newport. The chief physical feature of the island, to which it owes its shape and much of its beauty, is an undulating range of chalk downs, extending from the Culver cliffs on the east to the Needles on the west, rising to its greatest elevation in Mottiston Down, 661 feet above the sea. The river Medina, rising near the southern extremity of the island, flows north through a gap in this range, expands into a tidal estuary below Newport, and flows into the Solent at Cowes. A second range of chalk downs, of greater elevation—St. Boniface Downs, 783 feet; etc.—rises at the southern point of the island, and expands into a broad promontory, the southern face of which forms the picturesque district known as the Undercliff, or "back of the island," in which is situated Ventnor. The whole of this part of the island is sheltered from cold winds, and enjoys a well-merited reputation as a residence for invalids suffering from consumption or any other pulmonary disease. Its remarkable healthfulness is attested by the death rate of the district, which is the lowest in the kingdom; while the mildness of its climate is borne witness to by the luxuriance of the myrtles and other exotics which live through the winter without protection.

The great variety of strata displayed within so small an area renders the Isle of Wight one of the best available localities for the geological student. In Alum Bay, at the western extremity of the island, the rapid succession of vertical layers of sands and clays of bright and varied hue produces a singular and beautiful effect. Isolated masses of chalk, which in consequence of their superior hardness have survived the marine and atmospheric waste, form the well-known Needles, at the western opening of the Solent, and the picturesque rocks of Freshwater Bay. The cliffs of the Undercliff are of the upper greensand or firestone, underlying the chalk. Below this comes the gault or blue marl. To the action of the land springs upon this formation the landslips to which the back of the island owes its beauty are due. The lower greensand succeeds the gault, occupying the greater part of the area between the north and south chalk downs. This presents a wall of cliff to the sea, diversified with many narrow picturesque gorges, locally known as chines. The fresh-water Wealden formation is the lowest visible in the island. Bones of the colossal iguanodon and other saurians are found in this formation. The antiquities include sepulchral barrows on the downs, Saxon burial places in several localities, the remains of a Roman

villa, with a tessellated pavement, at Carisbrooke, and the scanty remains of Quarr Abbey, near Ryde, now incorporated in the monastery of the French Benedictines from Solesmes. Carisbrooke Castle is a fine ruin, occupying a commanding position.

The Isle of Wight is supposed to have been the tin mart of the Greek traders mentioned under the name of *Ictis* by Diodorus Siculus. The Romans knew it as *Vecta* or *Vectis*, which is the Latinized form of the native name. It was conquered for the Romans by Vespasian in the reign of Claudius (43 A.D.). Cerdic, the founder of the Kingdom of Wessex, took the island in 530 A.D. In 661 A.D. it was reduced by Wulphere of Mercia, and given to Ethelwold, King of Sussex, from whom it was wrested (686 A.D.) by Ceadwalla of Wessex, to whom, under the influence of Wilfrid, Archbishop of York, the island owed the introduction of Christianity. During the three centuries preceding the Norman Conquest it was repeatedly devastated by the Danish pirates, who made it their stronghold to which they retired with their plunder. William the Conqueror gave it to his kinsman, Fitz-Osborne; Henry I transferred it to the family of De Redvers, in whose hands it remained till the reign of Edward I, when it passed by sale to the crown. During the French wars of Edward III and his successors the island was repeatedly invaded and pillaged by the French. At the close of the reign of Henry VIII the Armada dispatched by Francis I, under the command of D'Annebault, made several landings on the coast, and inflicted some damage, but was ultimately driven back by the prowess of the islanders. The most interesting event in the history of the island is the imprisonment of Charles I in Carisbrooke Castle, after his flight from Hampton Court. The island, though included in Hampshire, enjoys a form of quasi self-government under a governor, who for many years has been some member of the royal family of Great Britain. Consult Edward Thomas, *The Isle of Wight* (Boston, 1912).

WIGHT, Orlando Williams (1824–88). An American physician and translator, born in Centreville, N. Y. He was educated at the Rochester Collegiate Institute, was ordained as a Universalist clergyman and accepted a call to Newark, N. J. (1850). Three years afterward he left the Church to engage in literary work. In 1865 he graduated in medicine at the Long Island College Hospital; in 1874 was appointed State geologist and Surgeon General of Wisconsin, and afterward served as health commissioner of Milwaukee (1878–80) and of Detroit. His publications include: *History of Modern Philosophy* (trans. with F. W. Ricord from the French of Victor Cousin, 1852); *Life of Abélard and Héloïse* (1853 and 1861); *Standard French Classics* (14 vols., 1858–60); *Pascal's Thoughts* (1859); *The Household Library* (18 vols., 1859 et seq.); six volumes of translations from Balzac (1860), Henri Martin's *History of France* (with Mary L. Booth, 1863); and *A Winding Journey Around the World* (1888).

WIGMORE, Baron of. See Mortimer, Roger de.

WIGMORE, John Henry (1863–). An American legal scholar and educator. He was born in San Francisco and was educated at Harvard (A.B., 1883; LL.B., 1887). He practiced law at Boston in 1887–89, served as professor of Anglo-American law at Fukuzawa University, Tokyo, Japan, in 1889–92, and was professor of law from 1893, and dean of the faculty of law from 1901, at Northwestern University. In 1909–10 he served as president of the American Institute of Criminal Law and Criminology. His publications include: *Digest of the Decisions of the Massachusetts Railroad Commission* (1888); *The Australian Ballot System* (1889); *Notes on Land Tenure and Local Institutions in Old Japan* (1890); *Materials for the Study of Private Law in Old Japan* (1892); *Treatise on Evidence* (4 vols., 1904–05; supplementary vol., 1908; 2d ed. of latter, 1915); *A Pocket Code of the Rules of Evidence* (1910; new ed., 1915); *The Principles of Judicial Proof* (1913).

WIG'WAG'GING. See Signaling and Telegraphing.

WIGWAM, wĭg'wŏm (Etchemin Algonquian *weekwahm*, house). In general, a native American house, especially one made of bark or matting. The typical wigwam consists of a framework of saplings set in the ground, connected by longitudinal poles, and bent inward and lashed together by means of withes or thongs in such a manner as to form a rounded roof; the whole covered with sheets of birch bark sewed together and attached to the frame by means of flexible rootlets. The better structures were provided with a smoke hole and wind guard in the centre of the roof, and a deerskin curtain to cover the doorway, which faced the east. South of the birch-tree zone mats made of rushes, etc., were sometimes substituted for the sheets of bark, although most of the mat-covered structures are elongated and dome-shaped in form. In some districts the walls were of slender saplings wattled together and the roof of bark or skin. Some of these forms grade into the *tipi*, or tent of poles and buffalo skins; the *wickiup*, or house of shrubbery usually wattled; the *ki*, or grass houses of the prairies and deserts; the earth lodge, of which the Navajo *hogan* may be taken as the type; and the *pueblo* of adobe or stone. The native houses were all invested with a certain sacred character, and each type was constructed with care according to fixed standards, and often in conformity with ritualistic observances, extending from the gathering of material to the ceremonial installation of household deities. See Indians.

WIJNANTS, vī'nants, Jan. A Dutch painter. See Wynants.

WIKCHAMNI, wĭk-chăm'nĭ. See Yokuts.

WIKING. See Normans.

WILAMOWITZ-MÖLLENDORF, vē'lä-mō'vĭts-mĕl'en-dōrf, Ulrich von (1848–). A German classical scholar. He was born at Markowitz, Posen, and was educated at the universities of Bonn and Berlin. In 1874 he became privatdocent in Berlin, and in 1876 professor of classical philology in Greifswald. In 1883 he was called to a similar position at Göttingen, and in 1897 to Berlin, where he was also made a member of the Academy of Sciences and a director of the German Archæological Institute. His works include: *Analecta Euripidea* (1875); Haupt's *Opuscula* (1876); *Callimachus* (1882; 3d ed., 1907); translations of Æschylus' *Agamemnon* (1885) and *Orestea* (1896); Euripides' *Hippolytus* (1891) and *Heracles* (3d ed., 1909), noteworthy for its introduction; *Aristoteles und Athen* (1893); *Bakchylides* (1898); the *Persians* of Timotheus

(1903), *Einleitung in die Attische Tragodie* (2d ed., 1907); "Die Griechische Literatur des Altertums," in *Die Griechische und Lateinische Literatur und Sprache*, vol. i, part 8 of *Die Kultur der Gegenwart* (3d ed., 1912); *Sappho und Simonides* (1912), *Reden und Vortrage* (3d ed., 1912); *Reden aus der Kriegszeit* (1915).

WILARS DE HONECOURT, vē'lar' de ōn'kōōr', written also VILLARD DE HONNECOURT (13th century). A French architect, born at Honnecourt in French Flanders. He was active in the middle of the thirteenth century, when he built the choir of the cathedral of Cambrai (demolished 1790); he also probably built churches at Meaux and Vaucelles. He traveled in Hungary and through parts of France, making numerous sketches, by which he is chiefly known. These invaluable drawings in silverpoint, lead, and pen-and-ink, are preserved in the Bibliothèque Nationale at Paris, whither they were transferred from Saint-Germain des Prés. Only 33 of the 41 leaves existing in the fifteenth century are now extant, representing the towers of Laon Cathedral, various rose windows, architectural details, and studies of figures and mechanical contrivances, accompanied by notes. The *Album de Villard de Honnecourt* has been published in Paris in facsimile.

WILBERFORCE (ALBERT) BASIL (ORME) (1841–1916). An English clergyman, son of Samuel Wilberforce (q.v.). He was born in Winchester and after studying at Eton and at Oxford was chaplain to his father, then Bishop of Oxford. Subsequently for some years he was a curate and rector. From 1894 to 1900 he served as canon of Westminster, being also rector of St. John's (Westminster), and, from 1896, chaplain of the House of Commons. From 1900 till his death he was archdeacon of Westminster. One of the most noted preachers of his time, he published *Sermons Preached in Westminster Abbey* (1898), a second series being entitled *Feeling after Him* (1902), and a third series *Sanctification by the Truth* (1906). Other writings include: *Following on to Know* (1904); *Speaking Good of his Name* (1905); *The New Theology* (1908); *The Hope that is in Me* (1909); *The Power that Worketh in Us* (1910).

WILBERFORCE, SAMUEL (1805–73). A distinguished English bishop. He was born at Clapham, and privately educated until his matriculation at Oriel College, Oxford. He was ordained deacon in 1828 and priest a year later, after which he became rector of Brightstone in the Isle of Wight and remained there for 10 years. He became archdeacon of Surrey in 1839 and canon of Winchester in 1840, in which year he also took the living of Alverstoke in Hampshire. In 1845 he was made dean of Westminster. Here he remained only a few months, however, becoming Bishop of Oxford in October. His position here was unusually difficult, owing to the excitement caused by the ferment of the Oxford movement. He was a moderate high churchman, but opposed the extremes of some of the ritualists. Among other activities, he founded a theological college at Cuddesdon and a training college for school masters at Culham. He soon became recognized as a power in the House of Lords and in the national life generally. He was the prime mover in the revival of Convocation (q.v.), and took a leading part in the controversies over *Essays and Reviews*, the Hampden election, and the Colenso case. In 1869, on the resignation of Bishop Sumner of Winchester, he was translated to the vacant see, which gave him opportunities for more extended work. Only four years later, however, he was killed by a fall from his horse, July 19, 1873. Consult his *Life*, by A. R. Ashwell and his son R. G. Wilberforce (London, 1879; revised edition by R. G. Wilberforce, ib., 1888), id., in *Leaders of the Church, 1800–1900* (ib., 1907); G. W. Daniell, *Bishop Wilberforce* (Boston, 1891); J. W. Burgon, in *Lives of Twelve Good Men* (2 vols., London, 1888); and references in most of the works cited under OXFORD MOVEMENT.

WILBERFORCE, WILLIAM (1759–1833). An English statesman and philanthropist, born at Hull, in Yorkshire, Aug. 24, 1759. While at school he addressed a letter to a York paper "in condemnation of the odious traffic in human flesh," a subject he seems never afterward to have lost sight of. At 17 he entered St. John's College, Cambridge, and in due time he passed his examinations with credit. On attaining his majority he came into possession of a large fortune, and determined to enter Parliament. In 1780 he was returned for Hull. He had known Pitt when at Cambridge, and in London they became inseparable friends. In Parliament, however, Wilberforce remained independent of party, and when the elevation of Pitt to the Premiership gave him an opportunity of taking office he declined to do so, but rendered efficient service to his friend. In 1784, in spite of opposition from the great Whig families, he was returned to Parliament without a contest as a representative from Yorkshire. In 1786 he carried through the Commons a bill for mitigating the criminal law, but the Lords rejected it. Next year he founded a society for the discouragement of vice, and about the same time he entered on his great struggle for the abolition of the slave trade, to which he thenceforward dedicated his whole energy. He was powerfully supported by the Quakers, and by Thomas Clarkson (q.v.), who collected evidence and kept the general public interested while Wilberforce represented the cause in Parliament. In 1789, after a critical illness, he brought before the House of Commons a series of resolutions condemning the slave trade. Supported by Pitt, Burke, and Fox, he carried them, but the planters caused their postponement. In 1792 a motion for the gradual abolition of the slave trade passed the House of Commons by a great majority. Again in 1804 his bill was carried through the Commons, to be rejected by the Lords, and in the following year it was lost in the Commons. In 1806, however, a resolution was moved by Fox, pledging the Commons to a total abolition of the slave trade in the following session. Meantime a work published by Wilberforce against the traffic had a remarkable influence on public opinion and on the subsequent debates. True to its pledge, the House of Commons accepted the bill, the Lords finally approved it, and it received the royal sanction in 1807. Wilberforce now sought to secure the abolition of the slave trade abroad, and at the same time entered on an agitation for the total abolition of slavery itself. Declining health, however, compelled him, in 1825, to retire from Parliament, in which since 1812 he had sat for the borough of Bramber. The movement against slavery was then intrusted to Sir T. Fowell Buxton. Three days before Wilberforce's

death news was brought him that the abolition bill had passed a second reading. He died July 29, 1833, and was buried as a national benefactor in Westminster Abbey. He was a man of great versatility of mind and character, sociable, witty, strenuous, and so kind and sincere that even his opponents loved him. He wrote *Practical View of the Prevailing Religious System of Professed Christians, in the Higher and Middle Classes, Contrasted with Real Christianity* (1st American ed., Philadelphia, 1798) and was the founder of the *Christian Observer*. Consult: R. I. and Samuel Wilberforce (his sons), *Life of William Wilberforce* (5 vols., London, 1838); his *Correspondence* (ed. by his sons, 2 vols., ib., 1840); *Private Papers* (ed. by A. W. Wilberforce, ib., 1897), also Thomas Clarkson, *History of the Rise, Progress, and Accomplishment of the Abolition of the African Slave Trade by the British Parliament* (New York, 1836), and Sir James Stephen, in *Essays in Ecclesiastical Biography* (ib., 1907).

WILBERFORCE UNIVERSITY. A coeducational institution for the higher education of colored students founded at Wilberforce, Ohio, in 1856, under the control of the African Methodist Episcopal church. In addition to regular courses the institution maintains a preparatory school. The total attendance in all departments in 1915–16 was about 450, and the faculty numbered 35. The total annual income of the university was about $85,000, of which the larger part was received from the State. The value of the grounds and buildings was about $420,000, and the endowment funds amounted to about $430,000. The library contains about 7000 volumes. The president in 1916 was William S. Scarborough.

WILBOUR, Charlotte Beebe (1833–1914). An American clubwoman, born at East Hartford, Conn. She was married to Charles E. Wilbour in 1858. An advocate of woman suffrage, she was a coworker with Susan B. Anthony, Elizabeth Cady Stanton (qq.v.), and others in advancing that cause. With Mrs. Jane C. Croly and Miss Kate Field (qq.v.) she founded the Sorosis Club, New York, of which she was president in 1870–75 and in 1903–07, and thereafter honorary president. At the time of her death she was president of Phalo, a woman's literary club. She lived abroad from 1875 to 1900. One of her daughters was married to E. H. Blashfield (q.v.).

WILBRANDT, vĭl'brant, Adolf (1837–1911). A German novelist and dramatist, born in Rostock. He studied at Rostock, Berlin, and Munich, whither he was drawn by Geibel and Hayse, and where he began his journalistic work on the *Süddeutsche Zeitung*, which he followed also to Frankfort-on-Main. Then after some years in Italy spent in recovering his health and in studying art, he went to Vienna, where he managed the *Burgtheater* from 1881 to 1888, and married the actress Augusta Baudius. In 1889 he removed to Rostock, where he continued his literary work till his death in 1911. His novels of present-day problems, *Adams Söhne* (1880), *Hermann Ifinger* (1892), *Der Dornenweg* (1894), *Die Osterinsel* (Stuttgart, 1895; 5th ed., 1905), *Schleichendes Gift* (1897), *Feuerblumen* (1900), *Vella Maria* (1902), *Grosse Zeiten* (1904), and *Irma* (1905), and others, were hardly less successful than his dramas, among which *Kriemhild* (1877) is noteworthy as an effort to give new life to the heroic saga. *Der Graf von Hammerstein* (1870), *Die Maler* (1872), *Gracchus* (1872), *Arria und Messalina* (1872), *Giordano Bruno* (1874), and *Timandra* (1903) are also noteworthy. His best comedies are *Jugendliebe* (1872) and *Nathalie* (1878). But his only drama that succeeded in holding the stage for any length of time is *Der Meister von Palmyra* (1889). He wrote biographies of Heinrich von Kleist (1863), Holderlin, and Fritz Reuter, the last two in the collection *Fuhrende Geister* (2d ed., Berlin, 1896). Consult Viktor Klemperer, *A. Wilbrandt* (Stuttgart, 1907).

WILBROD, or **WILBRORD,** Saint. See Willibrord.

WIL'BUR, John (1774–1856). The founder of the Wilburite branch of Friends (q.v.). He was born at Hopkinton, R. I., and spent much of his life as a school teacher and surveyor. At the age of 28 he was appointed an elder in the orthodox Friends church. For opposing the innovations made in the church by Joseph J. Gurney and others he was denounced in the Rhode Island Yearly Meeting in 1838, and when he was sustained by his own monthly meeting of South Kensington, that meeting was dissolved, and its members were added to the Greenwich meeting, while in 1843 he was disowned. A considerable number of his supporters withdrew from the orthodox church and formed an independent yearly meeting, whose members became known as Wilburites. This branch, in 1915, numbered 3880. Wilbur published *A Narrative and Exposition* (1845). His *Journal and Correspondence* were published by his friends in 1859. Consult A. C. and H. R. Thomas, *History of the Society of Friends in America* (New York, 1894).

WILBUR, Ray Lyman (1875–). An American physician and university president. He was born at Boonesboro, Iowa, graduated in 1896 from Leland Stanford University and in 1899 from Cooper Medical College, San Francisco, and at various times did postgraduate work in Frankfort-on-the-Main, London, and Munich. At Stanford he had risen to be professor of medicine by 1909, and in 1911 added to his other duties those of dean of the medical school; in 1915 he was chosen president of the university. Wilbur held the presidency of the American Academy of Medicine in 1912–13.

WIL'COX, Cadmus Marcellus (1826–90). An American soldier, born in Wayne Co., N. C. He studied at Cumberland College, Nashville, graduated in 1846 at West Point, and served through the Mexican War. Upon the outbreak of the Civil War he resigned his commission of captain and was appointed a colonel in the provisional Confederate service. He reënforced General Beauregard at the first battle of Bull Run, and served with the Army of Northern Virginia until its surrender. In 1861 he was promoted brigadier general, and in 1863 major general. He fought in the second battle of Bull Run and at Fredericksburg, Chancellorsville, and Gettysburg, and after the war declined an appointment as brigadier general in the Egyptian army. From 1886 to 1889 he was chief of the railroad division of the Washington general land office. He published *Rifles and Rifle Practice* (1859), *Evolutions of the Line, as practiced by the Austrian Infantry and Adopted in 1853* (1860), and a *History of the Mexican War*.

WILCOX, Delos Franklin (1873–).

An American municipal expert. Born at Ida, Mich., he graduated from the University of Michigan in 1894, and later studied at Columbia (Ph.D., 1896). He was editor of the *Civic News* at Detroit, Mich., in 1905–07, and served as chief of the bureau of franchises of the Public Service Commission (first district) of New York in 1907–13. One of the foremost experts on American municipal government, he wrote: *The Study of City Government* (1897); *Ethical Marriage* (1900); *The American City* (1904); *The Government of Great American Cities* (1908); *Municipal Franchises* (2 vols., 1910–11); *Great Cities in America* (1910); *Government by All the People* (1912).

WILCOX, ELLA WHEELER (1855–**1919**). An American journalist and writer of popular verse, born at Johnstown Centre, Wis. She was educated at the University of Wisconsin and married (1884) Robert M. Wilcox, of Meriden, Conn. Soon afterward she moved to New York. She was at an early age a frequent contributor to journals. Among her collections of verse are: *Drops of Water: Temperance Poems* (1872); *Maurine* (1876); *Shells* (1873); *Poems of Passion* (1883), her best-known performance; *Poems of Pleasure* (1888); *Picked Poems* (1912). Other books of hers are: *Mal Moulée* (1886), a novel; *Men, Women, and Emotions* (1896); *Sweet Danger* (1902); *Story of a Literary Career* (1905); *Sailing Sunny Seas* (1910); *A Woman of the World* (1912); *The Art of Being Alive* (1914). She also wrote many short essays for the New York *Journal* and Chicago *American*. Though critics refused to take her work seriously, she found a large public for her writings in both verse and prose.

WILD, vilt, HEINRICH VON (1833–1902). A Swiss meteorologist and physicist. He was born Dec. 17, 1833, at Uster (Canton Zurich), and was educated at Zurich, Königsberg, and Heidelberg. In 1858 he was appointed professor of physics and director of the observatory at Bern. That institution he enlarged into a central meteorological bureau and laid the foundation of the extensive meteorological system of Switzerland. Appointed inspector of weights and measures in 1861, he brought about reforms, and was made head of the commission to maintain the standards (1867). In 1868 he was called to St. Petersburg, where he completely reorganized the observatory and established a meteorological system throughout the Empire and founded the meteorological observatories at Pavlovsk and Irkutsk. Until his retirement in 1895 he remained in the service of the Russian government. Wild died at Zurich Sept. 5, 1902. He invented the polaristrobometer—a form of saccharimeter—a polarization photometer, a magnetic theodolite, and various new optical methods for comparing measures of length. Many of his papers were published in the *Annalen des physikalischen Observatoriums für Russland* and the *Neues Repertorium für Meteorologie*, founded by himself in 1865 and 1869 respectively; as also in the *Mitteilungen* of the International Polar Commission, of which he was president (1882–83). He published, furthermore, the great work *Temperaturverhältnisse des russischen Reichs* (tables, atlas, etc., 1876; Ger. and Russ.).

WILD, JONATHAN (c.1682–1725). An English thief and receiver of stolen goods. He was born at Wolverhampton, was apprentice to a Birmingham buckle maker, and about 1706 went to London. Having been four years imprisoned for debt, he became a receiver of stolen goods, and, when he chose, an informer. He concluded his career at Tyburn. He is interesting chiefly as being in rather remote fashion the subject of Fielding's satire, *History of the Life of the Late Mr. Jonathan Wild the Great* (1743).

WILD'AIR, SIR HARRY. A gay man-about-town, in Farquhar's *Constant Couple*, and the title character of the same author's *Sir Harry Wildair*. The character was successively personated by Wilks, Garrick, and Peg Woffington.

WILD AMMONOOSUC. See AMMONOOSUC.

WILD CARROT. See CARROT.

WILDCAT. In general, a wild cat as distinguished from a domesticated one; specifically, the European wildcat (*Felis catus*), primitively numerous all over Europe, except Scandinavia, and much of northern Asia, and still to be found in the wilder districts. It is much larger than the domestic cats and differs from them in the proportionately longer body and limbs and the shorter and thicker tail. Its body is yellowish gray, with a dark mark along the back, and numerous darkish stripes down the sides and across the limbs; its tail is ringed with black; and in the male the soles of the feet are deep black. Although it may have contributed by an occasional cross to the varieties of domestic cat (q.v., under CAT), it is not believed that any domestic race sprang directly from it. Consult for this species Hamilton, *The Wildcat of Europe* (London, 1896).

In the United States the name "wildcat" is applied to the lynx; in Egypt, to the Caffre cat or the gloved cat; in India, usually to the jungle cat; and in Mexico, to the chati or margay (two forms of *Felis tigrina*). In fact, omitting the lion, tiger, leopard, puma, jaguar, and a few others, the term applies to all the feline race, of which some 40 species might be mentioned, most of which are elsewhere described under their distinctive names, as OCELOT, EYRA, ETC. See FELIDÆ; CAT; and authorities there cited. See Plate of WILDCATS, under CAT.

WILD CELERY. See VALLISNERIA.

WILD CHERRY (*Prunus*). Several North American trees and shrubs belonging to the



WILD RED CHERRY (*Prunus pennsylvanica*).

family Rosaceæ. *Prunus pennsylvanica*, or wild red cherry, is a tree from 20 to 30 feet high, common in rocky woods, particularly in the

northern States, with oblong-lanceolated, pointed, finely and sharply serrate leaves, green, and smooth on both sides; flowers in a cluster on long pedicels in May; fruit round, light-red, very small, with thin pulp, stone globular. *Prunus serotina*, the wild black cherry, is a fine tree with gray or black, sometimes rather shaggy bark on the trunk, and reddish limbs, often growing in the western States to 100 feet in height and 4 feet or more in diameter, but smaller in the Atlantic States, leaves lanceolate-oblong, taper-pointed, serrate, with incurved, short, and callous teeth, thick, shining above, flowers, which appear in June, in long racemes, fruit purplish-black, about the size of a common pea, but often larger on rich alluvial soils. When very ripe it is agreeable to the taste. In some of the older sections of New York the tree occurs in the fields and along the fences. Its light brown or red timber is highly valued as a cabinet wood. *Prunus virginiana*, the common choke cherry, is a tall, rather slender shrub (sometimes it may be called a tree), from 8 to 15 feet high, with grayish bark, leaves oval, oblong, or obovate, blunt-pointed, sharply serrate; racemes short and close; petals roundish, fruit red, turning to dark crimson, and very astringent until perfectly ripe, when it is not unpleasant to the taste. The tree grows along fences and river banks, especially northward The popular name is sometimes wrongly applied to the preceding species The name wild cherry is often given to other species than the above, as to the bitter cherry (*Prunus emarginata*) and the holly-leaf cherry (*Prunus ilicifolia*), varieties of the cultivated cherries that are said to have escaped from cultivation in some places in the eastern United States The sand cherry common from New Brunswick to Virginia and westward to Wisconsin is *Prunus pumila*, a low shrub The same name is given to *Prunus besseyi* in Nebraska and the Dakotas. See CHOKE CHERRY.

WILD COFFEE. See FEVERWORT.

WILD COMFREY. See HOUND'S TONGUE.

WILDE, wild, HENRY (1833–). An English electrical engineer, born at Manchester. He was educated at private schools, and from an early age engaged in scientific pursuits, particularly the study of electromagnetism, which enabled him to make certain improvements in lightning conductors and the telegraph (1858–64). In 1864 he discovered that currents of electricity of considerable intensity could be derived when electromagnets were substituted for permanent magnets in the magneto machine, and in this way was thus led to develop a dynamo-electric machine. Four years later in investigating alternating currents he discovered that by their synchronizing property it was possible to control the rotations of the armatures of a number of generators. In 1878 he discovered certain remarkable multiple relations among the atomic weights. He developed a powerful electric light, used in 1865 and later developed into a searchlight employed in the Royal Navy He also carried on important investigations in electrolysis and magnetism, devising many important methods used in electroplating, and inventing a magnetarium for reproducing and studying the phenomena of the earth's magnetism.

WILDE, LADY JANE FRANCISCA ELGEE (1826–96). An Irish writer, wife of Sir William Robert Wilde, and mother of Oscar Wilde (q.v.) She was born at Wexford, Ireland, and after her marriage began to contribute both in prose and in verse to the nationalist newspaper, *The Nation*. An article from her pen, signed Speranza, was the ostensible reason for the suppression of the journal in 1848. After 1876, she took up her residence in London. Her publications include: *Poems by Speranza* (1871), *Driftwood from Scandinavia* (1884); *Ancient Legends, Mystic Charms, and Superstitions of Ireland* (1887), *Ancient Cures, Charms, and Usages of Ireland* (1890); *Notes on Men, Women, and Books* (1891), and *Social Studies* (1893)

WILDE, OSCAR (O'FLAHERTIE WILLS) (1856–1900). A British author and wit. He was born Oct 15, 1856, in Dublin. His father was Sir William Wilde (q.v.) and his mother Lady Jane Francisca Elgee Wilde (q.v.). The son studied at Trinity College, Dublin, in 1873–74, and graduated B.A. from Magdalen College, Oxford, in 1878. In both institutions he was noted as a classical student; in the latter he won the Newdigate prize with his poem "Ravenna." While an undergraduate at Oxford Oscar Wilde formulated the æsthetic philosophy of which he became a kind of apostle. His long hair and velvet knee breeches, his enthusiasm for *objets d'art*, sunflowers, blue china, and peacock feathers, and his other æsthetic eccentricities brought him his desired notoriety, made him a target for the satire and ridicule of *Punch;* and resulted in the creation of the character of Bunthorne in Gilbert and Sullivan's *Patience.*

A collection of his poems appeared in 1881, and during a lecture tour he made in the United States in 1882, his drama *Vera* was produced in New York. Returning to England he settled in London, and married Constance Lloyd in 1884. devoting himself to literature. In 1888 appeared the delightful fairy stories *The Happy Prince and Other Tales*, a vein further worked in *A House of Pomegranates* (1892). In 1891 appeared two volumes from Wilde's pen—*The Picture of Dorian Gray*, perhaps his most widely read book and one which makes no effort to conceal the unwholesome taint that frequently discovers itself in his work, but which is, for all that, a fine performance on the score of brilliant, epigrammatic writing; and the short stories in *Lord Arthur Savile's Crime.* His American dramatic venture of 1882, Wilde followed up with *The Duchess of Padua* (1891), which was produced in New York, but it was not until the appearance of *Lady Windermere's Fan* (produced in London, 1892, and published there in 1893) that he found himself dramatically. That light comedy, with the clever insolence of its dialogue and its sparkling wit, was followed by similar plays—*A Woman of No Importance* (produced in London in 1893, and published in 1894), *The Ideal Husband* and *The Importance of Being Earnest* (both produced in London in 1895; published 1899). In 1891, in the *Fortnightly Review*, Wilde made himself a defender of Socialism in "The Soul of Man under Socialism," which was apparently serious under its paradoxical play of wit and irony, and took his public by surprise. In the same year was published a volume of essays entitled *Intentions.* In 1892 appeared his *Collected Poems.*

Continued dramatic activity was evidenced by *Salomé*, a morbid drama, but the best of his serious plays, the performance of which was forbidden by the licenser of plays in 1893.

Originally written in French, an English rendering of it, illustrated by Aubrey Beardsley, appeared in 1894, which latter year saw also the production of the French version by Sarah Bernhardt in Paris. In 1905 Strauss made an opera from the play.

Convicted in 1895 of a grave offense against morality, Wilde was imprisoned for two years. A literary result of this imprisonment was the most powerful of his poems, the *Ballad of Reading Gaol* (1898), and *De Profundis* (1905), an account of certain of his prison experiences and a kind of *Apologia*, the sincerity of which critics have not found above suspicion. Essayist, minor poet, and novelist, Wilde's chief distinction derives from his light, elegant, dexterous comedies, unsurpassed in wit and epigrammatic brilliance since Sheridan. His last years were passed under a cloud on the Continent, and mainly in Paris, where he used the name "Sebastian Melmoth" and where he died Nov 30, 1900 The Ravenna edition of his works is in 13 volumes (New York, 1915) Consult: R H. Sherard, *Life of Oscar Wilde* (New York, 1906); Arthur Ransome, *Oscar Wilde: a Critical Study* (London, 1912); Lord Alfred Douglas, *Oscar Wilde and Myself* (New York, 1914); Stuart Mason, *Bibliography of Oscar Wilde* (London, 1914).

WILDE, Richard Henry (1789–1847). An American poet, born in Dublin, Ireland. He came to America with his parents in 1797, settling finally at Augusta, Ga. He studied law, was admitted to the bar in 1809, rose rapidly in his profession, became Attorney-General of the State, and was three times a member of Congress, 1815–17, 1824–25, and 1827–35. He was a lyric poet of merit, and during a stay in Europe from 1835 to 1840 did considerable study in Dante and Tasso, and helped to discover Giotto's portrait of the first-named poet. He translated several of Dante's sonnets and wrote a *Life and Times of Dante* that remained in manuscript. On his return from Europe he attained success at the bar of New Orleans, and was made professor of constitutional law in the University of Louisiana. He is best known as the author of the lyric, "My Life is Like the Summer Rose." A long posthumous poem, *Hesperia*, was published in 1867, and during his life he issued *The Love, Madness, and Imprisonment of Torquato Tasso* (1842).

WILDE, Thomas. See Truro, Baron.

WILDE, Sir William Robert Wills (1815–76). An Irish surgeon and antiquarian, born at Castlerea, County Roscommon. Beginning his studies at Dublin in 1832, he received his diploma as a surgeon five years later. He spent three years in study at London, Berlin, and Vienna, and after 1841 practiced at Dublin. In 1851 he married Jane Francisca Elgee (see Wilde, Lady Jane F. E.), and was the father of Oscar Wilde (q.v.). He was knighted in 1864. His publications include: *The Narrative of a Voyage to Madeira, Teneriffe, and along the Shores of the Mediterranean* (2 vols., 1840; 2d ed., 1844); *The Closing Years of Dean Swift's Life* (1st and 2d ed., 1849); *Epidemic Ophthalmia* (1851); *Aural Surgery* (1853); *Catalogue of the Contents of the Museum of the Royal Irish Academy* (3 vols., 1858–63).

WILDEBEEST, wĭld'bēst *or* vĭl'de-bāst. See Antelope; Gnu.

WILDENBRUCH, vĭl'den-brŭk, Ernst von (1845–1909). A German dramatist and novelist, born in Beirut, Syria, where his father was Prussian Consul. He belonged to a side branch of the Hohenzollern. He served for two years in the army, then studied law, and entered the government service He became Privy Councilor of Legation in 1897 Of his earlier dramas the more successful were. *Väter und Söhne* (1882), *Harold* (1882), *Der Menonit* (1882), all in a somewhat radical spirit More significant are the series of national dramas: *Die Karolinger* (1882), *Die Quitzows* (1888), *Der neue Herr* (1891), *Heinrich und Heinrichs Geschlecht* (1895), *Willehalm* (1897), and *Die Tochter des Erasmus* (1900), all remarkable literary expressions of the new Prussia He was awarded the Schiller prize in 1884 and 1896. In his short stories and novels, e g, *Der Meister von Tonagra* (1880), *Der Astronom* (1887), *Das edle Blut* (1893), *Franzeska von Rimini* (1893), *Eifernde Liebe* (1893), *Schwester-Seele* (1894), *Der Zauberer Cyprianus* (1896), *Tiefe Wasser* (1898), and *Nemiramis* (1904), as well as in social drama, Wildenbruch showed great originality Among his *Lieder und Gesange* (1877) and *Dichtungen und Balladen* (1884) are pieces, notably "The Witches' Song," that have become widely popular Consult Röhr, *Wildenbruch als Dramatiker* (Berlin, 1908), and A. Stern, article in *Studien zur Litteratur der Gegenwart* (3d ed, Dresden, 1905).

WILDER, Burt Green (1841–). An American comparative anatomist, born in Boston. He graduated at Harvard (Lawrence Scientific School, 1862; medical department, 1866) During part of the Civil War he served as surgeon of the Fifty-fifth (Negro) Massachusetts Infantry. From 1867 to his retirement in 1910 he was professor of neurology and vertibrate zoölogy at Cornell. He also lectured at various other institutions. In 1885 he was president of the American Neurological Association and in 1898 of the Association of American Anatomists. In 1892, 15 of his former students presented to him a *Festschrift*, called *The Wilder Quarter-Century Book*. Among his writings are: *What Young People Should Know* (1874); *Anatomical Technology* (1882), with Gage; *Physiology Practicums* (2d ed, 1895). He also wrote music for songs.

WILDER, Marshall Pinckney (1798–1886). An American merchant and agriculturist, born at Rindge, N. H. He received a common school education, worked on a farm for some time, and in 1825 became a merchant in Boston in the West India trade. He was a member at different times of both Houses of the Massachusetts Legislature, being chosen President of the Senate in 1850, and was also a member of the Executive Council. He was one of the organizers of the Constitutional Union party, which nominated Bell and Everett in 1860. Having acquired a large fortune, he turned his attention to the development of agriculture. He founded the United States Agricultural Society and the Massachusetts Agricultural College, was an officer of various agricultural and genealogical societies, and was one of the earliest promoters of the Massachusetts Institute of Technology. Among his publications are a number of addresses and *The Hybridization of the Camellia and Its Varieties* (1847) and other lectures on floriculture, pomology, and agriculture.

WILDER, Marshall Pinckney (1859–1915). An American humorist, born at Geneva, N. Y

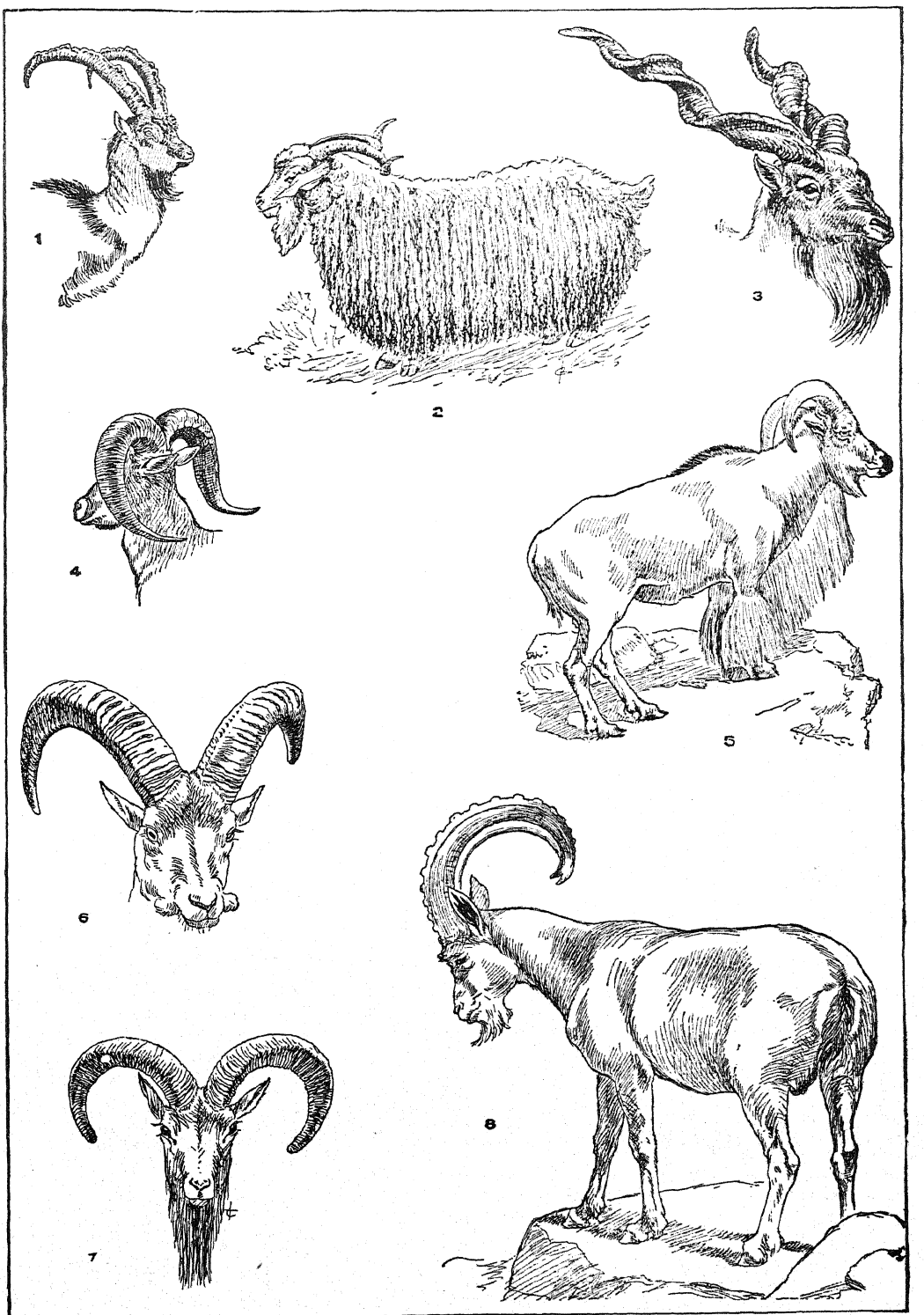
He was crippled by a fall when a child, so that he was handicapped all his life. His gifts as a mimic and elocutionist eventually led to his becoming a public entertainer in 1879. In 1883 he went to London, where he appeared before the Prince of Wales (later Edward VII), whose patronage started him on the road to success. Thereafter he appeared annually in London until 1899, when he entered vaudeville. In 1901–05 he toured the world. He always managed his own appearances, and his shrewdness and popularity combined to earn him a fortune. His writings include *The People I've Smiled with* (1899); *The Sunny Side of the Street* (1905); *Smiling 'round the World* (1908). He edited *The Ten Books of the Merrymakers* (1909).

WILDERMUTH, vil'dĕr-mōōt, OTILIE (1817–77). A German novelist. She was born at Rottenburg-on-the-Neckar, was married in 1843 to Professor Wildermuth, of Tubingen, and in that city passed the remainder of her life. Her novels had a wide popularity especially with women and children. She pictured with much grace the life of the region to which she confined her work—Swabia. The best of her works are: *Bilder und Geschichten aus Schwaben* (1852–54), *Ingust* (1857), *Bilder aus der Wirklichkeit* (1861), and *Zur Dämmerstunde* (1871). Her collected works were issued in 10 vols. (1892–94) and her autobiography was edited by her daughters (Stuttgart, 1888).

WILDERNESS, BATTLE OF THE. A battle of the Civil War in America, fought on May 5–6, 1864, between the Army of the Potomac under General Meade, with General Grant in supreme command, and the Army of Northern Virginia under General Lee. The Wilderness is a region lying immediately south of the Rapidan River, extending for about 15 miles from east to west and 10 miles from north to south, and so thickly covered with second-growth scrub and underbrush as to make not only cavalry operations and the use of artillery, but even ordered infantry operation, extremely difficult. The battle of the Wilderness was the opening engagement of the campaign of 1864 in Virginia. The Confederate army, consisting of three corps, lay in a strong position south of the Rapidan, with its right under Ewell on the river, the centre under A. P. Hill at Orange Court House, and the left under Longstreet at Mechanicsburg. Its strength was about 62,000 men, with 224 guns. The Union army was encamped north of the Rapidan from Hazel's River through Culpeper to Stevensburg. It comprised the corps of Warren (Fifth), Sedgwick (Sixth), and Hancock (Second). With Burnside's corps a day's march to the north, the Union strength amounted to about 120,000 men, with 356 guns. Grant's plan was to cross the Rapidan, turn Lee's right flank, and then force that general either to come out of his entrenchments, or to be taken in reverse. The movement of troops was begun at midnight of May 3, Warren's corps, preceded by cavalry and followed by the corps of Sedgwick, crossing at Germanna Ford, while Hancock crossed at Ely's Ford, farther down the river. The right column was ordered to proceed to Wilderness Tavern, at the junction of the Germanna Plank Road and the Orange County Turnpike; Hancock's objective was Chancellorsville. Lee had anticipated this movement; informed that it had begun, he audaciously sent Ewell and Hill along the Orange County Turnpike and the Orange Plank Road to take Grant's army in flank. Early in the morning of May 5, Warren reported the hostile infantry in some force on the pike, about 2 miles from Wilderness Tavern. Believing at first that the enemy's forces were but a strong rear guard, Grant made no attempt to support Warren, but some time before noon it became evident that the main strength of the Confederates was in front. Sedgwick's corps was thereupon directed to support Warren on the right, while orders were sent by Meade to Hancock, who was now some distance beyond Chancellorsville, to return by the Brock Road and take up his position at its junction with the Orange Plank Road and to Getty to move up to the same point. Owing to the nature of the ground, Sedgwick was delayed in bringing support to Warren on his left, and though Griffin's and Wadsworth's divisions drove Ewell's vanguard before them, they were compelled to give way before the attack of the latter's main force. The Sixth Corps as it was working into position was also struck by Ewell, but after a fierce struggle the Confederates were repulsed. Getty, meanwhile, hard pressed by Hill, was relieved by the arrival of Hancock at about three in the afternoon, and a desperate conflict ensued, at a close distance, in which neither side gained any distinct advantage. Wadsworth, sent to the support of Hancock's right, did not arrive until night put an end to the combat. Owing to the impossibility of manœuvring in the tangled underbrush, the conflict became a struggle between lines of men closely in touch, but for the most part invisible. It was almost exclusively a musketry battle. The combat between Warren and Ewell and that between Hancock and Hill were practically distinct conflicts.

During the night of the 5th and 6th Burnside's corps was brought to the front and placed between Warren and Hancock but did not go into action till 2 P.M. of the 6th. The gap in the meantime had been filled on the Confederate side by Heth and Wilcox, who succeeded in repelling the attack of Burnside's troops. Longstreet had been summoned by Lee from Gordonsville and ordered to reenforce Hill on his right. At 5 A.M. of the 6th, the attack was renewed on the right and left of the Union line. Sedgwick could make no impression on Ewell, but Hancock succeeded in driving back Hill, by attacks on his flank, for more than a mile, when the Union advance ceased, owing to the confusion in the lines and to the fact that Hancock had left part of his corps behind, in anticipation of a flanking movement by Longstreet. The latter now came on the field of battle, driving Hancock back to his original position. At 10 A.M. he sent Mahone against Hancock's left. The movement was successful, driving back the Union line to its trenches on the Brock Road. Here General Wadsworth was killed. But at this critical moment for the Union army Longstreet was wounded by some of Mahone's men; General Jenkins was killed by this fire, and the violence of the attack subsided until about four o'clock, when Lee threw Hill's and Longstreet's corps against Hancock. Aided by a fire which broke out in the underbrush and seized on the logs of the Union breastworks, while the wind blew the smoke into the faces of the Federals, the Confederates broke through the Union line and a Confederate flag was planted upon the intrenchments. Almost

WILD GOATS AND SHEEP



1. WILD GOAT; PASANG (Capra ægagrus).
2. ANGORA RAM.
3. MARKHOR (Capra Falconeri); Kabul variety.
4. BHARAL (Ovis nahura).
5. AOUDAD (Ovis tragelaphus).
6. WESTERN CAUCASUS TUR (Capra Severtzowi).
7. OORIAL or SHA (Ovis Vignei).
8. ALPINE IBEX (Capra ibex).

immediately, however, the Confederate line was driven back The battle ended with an assault by Ewell (suggested by Gen J. B Gordon early in the day but rejected by Ewell, and finally ordered by Lee in person at about 6 P M) on the Union right, in which two brigades were captured and the Union line was for a time endangered. Night, however, came to the Federal rescue The battle was a drawn one.

The best authority places the Union casualties at 2265 killed, 10,220 wounded, and 2902 missing, a total of 15,387 The woods took fire in many places, and at least 200 wounded perished in the flames The Confederate records show 2000 killed, 6000 wounded, and 3400 missing, a total of 11,400. Among the general officers killed were Wadsworth and Baxter of the Union army, and Jenkins of the Confederates, while Getty of the one and Longstreet of the other side were wounded.

Bibliography. William Swinton, *Twelve Decisive Battles of the War* (New York, 1867); A A. Humphreys, *Virginia Campaign of '64 and '65*, in "Campaigns of the Civil War," no. 12 (ib, 1883); Adam Badeau, *Military History of U S. Grant from April 1861 to April 1865* (3 vols., ib., 1885); Johnson and Buel (eds.), *Battles and Leaders of the Civil War* (New York, 1887); C. W. Battine, *Crisis of the Confederacy: A History of Gettysbury and the Wilderness* (ib., 1905); E. T. Alexander, *Military Memoirs of a Confederate* (ib, 1907), Steele, *American Campaigns* (Washington, 1909); U. S. Grant, *Personal Memoirs* (new ed, 2 vols., New York, 1909); F. H. Meserve, *Grant in the Wilderness* (ib., 1915).

WILD FOWL. A general term for wild birds, especially such as interest sportsmen, in distinction from domesticated fowls. The term has been restricted to game birds, especially to ducks, geese, or waterfowl, etc., and to shore birds, one who made a practice of shooting this class of birds for sport was formerly known as a wild-fowler. The indefiniteness of the term has gradually caused its disuse and the term "wild fowl" is now chiefly poetic.

WILD GINGER. See ASARABACCA.

WILD GOATS, SHEEP, AND IBEXES. A group of small ruminants not easily divisible technically even into the two apparently easily distinguishable genera *Ovis* (sheep) and *Capra* (goats and ibexes); and characterized by the massive, angulated horns borne by the male (rams), which in the sheep tend to form a coil beside the head, and in the goats sweep backward from the forehead and show a strongly cross-ridged front. The wild sheep and goats are mountain-dwelling animals, and are limited, with one exception, to the central elevated regions of the Old World, stretching from the Pyrenees, Atlas, and Abyssinian mountains through the Sinaitic Carpathian, Armenian, and Persian chains, to the Himalayan and Mongolian ranges, which are continued northeastward to Bering Strait. Each separate section of the line of uplift has one or more peculiar species. There is also an American species or group of species (see BIGHORN) native to the northern cordillera, as far south as the borders of Mexico. The species are not many, most of them have a comparatively limited and local range, and several are extinct as wild animals. The genus *Ovis* has given to civilized man the domestic sheep, but their specific source (or sources) is uncertain. The domestic goat seems to have been derived with little admixture from the wild goat still extant in southwestern Asia. See GOAT, IBEX; SHEEP.

WILD-GOOSE CHASE, THE. A comedy by John Fletcher, produced in 1621, printed in 1652. Four acts of Farquhar's *The Inconstant* were taken from it

WILDING, wild'ing. 1. The principal character in Shirley's *The Gamester* In his adaptation of this play, *The Gamesters*, Dec 22, 1757, Garrick himself assumed the rôle 2. The principal character in Foote's play, *The Liar*. The author himself created the rôle of Young Wilding in this play

WILD LEMON. See PODOPHYLLUM.

WILD LIFE, CONSERVATION OF. In its current meaning this phrase refers especially to governmental and private efforts to preserve, in their natural state or in established sanctuaries, the species of wild mammals, birds, and fishes which are more beneficial than harmful to mankind

In 1913 Dr. William T. Hornaday (q.v.), director of the New York Zoological Park, and a careful student of this subject, stated that, between 1840 and 1910, 11 species of American avifaunal life were exterminated, and that 23 others were then threatened with early extinction. As to American mammals Dr. Hornaday directed attention to the extermination, in a wild state, of the great herds of bison which, within the memory of middle-aged men, roamed the American plains west of the Mississippi, and the similar fate of the Arizona elk, the California grizzly bear, and the prong-horn antelope—now practically extinct. Various African and Asiatic species have also disappeared within recent times.

The champions of the movement point to the fact that more or less serious results always follow the disturbance of nature's balance: that, e.g., if at the behest of gunners animals or birds which prey partly on game birds and partly on noxious insects and vermin are exterminated in any locality, the insects and vermin will increase often to the point of becoming serious pests. Similar results follow the destruction of insectivorous birds; and that this is a serious matter may be inferred from the estimate of the United States Board of Agriculture that in 1904 (when this subject was carefully investigated by the Board) crops of all kinds to the value of $420,100,000 were destroyed by insect pests, most if not all of which are the natural food of such birds.

Governmental protection of wild life in America may be said to have begun in 1739 with the appointment in Massachusetts of local officers for the preservation of deer. For further discussion of the governmental and private protection of wild life the reader is referred to the articles GAME LAWS and GAME PRESERVE, but it may be added here that, in 1915, 45 States and Territories of the United States intrusted the enforcement of game laws to game commissioners, game wardens, or other State officials.

By far the most sweeping measure for the national protection of wild life enacted by the United States government is the so-called "Federal Migratory Bird Bill," included as an amendment of the Agricultural Appropriation Bill, signed by President Taft on March 4, 1913. This measure extends Federal protection to all migratory game and insectivorous birds (including about 600 species), i.e., to all birds (quot-

ing the text of the law) "which in their northern and southern migrations pass through and do not remain permanently the entire year within the borders of any State or Territory." The origin of this law was a bill introduced in the House of Representatives by the Hon. George Shiras, 3d, of Pennsylvania, in 1904. This measure was followed by others having a similar purpose, but the final success of the movement seems clearly to have been due to the inclusion of the nongame insectivorous birds, whose incalculable economic value was made the subject of a nation-wide campaign of education conducted (1913) in a most aggressive manner by Dr. Hornaday, T. Gilbert Pearson, secretary of the National Association of Audubon Societies, and many other organizations and individuals. The only serious opposition to the measure, once it had become a law, was aroused by its prohibition of the spring shooting of wild fowl This opposition came mainly from the gunners of the Middle West (especially Missouri and Arkansas), and found definite expression in several suits (still pending in 1916) to test the constitutionality of the principle that the migratory habits of the birds included made them proper subjects for Federal legislation At the same time there was also pending a treaty between the United States and Canada for the protection of migratory birds.

Another Federal law of great importance in the conservation of wild life was the clause included in Schedule N of the Tariff Bill of 1913, which forbids the importation of all foreign wild birds' plumage except for educational or scientific uses, and thereby practically put an end to the employment in the United States of such birds' plumage for millinery purposes. It is worth noting that this bill had the hearty support of many of the influential women's organizations in America. Still another Federal law designed to protect American birds and mammals is the "Lacey Act," passed in 1900, which makes unlawful the delivery to any common carrier for shipment between any States or Territories of dead birds or animals (or parts of them), which have been unlawfully killed. A third important measure was the Chamberlain-Hayden Bill (introduced in Congress in January, 1916) for the establishment of game preserves in national forests.

National organizations for the conservation of wild life include the following: New York Zoological Society (1895), New York; National Association of Audubon Societies (1902), New York (which conducts invaluable educational work especially by means of the Junior Audubon Classes, which in 1915 included 7723 clubs with a total paid membership of 152,179); American Bison Society (1905), New York; the American Ornithologists' Union (1884), Washington, D. C.; Boone and Crockett Club (1887), New York; Camp Fire Club of America (1903), New York; National Association of Game Commissioners and Wardens (1902), East Orange, N. J.; American Game Protective Association (1911), New York; National Educators' Conservation Society (1916), New York; and the Permanent Wild Life Protection Fund, amounting (in May, 1916) to $102,000, secured by the efforts of Dr. Hornaday, and of which he is the trustee.

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WILD ONION. See ALLIUM

WILD PIGEON. Specifically, the American passenger pigeon See PIGEON.

WILD POTATO VINE. See IPOMŒA.

WILD SARSAPARILLA. See ARALIA.

WILD SPINACH. See CHENOPODIUM.

WILES, IRVING RAMSAY (1861–). An American figure and portrait painter, born in Utica, N. Y. He was a pupil of his father, Lemuel M. Wiles, who was for many years director of the college of fine arts at Ingham University, Le Roy, N. Y., and was also known as a painter. Irving Wiles later studied at the Art Students' League, New York, under Chase and Beckwith, and from 1882 to 1884 with Carolus Duran in Paris. Returning to the United States, he settled in New York and devoted himself principally to portraits and figure subjects. Among his paintings, which are characterized by breadth and sureness of handling, careful composition, and agreeable color, are "Sonata"; "Memoirs" (1891, Carnegie collection); the "Girl in Black"; "Golden Dreams"; "Lady Betty" (St. Louis Museum); "Shelter Island, Summer" (Metropolitan Museum, New York); "The Student" (Corcoran Gallery, Washington); "The Brown Kimona"; and "Russian Tea" (National Gallery, Washington). Representative portraits are "My Father and Mother" (1902); Julia Marlowe (1903); Mrs. Gilbert (1904); Lemuel Maynard Wiles (1904, Metropolitan Museum); Henry Wolfe (1906); St. Clair McKelway (1914); Ex-Mayor Schieren (City Hall, Brooklyn); Gen. Eugene V. Henry (West Point); George A. Hearn (1914, Metropolitan Museum) Wiles was elected a member of the National Academy in 1897 and received numerous prizes and medals, including gold medals at Buffalo (1901), St. Louis (1904), Buenos Ayres (1910), San Francisco (1915), and the Proctor Portrait Prize at the National Academy of Design (1913).

WILEY, wī'lī, HARVEY WASHINGTON (1844–). An American food chemist, born at Kent, Ind. He graduated at Hanover (Ind.) College in 1867, at the Indiana Medical College in 1871, and at Harvard in 1873; was professor of chemistry at Purdue University from 1874 to 1883, and was State chemist of Indiana in 1881–83. From 1883 to 1912 he was chief of the Division of Chemistry in the United States Department of Agriculture, where by his energetic enforcement of the pure food and drug laws he aroused much antagonism among manufacturers, who made charges against him. In 1911 an investigation was made by Congress and he was fully exonerated. In addition to his government work he was professor of agricultural chemistry in George Washington University from 1899 to 1912. Thereafter he devoted himself to pure food propaganda by public lectures and by his contributions to *Good Housekeeping*, of which magazine he became editor. In 1893–94 he served as president of the American Chem-

cal Society and in 1911 of the American Therapeutic Society. His publications include: *Songs of Agricultural Chemists* (1892), *Principles and Practice of Agricultural Analysis* (3 vols., 1894–97; 2d ed., 1906–14), *Foods and Their Adulterations* (1907; 2d ed., 1911); *1001 Tests of Food, Beverages, and Toilet Accessories* (1914); *The Lure of the Land* (1915); *Not by Bread Alone: The Principles of Human Nutrition* (1915), and a large number of government bulletins and reports.

WILFLEY (wĭl'flĭ) **TABLE.** See ORE DRESSING

WILFRID, or **WILFRITH,** SAINT (c.634–709). An English churchman. He was the son of a Northumbrian thane. At 14 he was sent to the court of King Oswin, and from there to the Monastery of Lindisfarne. At the age of 19 he went on a pilgrimage to Rome. After an absence of five years he returned to England and warmly advocated the Roman custom of celebrating the Easter Festival on the 14th day of the moon, which had never been followed in the British Isles. From Alchfrith, King of Deira, he received a grant of land for a monastery at Ripon, and there, probably in 663, he was ordained a priest. The Synod of Whitby, which met in 664 to discuss the disputed question regarding Easter Time was attended by the most distinguished members of both parties, and among others by Colman, Bishop of Lindisfarne, and Wilfrid. The council and audience were carried away by Wilfrid's argument, and the King decided in favor of the Roman party. Wilfrid was afterward named Bishop of York, but he did not enter into possession of his see until 668 or 669. He then surrounded himself with great pomp, built churches, one of which, at Hexham, was said to be the finest north of the Alps, but soon found himself at strife with the royal power. A quarrel with the King of Northumbria, named Ecgfrith, resulted in Wilfrid's deposition. He started on a journey to Rome to make a personal appeal to the Pope and on the way landed on the coast of Frisia, the inhabitants of which were still pagan. There, however, he was hospitably received by the ruler, and he baptized many of the people. Wilfrid was afterward recalled to his see; but he was still active as the leader of the Roman party, and ultimately he was deprived of his bishopric. He again went to Rome, where he was in 703–704, returned to England in 705, and received the see of Hexham. He died at Oundle, in Northamptonshire. The best contemporary authority is Eddi's *Vita Wilfridi*, published in *Historians of York*, vol. i, "Rolls Series." Consult also William Bright, *Early English Church History* (3d ed., Oxford, 1897); William Hunt, *The English Church from Its Foundation to the Norman Conquest* (London, 1899).

WILGUS, WILLIAM JOHN (1865–). An American railway engineer, born in Buffalo, N. Y. He entered railroad service as a rodman in 1885, and by 1890 had become division engineer of construction with the Minnesota and Northwestern Railroad. For the next three years he had charge of the construction of the Chicago Union Transfer Railroad. Between 1893 and 1907 he was connected in various capacities with the New York Central, being chief engineer of construction in 1899–1903 and then vice president in general charge of construction, including the important electrification of the approach to the Grand Central terminal and of suburban lines within a specified zone. Wilgus was also chairman of the advisory board of engineers for the construction of a tunnel under the Detroit River. In 1908 he established himself in private practice as a consulting engineer. He received the Rowland prize of the American Society of Civil Engineers in 1909 and the Telford medal of the Institution of Civil Engineers, London, in 1911. He published *Physical Valuation of Railroads* (1913).

WILHELM. See WILLIAM.

WILHELM, KARL. See WACHT AM RHEIN, DIE.

WILHELMINA, vĭl'hĕl-mē'nȧ, Queen of the Netherlands (1880–). The only daughter of William III of the Netherlands and his second wife, Emma, daughter of Prince George Victor of Waldeck, she was born at The Hague on Aug. 31, 1880. Upon the death of her father in 1890 she became Queen; but the country remained under the regency of Queen Emma until Aug. 31, 1898, when Wilhelmina completed her eighteenth year and became Queen regnant. Her coronation took place on Sept. 6, 1898, in the New Church at Amsterdam, amid great rejoicing. The influence of the popular Queen Emma was not lessened by this event, however, and she remained the constant companion and adviser of her daughter till the latter's marriage on Feb. 7, 1901, at The Hague, to Duke Henry Frederick of Mecklenburg-Schwerin. Wilhelmina came to be greatly beloved by her people. Consult Helen Vacaresco, *Kings and Queens I Have Known* (New York, 1904). Her daughter and heir presumptive, Juliana, was born at The Hague on April 30, 1909, and received the titles of Princess of Orange-Nassau and Duchess of Mecklenburg.

WILHELMJ, vĕl-hĕl'mĕ, AUGUST (1845–1908). A German-English violinist and conductor. He was born at Usingen, in Nassau, and received his first lessons on the violin from Conrad Fischer, court conductor to the Duke of Nassau at Wiesbaden. At the age of eight he played in quartets, and on Jan. 8, 1854, made his first public appearance at a concert given at Limburg-on-the-Lahn, and two years later caused a great sensation with his skillful playing at the Court Theatre of Wiesbaden. From 1861 to 1864 he studied under Richter and Hauptmann, at the Leipzig Conservatory, and subsequently under Raff at Wiesbaden. Throughout his entire career as a student, however, Ferdinand David, to whom he had been taken by Liszt, superintended his studies. In 1865 he made a tour of Switzerland, and the following year visited Holland and England, in 1877 France and Italy, and in 1878 Russia, in which latter country he became acquainted with Berlioz. In 1874 he toured Norway, Sweden, Denmark, Germany, and Austria, and made a long stay in England. In 1876 he was concertmeister of the Bayreuth orchestra during the production of *Der Ring des Nibelungen*. Probably his most successful and enthusiastic tour was that of the United States from 1878 to 1882. Other tours in European countries followed up to 1892, when he permanently settled in London as professor of violin at the Guildhall School of Music. He has been an important factor in the development of orchestral music and concerts in England, and notably in the great Wagner Festival held in the Royal Albert Hall in May, 1877, for which event he was able to

secure the personal attendance and conductorship of Wagner himself, and at the same time introduced Hans Richter to the British public. He died in London. His only published works are: *Hochzeits Cantate*, for soli, chorus, and orchestra, a violin concerto, a few instrumental pieces, and a number of transcriptions from Bach, Chopin, and Wagner. Together with James Brown he wrote a *Modern Violin School* (six parts).

WILHELM MEISTER'S LEHRJAHRE, vil'hĕlm mī'stĕrz lar'ya-re (Ger., Wilhelm Meister's apprenticeship). A romance by Goethe, published in 1795–96, but planned some 20 years previously, and three-fourths drafted by 1785. In it appear several of Goethe's finest lyrical compositions, including Mignon's "Kennst du das Land."

WILHELMSHAVEN, vil'hĕlms-hä'fen, or **WILHELMSHAFEN**. The chief naval station of Germany, on the west side of the entrance of the Bay of Jade, an inlet of the North Sea, 40 miles northwest of Bremen (Map: Germany, B 2). The town, projected in 1856, is regularly laid out on a strip of land bought in 1853 by Prussia from Oldenburg. There is an inner and an outer harbor, divided by locks, the former containing a shipbuilding basin, 1237 feet long, from which three immense dry docks open out, and a fitting-out basin, 3832 feet long. The workshops of the Imperial shipyards are inclosed by a lofty wall, pierced by 14 portals. There is a torpedo-boat station, connecting with the Jade by a lock. The town is strongly fortified. It is the station of the North Sea fleet and possesses artillery and naval mine depots. Pop., 1900, 22,571; 1910, 35,044.

WILHELMSHOHE, vil'hĕlms-hē'e. See CASSEL.

WILHELM TELL, vil'hĕlm tĕl. See SCHILLER.

WILHEM, GUILLAUME LOUIS BOCQUILLON. See BOCQUILLON-WILHEM.

WILKES, CHARLES (1798–1877). An American naval officer and explorer, born in New York City. He received a common school education, entered the United States navy as a midshipman in 1818, served in the Mediterranean and the Pacific, became a lieutenant in 1826, and in 1830 was placed in charge of the United States department of charts and instruments. In 1838 he was placed in command of an expedition authorized by act of Congress of May 18, 1836, for the purpose of exploring and surveying the Southern Ocean. This was the first expedition fitted out by the National government for scientific purposes. Between the years 1838 and 1842 the expedition visited the Madeira Islands and Rio de Janeiro in 1838; Tierra del Fuego, Chile, Peru, the Paumotou group, Tahiti, Tutuila and the Samoan group, and New South Wales in 1839; the Antarctic regions, New Zealand, the Fiji group, and the Hawaiian Islands in 1840; the Columbia River, of which a survey was made, Willamette valley, and part of the California coast in 1841; and the Philippine Islands, Sulu Archipelago, St. Helena, Singapore, and the Polynesian Islands in 1842. A great mass of valuable scientific information was collected during the voyage and afterward published in 19 large volumes. A very valuable part of the report was that of J. D. Dana (q.v.). Wilkes wrote the volumes on *Meteorology* and *Hydrography*, and also the *Narrative of the United States Exploring Expedition* (6 vols., 1845; abridged ed., 1850). The claim of Wilkes to the discovery of an Antarctic continent has not always been conceded although Sir Ernest Shackleton and Sir Douglas Mawson (qq.v.) later confirmed Wilkes's discoveries. Wilkes became a commander in 1843 and a captain in 1855, and in 1861, upon the outbreak of the Civil War, was placed in command of the frigate *San Jacinto* and sent to the West Indies in search of the Confederate cruiser *Sumter*. On Nov. 8, 1861, he stopped at sea the English mail steamer *Trent*, and removed therefrom Mason and Slidell, the Confederate commissioners to England and France respectively (See TRENT AFFAIR.) Wilkes commanded the Potomac flotilla in 1862, and later commanded the flying squadron ordered to prevent blockade running between the West Indies and the Confederacy. He became a commodore in July, 1862, was placed on the retired list in June, 1864, and became a rear admiral on the retired list in July, 1866. Besides the reports mentioned above, he published *Western America, Including California and Oregon* (1849); and *The Theory of the Wind* (1855).

WILKES, JOHN (1727–97). An English politician, born in London, Oct. 17, 1727. He received an excellent education, spending four years at the University of Leyden. In 1754 he entered national politics by standing for Berwick-upon-Tweed, but he was not successful. Three years later, however, he became member for Aylesbury. In 1761 he was again returned for the same seat. When Lord Bute forced Pitt out of office in 1762, Wilkes began a bitter fight against the new government. To assist him in this attack he established a paper called the *North Briton*. Number 45 of this paper, which was issued after the appearance of the King's message on the Peace of Hubertsburg (1763), contained an article that maligned the government for its desertion of Frederick the Great and its peace policy in general. Then followed what was popularly known as the Seven Years' War against Wilkes. A general warrant was issued for the apprehension of the author of the article, and Wilkes was among the number of those arrested, but after a week in the Tower he was released on the ground of his privilege as a member of Parliament. With this incident the practice of issuing general warrants came to an end, for Wilkes and others brought suit against Lord Halifax and other officials of the government who were concerned in the matter, with the result that the court declared general warrants illegal, and granted heavy damages, Wilkes receiving £4000. When Wilkes, however, reprinted the obnoxious issue, his enemies renewed their attack upon him and succeeded in getting the House of Commons to declare the article "a false, scandalous, and seditious libel." In January, 1764, he was expelled from Parliament on this ground, and in February the Court of King's Bench found him guilty of republishing the article and also of printing an *Essay on Woman*, an obscene parody on Pope's *Essay on Man*. In the meantime Wilkes, who had been wounded in a duel, had repaired to Paris to recuperate, and, as he did not appear to receive his sentence, the court declared him an outlaw. Wilkes remained abroad until, in 1768, his penurious condition forced him to face matters in England. He first sued for pardon from the King, but in so undiplomatic a way that it was denied him. He then stood for Parliament from

London, but was defeated. A second contest, this time for Middlesex, brought him victory. Wilkes then surrendered himself to the Court of King's Bench to answer to the charge of outlawry. A technical point brought about the reversal of this sentence, but the original condemnation for reprinting Number 45 of the *North Briton* and the *Essay on Woman* still stood, and for these he was sentenced to 22 months in prison and a fine of £1000. He was expelled from the House. Though still in prison, Wilkes was again returned for the district, only to be expelled a second time. Again the same process was repeated, and when the district returned him a fourth time by a vote of 1143 to 296 for his opponent, Colonel Luttrell, the House seated the latter, declaring that as Wilkes was an outlaw all votes for him were void. This persecution gained for Wilkes great personal popularity and money Before he left prison he was elected alderman of London. In 1771 he served also as sheriff for Middlesex and London and in the same year played a prominent part in the contest between the House of Commons and the printers, by which the latter gained the freedom to publish Parliamentary debates. In 1774, after a previous unsuccessful contest, he became Lord Mayor of London. In the same year he was returned to Parliament from his old Middlesex district, which he now represented continuously until 1790. This time the House permitted him to sit, on the ground that the disability resulting from outlawry did not last over the Parliament in which it occurred In 1779 Wilkes was elected to the position of Chamberlain of the City of London. He spent the last years of his life in his Parliamentary work and in various literary undertakings, but none of the latter are of especial merit Wilkes's contest with the Ministry is of primary importance in English history as vindicating the absolute rights of the Parliamentary constituencies. Consult: W. F. Rae, *Wilkes, Sheridan, and Fox* (London, 1874); P. H. Fitzgerald, *The Life and Times of John Wilkes, M. P.* (ib., 1888); J. B. Daly, *The Dawn of Radicalism* (ib, 1892).

WILKES-BARRE, wĭlks'bär-rē. A city and the county seat of Luzerne Co., Pa., 145 miles by rail north by west of Philadelphia, on the Susquehanna River, here spanned by four iron bridges, and on the Pennsylvania, the Lehigh Valley, the Central of New Jersey, the Delaware and Hudson, the Lackawanna and Wyoming Valley, the New York, Susquehanna, and Western, and the Wilkes-Barre and Hazleton railroads (Map: Pennsylvania, K 4). It is attractively situated in a region abounding in beautiful scenery, and is rich in reminiscences of the Colonial and Revolutionary periods. The Wyoming Monument in the vicinity marks the site of the conflict of July 3, 1778, between the Americans and the Loyalists and Indians (see WYOMING VALLEY). The Forty Fort Church and Queen Esther's Rock are points of interest. Among the prominent institutions of Wilkes-Barre are the Harry Hillman Academy, the Wyoming Seminary, Wilkes-Barre Institute, Y. M. C. A., the Mallinckrodt Convent, St. Mary's Convent, Home for Friendless Children, Home for Homeless Women, and the City, Homeopathic, Nesbitt, and Mercy hospitals. The Osterhout Free Library has more than 40,000 volumes. Other collections include those of the Law and Library Association, the Wyoming Historical and Geological Society, the Luzerne County Medical Society, and the Young Men's Christian Association. The Wyoming Historical Museum has 20,000 volumes, and a collection of 30,000 relics of the early wars Of the buildings the most notable are the post office, the Irem Temple, a splendid example of Moorish architecture, the Y W C A., county courthouse, city hall, jail, armory, and coal exchange. Wilkes-Barre is known as the centre of the most productive anthracite coal region in the United States, the total shipment of the trade region in 1914 amounting to more than 41,000,000 tons. The manufacturing interests are extensive. According to the 1914 census the various industries had an invested capital of $18,987,000 and a production value of $16,669,000. Among the largest concerns of their kind in the country, are its lace manufactory, wire-rope works, axle works, iron works, and adding-machine plant. Other important establishments include foundries and machine shops, and manufactures of silk, underwear, flour, clothing, shirts, munitions, tobacco, etc The commission form of government has been adopted, providing for a mayor, chosen every four years, and four councilmen, elected for a period of two years. All subordinate officials except the city controller are appointed by the commission. In 1914 the net bonded debt of the city was $1,374,000, and the assessed valuation of real and personal property was $60,000,000. Pop., 1900, 51,721; 1910, 67,105, 1915, 75,218; 1920, 73,833. The first settlers came to Wilkes-Barre in 1769 and laid out the village. In 1784, during the Pennamite-Yankee War, 23 of the 26 buildings were destroyed by the Pennamites, but the village was slowly rebuilt and in 1806 was incorporated as a borough. In 1850 its population was only 2723, but after the Civil War it grew rapidly, and in 1871 was chartered as a city. It takes its names from John Wilkes and Col. Isaac Barré, advocates of the colonists in the British Parliament, during and preceding the Revolution. Consult O. J. Harvey, *History of Wilkes-Barré and Wyoming Valley* (3 vols., Wilkes-Barre, 1909).

WIL'KIE, SIR DAVID (1785–1841). The principal genre painter of the Scottish school. He was born at Cults, a small village in Fifeshire, where his father was a clergyman. At 14 he entered the Trustees' Academy, Edinburgh, where he studied under the historical painter John Graham until his return in 1804 to Cults. Here he painted "Pitlessie Fair," his first important work and in 1805 he went to London, enrolling at the Royal Academy schools. In 1806 he exhibited "Village Politicians," which received much favorable comment. Among the best of his popular works that followed are: "Blind Fiddler" (1806), and "Village Festival" (1812), "The Bagpiper" (1813), all in the National Gallery; "Card Player" (1808), "Rent Day," "The Cut Finger," "The Penny Wedding" (1818, Buckingham Palace); and "Reading of the Will" (Pinakothek, Munich); "The Parish Beadle" (Tate Gallery). Wilkie's work is characterized by unfailing invention and good humor, careful, detailed technique, and considerable charm of color. He was elected a Royal Academician in 1811. In 1825–28, because of enfeebled health, Wilkie traveled extensively abroad, and was especially influenced by the works of Velazquez, Titian, and Rembrandt. He changed his theme from genre to historical and portrait subjects, in which, however, he did not succeed so well. His

best known works of this character, which are executed with breadth of handling, include: "Wellington Writing a Dispatch," "Napoleon and the Pope at Fontainebleau," and "John Knox Preaching" (1832, Tate Gallery). In 1830 he was appointed painter to the King, in 1836 he was knighted, and in 1840 he started upon a tour abroad, but died and was buried at sea. Consult: Allan Cunningham, *Life of Sir David Wilkie, with his Journals, Tours, and Critical Remarks on Works of Art . . .* (3 vols., London, 1843); Lord Ronald Gower, *Sir David Wilkie* (New York, 1902), J. C. Van Dyke, in *Old English Masters* (ib., 1902); William Bayne, *Sir David Wilkie* (ib., 1903); *Masters in Art*, vol. vii (Boston, 1906).

WIL'KINS, JOHN (1614–72). An English prelate and scientist. He was born at Fawsley, Northamptonshire. He graduated at Oxford in 1632; took orders in 1635, during the Civil War adhered to the Parliament, was made warden of Wadham College (1648); and was appointed by Richard Cromwell master of Trinity College, Cambridge, in 1659. He was ejected at the Restoration (1660), but being greatly esteemed for his toleration and attainments, obtained favor with Charles II, was made prebendary of York in 1660, rector of St Lawrence, London, in 1662; and Bishop of Chester in 1668. At an early age he became known for his scientific writings, invented and described the perambulator or measuring wheel, and in 1645 was one of the promoters of a philosophical club which in 1662 developed into the Royal Society, of which he became first secretary. His principal writings are *The Discovery of a World in the Moone* (1638), to which was added a *Discourse Concerning the Possibility of a Passage Thither* (1640); *A Discourse Concerning a New Planet* (1640), an argument that the earth is one of the planets; *Mercury, or the Secret and Swift Messenger* (1641), an ingenious treatise on rapid means of correspondence; *Mathematical Magick* (1648); *An Essay Towards a Real Character and a Philosophical Language* (1668); and *On the Principles and Duties of Natural Religion* (1678). Consult P. A. Wright-Henderson, *The Life and Times of John Wilkins* (London, 1910).

WIL'KINS, MARY ELEANOR (MRS. MARY E. WILKINS FREEMAN) (1862–). An American novelist, born in Randolph, Mass., of Puritan descent. She received her education at Mount Holyoke Seminary, South Hadley, Mass., and passed the greater part of her life in Massachusetts and in Vermont. For many years she was secretary to Dr. O. W. Holmes (q.v.). In 1902 she married Dr Charles M. Freeman of Metuchen, N. J. Occasionally she contributed verse, as well as prose, to magazines. Her stories, dealing mostly with New England life, and among the best of their class, include: *The Adventures of Ann* (1886); *A Humble Romance* (1887), which made her widely known; *A New England Nun* (1891), *Young Lucretia* (1892); *Jane Field* (1892); *Giles Corey* (1893), *Pembroke* (1894); *Madelon* (1896), *Jerome, a Poor Man* (1897); *Silence, and Other Stories* (1898), containing some of her best work; *The Love of Parson Lord* (1900); *The Portion of Labor* (1901); *The Wind in the Rose Bush* (1903); *The Givers* (1904); *The Debtor* (1905); *The Fair Lavinia, and Others* (1907); *The Winning Lady, and Others* (1909); *Butterfly House* (1912); *The Copy-Cat, and Other Stories* (1914).

WILKINSBURG. A borough in Allegheny Co., Pa., adjoining Pittsburgh, of which it is a residential suburb (Map. Pittsburgh, and vicinity). It has the Home for Aged Protestant Women and the United Presbyterian Home for the Aged. Wilkinsburg was named in honor of William Wilkins, Secretary of War under President Tyler. Pop., 1900. 11 886, 1910, 18,924; 1915 (U. S. est.), 22,361; 1920, 24,403.

WIL'KINSON, JAMES (1757–1825). An American soldier and adventurer, born in Benedict, Md., of English ancestry. He was privately tutored and studied medicine in Philadelphia (1773–75). In September, 1775, he enlisted in the American army, joining the army before Boston; the following year, he was made captain and led a company northward, joining Arnold at La Chine in the invasion of Canada. He became a colonel, served on the staff of General Gates, and was promoted by the latter to be deputy adjutant general of the Army of the Northern Department. He served with some distinction through the Saratoga campaign, and was delegated to bear to Congress the news of the surrender of Burgoyne. He was brevetted brigadier general in November, 1777; was implicated in the Conway Cabal (q.v.); acted as secretary to the Board of War from January to March, 1778; and in July, 1779, was made clothier general of the Continental Army. He resigned in 1781, and in 1784 removed to Kentucky, where he soon came to exert considerable influence. He played a conspicuous part in the early politics of that State; and even went so far as to intrigue with the Spaniards in Louisiana for the absorption of the western country by Spain. For the rôle he played he received valuable trade concessions with Louisiana—he had come to be the largest tobacco dealer in the West—and a pension from the Spanish government. His treasonable conduct being unknown, he was appointed lieutenant colonel in 1791, and served with ability in the Indian wars of the West, notably in Anthony Wayne's campaign. In March, 1792, he was appointed brigadier general, and in 1796 succeeded Wayne as commander in chief of the army. He continued to receive his Spanish pension. In 1805, after the acquisition of Louisiana and its division into two Territories, he was appointed by Jefferson Governor of upper Louisiana with his capital at St. Louis. At this time he was already engaged with Aaron Burr in a scheme for the conquest of Mexico, and in the following year sent Z. M. Pike (q.v.) upon his exploration to the Southwest. During 1806, under cover of the Spanish War excitement, this scheme took shape, but Wilkinson, seeing the opportunity of driving a double bargain, turned traitor, denouncing the expedition to the President, and applying to the Viceroy of Mexico for money to compensate him for having saved that kingdom to Spain. His treachery and guilty conduct, however, were clearly exposed to some people and he narrowly escaped indictment along with Burr at Richmond in 1807. On Dec. 31, 1807, John Randolph introduced a resolution in Congress to inquire into the conduct of Brigadier General James Wilkinson "in relation to his having, at any time, while in the service of the United States, corruptly received money from Spain or its agents." He was exonerated, but of his guilt Randolph was certain, and early in 1810 two committees in Congress took up charges against the general. On Dec. 25, 1811, he was again acquitted, and in 1812 resumed command

of the army at New Orleans. In March, 1813, during the second war with Great Britain, he was raised to the rank of major general and placed in command of the Canada Expedition, but, proving incapable, he was superseded in 1814, and in November a court-martial was ordered for his trial on charges of neglect of duty, drunkenness, conduct unbecoming an officer, and of countenancing and encouraging disobedience of orders. In 1815 he was again acquitted, and was honorably discharged from the service. He removed to Mexico City and took a small part in some of the revolutionary movements then afflicting that country. His last years were spent in trying to collect from Mexico a large sum of money due himself and some of his friends for munitions and arms. He was a brave officer, a fluent speaker, and a ready but rather grandiose writer. Since his death materials have been brought to light which show him to have been a consummate intriguer, barren of honor and shamelessly corrupt He published: *The Aaron Burr Conspiracy Exposed* (1808); and a partially reliable work, *Memoirs of My Own Times* (1816), which was left incomplete. For accounts of his Western intrigues, consult· Gayarré, *Spanish Dominion in Louisiana* (New York, 1854); Roosevelt, *Winning of the West*, vol. iii (ib., 1894); Daniel Clark, *Proofs of the Corruption of Gen. James Wilkinson* (1809); McCaleb, *The Aaron Burr Conspiracy* (New York, 1903); Shepherd, "Wilkinson and the Beginning of the Spanish Conspiracy," in *American Historical Review*, vol. ix (New York, 1904); and Cox, "The Later Intrigue of Wilkinson with the Spaniards," in *American Historical Review*, vol. xix (ib., 1914).

WILKINSON, JEMIMA (1753–1819). An American religious enthusiast. She was born at Cumberland, R. I., and educated among the Society of Friends. When 20 years old she suffered from a severe fever, and, after an apparent suspension of life, asserted that she had been raised from the dead, and professed to work miracles. She had a few followers who with her built in Yates Co., N. Y., a village named Jerusalem (1789). She enjoined celibacy, and the religious exercises which she instituted had some resemblance to those of the Shakers. At her death the sect was broken up.

WILKINSON, JOHN (1728–1808). An English ironmaster, born at Clifton, Cumberland. He established the first blast furnace at Bilston, Staffordshire, about 1748, and about 1756 founded a plant at Bersham for boring cylinders, of which he became owner and manager in 1761–62. He then set up a large forge at Brosely, where he manufactured wrought iron. In 1786 he was filling large government orders for artillery material, and in the following year constructed the first iron barge. In 1790 he patented an important process for making lead pipe. Wilkinson also proposed and cast the first iron bridge.

WILKINSON, SIR JOHN GARDNER (1797–1875). A distinguished English traveler and Egyptologist, born Oct. 5, 1797. Wilkinson was educated at Harrow and at Exeter College, Oxford, but left the university without taking a degree and went to Italy for his health in 1820. Becoming interested in Egyptological studies, he went to Egypt in 1821 and took up his abode at Cairo, where he soon became proficient in Arabic and in Coptic. In the course of the next 12 years he explored nearly every part of Egypt and lower Nubia, twice ascending the Nile as far as the second cataract and several times as far as Thebes. To the exploration of the latter site he devoted more than a year, and he also visited the deserts on either side of the Nile and the Egyptian oases. As a result of his first visit to Egypt, he transmitted to the British Museum more than 300 antiquarian objects, besides numerous specimens of natural history. His first work on Egyptian antiquities, *Materia Hieroglyphica*, was published at Malta in 1828. It was followed, two years later, by *Extracts from Several Hieroglyphical Subjects*, and in the same year (1830) he published his *Topographical Survey of Thebes* in six sheets. In 1833 he was compelled by ill health to return to England, and at the close of the following year he was elected fellow of the Royal Society. His *Topography of Thebes and General View of Egypt* was published at London in 1835, and two years later appeared his great work, *Manners and Customs of the Ancient Egyptians* (3 vols., best ed. by Birch, 1878), a work remarkable both for the extensive and accurate information it contains and for the agreeable style in which it is written. It immediately attained great popularity and gained for its author in 1839 the honor of knighthood. In 1841 he revisited Egypt, traveled extensively in northern Africa, Syria, and Turkey, and returned to England in 1843. In the year of his return he published his *Modern Egypt and Thebes*, of which a new and condensed edition was issued among Murray's *Hand-books* in 1847. A journey through Montenegro, Herzegovina, and Bosnia, in 1844 furnished the material for his *Dalmatia and Montenegro* (2 vols, 1848). He visited Egypt for the third time in 1848–49 and again in 1855–56. He presented his collection of Egyptian, Greek, and other antiquities to Harrow School and in 1874 gave to the same institution his valuable collection of coins and medals. He died at Llandovery, in Wales, Oct. 29, 1875. Among Wilkinson's other works may be mentioned: *The Architecture of Ancient Egypt* (1850); *The Fragments of the Hieratic Papyrus at Turin* (1851); *A Popular Account of the Ancient Egyptians* (1853); *The Egyptians in the Time of the Pharaohs* (1857); *On Color, and on the Necessity for a General Diffusion of Taste among All Classes* (1858).

WILKINSON, (HENRY) SPENSER (1853–). An English writer on military subjects. He was born in Manchester; was educated at Owens College, Manchester, and at Merton College, Oxford, and was called to the bar at Lincoln's Inn in 1880. From 1882 to 1892 he was on the staff of the Manchester *Guardian*, and from 1895 to 1914 on the staff of the London *Morning Post*. Convinced as early as 1874 that Great Britain was inadequately armed, he began to devote his attention to the subject of the national defense. During the early months of the Boer War (1899–1900) Wilkinson made remarkably accurate forecasts of military movements. He was made Chichele professor of military history at Oxford in 1909. He wrote: *Essays toward the Improvement of the Volunteer Forces* (1886); *The Brain of an Army* (1890), an account of the German general staff; *Imperial Defense* (1892), with Sir Charles Dilke; *The Command of the Sea* (1894); *The Nation's Awakening* (1896); *British Policy in South Africa* (1899); *War and Policy* (1900); *Britain at Bay* (1909); *Hannibal's March through the Alps* (1911); *First Lessons in War*

(1914); *The French Army before Napoleon* (1915), *The Nation's Servants* (1916). Consult William Archer, *Real Conversations* (London, 1904).

WILKINSON, TATE (1739–1803). An English actor and theatrical manager, especially celebrated for his powers of mimicry. At first he did not meet with much success as an actor, and in fact his own regular acting never advanced him very far, but he showed such a popular gift for mimicking the peculiarities of other performers that he was throughout his early career alternately the delight and the detestation of the theatrical people with whom he had to do. He was especially successful in mimicking Peg Woffington, Foote, and Garrick, to all of whom he gave considerable offense. In the provinces Wilkinson successfully took leading parts in serious drama. About 1768 he married and settled down in York as the manager of what was called the Yorkshire Circuit, which he directed with excellent judgment and prosperity for over 30 years. Among his actors were Mrs. Siddons and the other Kembles, Miss Farren, and a number of others who afterward became famous. His oddities were notorious, but he was a generous manager. Of his writings the most important are the *Memoirs of his Own Life, by Tate Wilkinson, Patentee of the Theatres-Royal, York and Hull* (1790), and *The Wandering Patentee; or a History of the Yorkshire Theatres from 1770 to the Present Time, etc.* (1785). Consult William Archer, in *Actors and Actresses of Great Britain and the United States*, edited by Matthews and Hutton (New York, 1886), and H. B. Baker, *Our Old Actors* (London, 1881).

WILKINSON, WILLIAM CLEAVER (1833–1920). An American scholar and writer. He was a graduate of the University of Rochester (1857) and the Rochester Theological Seminary (1859), pastor of Baptist churches in New Haven and Cincinnati, and then head of a school at Tarrytown, N. Y. From 1872 till 1881 he was professor of homiletics in Rochester Seminary, and after 1892 professor of poetry and criticism in the University of Chicago. He devoted much time to literary work. For the Chautauqua Literary and Scientific Circle he prepared many textbooks on languages. He published also: *The Dance of Modern Society* (1868); *A Free Lance in the Field of Life and Letters* (1874), *The Baptist Principle* (1881); *Webster*, an ode (1882); *Poems* (1883); *Edwin Arnold as Poetizer and Paganizer* (1885); *Poetical Works* (5 vols., 1905); *Daniel Webster, with Other Historical Essays* (1911); *Paul and the Revolt against him* (1914).

WILL. In psychology, a term which formerly signified a power or activity of the mind coordinate with thought and feeling, but which has now come to be the "general name for the sum total of tendencies, inherited and acquired, that determine our actions" (See DETERMINING TENDENCY.) Under the general heading of Will experimental psychology is concerned (1) with the psychology of action, particularly in its selective and volitional stages, and (2) with the psychological description of the will-consciousness.

The first of these problems has been considered under Action (q.v.). There it is shown that the essential thing in every action-consciousness is its predetermination in the sense of an idea of end. The typical impulsive action is singly determined, i.e., the determination drives straight through to its goal, there is no indecision, no questioning, no halting, until the idea of end is realized in perception. On the conscious side the tendency is actualized in three successive steps. (*a*) the intention of movement (usually given in kinæsthetic terms) and the idea of result. (*b*) the perception of an object, which is apprehended in relation to the idea of result; and (*c*) the perception of movement and the realizing perception of result. This is the typical action-consciousness, and so far there need be no specific will-consciousness. In selective and volitional action we find a conflict of tendencies, two or more struggling for control of the nervous paths, and when one eventually wins, the typical action-consciousness is repeated. There are, of course, many possibilities as regards the outcome of the struggle; two tendencies may completely inhibit each other, or under other circumstances may facilitate each other. The point is that the action is still determined, and that as yet there need be no pattern of consciousness other than the determined succession of ideas which is typical of the action-consciousness at large.

There is, however, a will-consciousness, and it is sometimes reported even in the simplest forms of action. Under analysis it appears to be a conscious attitude of acceptance or of resolution. The attitude sometimes reduces to an organic set, which carries the meaning "I agree," or "I will." The same meaning may also be expressed in verbal and bodily kinæsthesis, the "I" of the meaning "I agree" is then emphatic, the individual feels himself into the situation; and there is often a feeling of exertion, as if the action were already being carried out. Finally, the attitude is incorporated, as it were, in the total reaction-consciousness, the organic sensations are blended with the other conscious contents, and the ideas of object and of end seem to be necessary parts of the will-consciousness. The will-consciousness is thus always complex, and is as difficult of analysis as are the conscious attitudes in general (see THOUGHT); but the key is to be found in the actor's consciousness of self, a variable group of processes set on a background of determining tendencies.

Attempts have been made to distinguish types of will, according as the sum total of tendencies to action shows itself characteristically in different ways. The energetic will, e.g., is a will of strong and persistent tendencies; the weak will is one of instable, the healthy will of nicely balanced tendencies. The explosive will is one that functions too rapidly for inhibitions to arise.

Some psychologists posit a mental element, called conation, which is described as a mental unrest, and which is said to be common to desire, yearning, longing, craving, wishing, willing, and like experiences. Such an element, however, is merely an assumption made in the interest of description, and experimental investigation shows no warrant for it. See CONATION.

Bibliography. William James, *Principles of Psychology* (new ed., 2 vols., New York, 1905); Narzies Ach, *Willenstatigkeit und das Denken* (Göttingen, 1905); id., *Ueber den Willensakt und das Temperament* (Leipzig, 1910), E. B. Titchener, *Text Book of Psychology* (New York, 1910); G. F. Stout, *Manual of Psychology* (London, 1913).

WILL. A legal act to take effect at death,

by which a person disposes of his property In civil law such an act is called a testament Power to testate has not been discovered in any primitive system of law, the primitive method of modifying succession is the adoption (q v.) of the intended heir, who thereby receives the right to succeed as a son. The modern will is a Roman invention Its general diffusion was effected, in the ancient world, through the expansion of the Roman Empire; in the modern world, through the influence of the Roman church.

Roman Law. The Roman testament grew out of mancipation. This was originally a sale, in which the price was paid in a certain weight of copper When the payment of price became symbolic, the transaction became a conveyance. A mancipation involved the presence of the conveyor and conveyee, a scale holder, and five witnesses. The evolution of testament out of mancipation was accomplished as follows. Originally, the estate (*familia*) was conveyed to the intended heir (*emptor familiæ*), on the understanding that he was not to assert his right until the conveyor's death. Later, a fiduciary conveyee was substituted, who took title to the estate not in his own interest, but in commission (*mandatela*), to dispose of it according to the instructions of the conveyor. These instructions (*nuncupatio*) were at first given publicly and orally, later, the conveyor produced written and sealed tablets, and declared that these contained his instructions. To the tablets were then attached, for identification, the seals of the conveyee, the scale holder, and the five witnesses. It is probable that the conveyee discharged, at this stage in the evolution of testament, the duties of an executor; later, he became, like the scale holder, a purely ceremonial person. At the close of the Republican period the prætors accepted testamentary tablets bearing the seals of seven witnesses, and gave effect to the dispositions contained in such tablets, without inquiring whether the forms of mancipation had been observed; and in the second century of the Empire Marcus Aurelius enacted that an allegation that there had been no mancipation should not be heard At this point the substitution of the written, secret, and revocable testament for the oral, public, and irrevocable conveyance was complete; but the ceremony "with copper and the scales" was long retained "in imitation of the old law."

The rules governing the Roman testament at the close of the Republican period were very technical. It must create one or more lines, or universal successors, who were to take the whole estate, pay debts and special bequests (*legata*), and retain the residue. The heir or heirs, accordingly, were at once executors and residuary legatees. If the heir was under age, or insane, his guardian acted as executor. If a testator had natural heirs under his household authority (*sui*, see PATRIA POTESTAS) he could indeed give the inheritance to others, but he must first expressly disinherit the *sui*

At the older civil law, again, only a Roman citizen of the age of puberty and not under *patria potestas* (q.v.) could make a testament; and only a person in existence at the time of the testator's death could take as heir. Uncertain persons (like the poor) could not be instituted as heirs, nor could juristic persons (corporations).

Informal dispositions of property in contemplation of death were made possible by the enactment of Augustus that trust bequests (*fidei commissa*, q v) should be enforced whenever the intention of the decedent could be proved. By such trusts nearly all the technical limitations upon testation were ended Such trusts were usually (but not necessarily) made in documents termed "codicils," and they might apply to the whole estate (universal *fidei commissa*). In the later Empire there was a reaction towards stricter forms. Except in the case of soldiers in the field, who might testate informally, every declaration of last will must assume the form either of a regular testament with seven witnesses, or of a codicil with five witnesses. Codicils might be added to a testament, but they could be established independently (*codicilli ab intestato*). Justinian introduced several alternative forms of testation for the benefit of persons who, by reason of their infirmities or their situation at the moment of testation, could not observe the usual forms.

Canon Law accepted the Roman law of testation with few modifications. It accepted a testament made in the presence of the parish priest and two witnesses, and it introduced testamentary executors.

Modern Civil Codes recognize various forms of testation. That most favored is the testament certified by a judge or by notaries and by at least two witnesses Less formal testaments may be made at sea, in time of pestilence (especially in quarantine), by soldiers in the field, etc, but such testaments usually become invalid soon after the emergency has passed and the testator is able to observe the usual forms.

In French, Italian, and Spanish law a testament wholly written by the testator himself and also dated and signed by him (holographic testament) is valid without witnesses or formalities of any sort. This rule has been much criticized, on the ground that it facilitates forgeries and bases the succession essentially on expert testimony as to handwriting.

Inheritance Contract. In Roman law and in all modern legislation successions to the property of a husband or wife may be granted, in part at least, by the term of an antenuptial contract. In the late mediæval customs of Germany reciprocal rights of inheritance might be established between any persons by contract (*Erbverbrüderung, Erbvertrag*), and the same result was attainable in northern France by the establishments of reciprocal testaments, which, unlike other testaments, were not revocable. In France reciprocal testaments were abolished by an ordinance of 1735; but the inheritance contract was recognized in nearly all the State codes of Germany and is recognized in the German Imperial code. The inheritance contract must be in writing and must be certified by a judge or a notary.

Limitations on the Power of Testation. At Rome in the later Republican period efforts were made to limit the amount of legacies or special bequests. This end was attained, 40 B.C., by the Lex Falcidia, which provided that legacies should not exceed three-fourths of the net value of the entire estate. This did not affect the power of the testator to make a stranger heir, to the total exclusion of his nearest kin. It was, however, possible for children or parents disinherited without cause, or for a brother or sister to whom a disgraceful person was preferred, to attack as undutiful a testament under which such natural heirs received less than one

fourth of their intestacy share, and such an attack was quite likely to be successful if mental weakness could be shown on the part of the testator or undue influence on the part of the stranger heir. Justinian gave descendants and ascendants an absolute right to one-third or, in some cases, to one-half of their intestacy shares, unless there was good ground for their disherison. All the modern civil codes give statutory shares to descendants and to parents, and nearly all give a share (or at least usufruct in a share) to a surviving spouse. See HEIR; INHERITANCE, SUCCESSION AB INTESTATO; TESTAMENT.

Wills at Common Law. At early common law a gift by will of personal property was valid without writing or other formality. As knowledge of the art of writing became more general, the courts came to look askance at verbal or nuncupative wills, holding that they were valid when executed in that manner only by force of necessity. An early statute (29 Charles II, ch. 3) placed various restrictions upon the power of disposing of personal property of less than 30 pounds in value by nuncupative wills. It required such wills to be executed by the testator in the presence of three witnesses in his own house and during his last sickness. This statute with unimportant modification was generally enacted into the statute law of this country. In all of the States wills of personal property may now be executed with the same formalities as wills of real estate, and in a number of States, as in New York, all wills of personal property are now required to be executed in that manner, with the exception that nuncupative wills of soldiers in actual service and of sailors while at sea are still deemed valid.

It seems probable that by the Anglo-Saxon law land held by grant from the King, sometimes known as book land, was to a limited extent devisable. Disposition of land by will, however, was inconsistent with feudal tenure, as it deprived the overlord of his feudal rights and privileges, and, following the Norman Conquest, the practice of making gifts of lands by will ceased with the gradual establishment of the feudal system. There were exceptions in some of the ancient cities as to lands held in burgage (q.v.) and in the County of Kent as to lands held by gavelkind (q.v.), where the power of disposition of land by will was preserved by local custom.

The development of the system of uses by the English Court of Chancery admitted of gifts of land by will by means of a conveyance of the land to such uses as the grantor might appoint by his will. (See TRUST.) This method of making devises was temporarily destroyed by the Statute of Uses (27 Hen. VIII), but the power of devising was completely restored as to all socage estates and as to two-thirds of the testator's lands held by knight service by the Statute of Wills (32 Hen. VIII) enacted in 1540. By the abolition of feudal tenures (12 Charles II, ch. 14) in 1656, the Statute of Wills was indirectly extended in its application to all lands.

No particular formality was required by the Statute of Wills for the execution of a valid will except that it was required to be in writing. By the Statute of Frauds (29 Charles II, ch. 3) a will was required to be signed by the testator and to be subscribed by three or more witnesses. Other statutory changes have been made in the English Law of Wills which are substantially embodied in the Wills Act (7 Wm IV and in 1 Viet., ch. 26).

Statutes based on the Statute of Wills and the Statute of Frauds have been enacted in most of the United States, in all of which there are statutes authorizing gifts of land by will. While varying in numerous particulars, these statutes are alike in requiring generally that the will shall be in writing and signed by the testator at the end of the will. Generally two and in some States three witnesses are required, who must subscribe the will as witnesses in the presence of the testator and in the presence of each other. In some States a smaller number of witnesses is required for a will of personal property than for a will of real property. In some States, also, as in New York, the testator is required to publish his will, that is, announce at the time of executing it that the document is his last will and testament, although in these States the witnesses are not required to subscribe the will in each other's presence, nor need the testator sign the will in the presence of the witnesses, provided he acknowledges the signature to be his. In Louisiana holographic wills without witnesses are valid, also nuncupative wills, provided the will is transcribed by a notary in the presence of witnesses numbering three or five according to circumstances. There are also in that State other rules as to the execution and proof of wills which are not generally in force in the other States of the United States.

The person executing a will must have testamentary capacity, i.e., he must be 21 years of age in case of wills of real estate, and in most States 18 years of age in case of wills of personal property. In New York in case of personal property the rule is 18 for males and 16 for females. He must be of sound mind and act without undue influence on the part of others. See INSANITY, INFANT, HUSBAND AND WIFE; MARRIAGE.

In general, any property may be disposed of by will. Such limitations as there now are upon such dispositions are properly limitations on the powers of beneficiaries to take, and only indirectly affect the power of giving property by will. (See CHARITABLE TRUSTS, OR CHARITIES.) As a will only takes effect at the death of the testator, it may affect all property acquired by him after its execution as well as before, provided the property falls within the description of the will. Formerly wills were held to affect only the property owned by the testator at the time of execution.

The rules governing the construction of wills, particularly of wills of real estate, are too numerous and complex for discussion here. The most important rule of interpretation is that the intention of the testator as it appears from the will shall be carried out wherever legally possible, and when the will is ambiguous the circumstances surrounding its execution may be examined for the purpose of ascertaining the testator's intention.

A codicil, which is in effect a supplementary will, is to be construed with the will which it supplements. See DEVISE; BEQUEATH; INTERPRETATION; LEGACY.

A will remains revocable until the time of the testator's death. The method of revocation is usually provided for by the statute giving authority to make wills. A will may be revoked by the express language of a subsequent will

or by gifts made by it inconsistent with the earlier will, and generally a will may be revoked by cancellation, tearing, or burning by the testator with intention to revoke it, although a part of a will may not generally be so revoked The accidental destruction of a will does not affect its validity or efficacy if its contents can be proved Disposition of his property by the testator before his death in effect works a revocation of his will, and under the earlier statutes marriage of the testator or the birth of a child revoked his will. There are now various statutory rules on this subject. Consult: Jarman on *Wills* (6th Am. ed, Boston, 1893); James Schouler, *The Law of Wills* (5th ed., Albany, 1915); W. P. Borland, *Law of Wills and the Administration of Estates* (Kansas City, 1915). See CONVEYANCE; EXECUTOR; PERSONAL PROPERTY; REAL PROPERTY.

WILLAERT, vĭl'lärt, ADRIAN (c.1480–1562). A Flemish composer, founder of the older Venetian school of composition. He was born at Bruges or at Roulers, West Flanders, studied with Jean Mouton and Josquin Deprés, and in 1516 went to Rome. In 1527 he received the appointment of maestro di cappella at St. Mark's, Venice, where he established a music school. He is known as the originator of the style of writing for two choirs, the idea of which was suggested to him from the two opposed organs at St. Mark's. Among his works are two masses for from four to seven voices, books of motets (1539–45); *Canzone villanesche* (1545); madrigals; vesper psalms; hymns; *Musica nova* (1559); and psalms for vespers and compline (1571).

WILLAMETTE, wĭ-lă'mĕt. A river of western Oregon. It rises in the Cascade Mountains, and flows northward through a fertile and well-settled valley, emptying into the Columbia River after a course of 250 miles (Map: Oregon, B 3). It is always navigable to Portland, about 15 miles, and by means of a canal and lock around the Willamette Falls small steamers can for the greater part of the year ascend it about 150 miles to Eugene.

WILLAMETTE UNIVERSITY. An institution for higher education founded in Salem, Oregon, in 1843, under Methodist Episcopal auspices. The university includes a college of liberal arts, an academy, school of music, and school of law. The total attendance in 1916 was about 312, and the instructors numbered 19. The endowment of the university amounted to about $560,000, the grounds were valued at $200,000, and buildings at $104,500. The library contained about 11,500 volumes. The annual income was about $35,000. The president in 1916 was Carl G. Doney, B.S., Ph.D.

WIL'LARD, ASHTON ROLLINS (1858–). An American art critic. He was born at Montpelier, Vt., and graduated at Dartmouth College in 1879. He at first practiced law, but subsequently directed his attention to literature and the criticism of art. He published: *The Life and Work of the Painter Domenico Morelli* (1895); *The History of Modern Italian Art* (1898); *The Land of the Latins* (1902). He spent much time in Italy, and in 1902 was created a Chevalier of the Crown of Italy by King Victor Emmanuel III.

WILLARD, EDWARD SMITH (1853–1915). An English actor. He was born at Brighton and made his début upon the stage at Weymouth in 1869. In 1881 he went to London, and with Wilson Barrett at the Princess Theatre played in *The Lights of London*, *The Silver King*, and other well-known pieces. In 1886 he made a hit as *Jim the Penman* at the Haymarket. One of his greatest successes was his production of *The Middleman*, by H A. Jones, at the Shaftesbury in 1889, he himself creating the part of Cyrus Blenkarn. He came to the United States in 1890 and again in 1896, remaining till 1903, when he had made 13 American tours. In 1906 he retired from the stage, but returned on special occasions, as in 1911 for the gala performance at His Majesty's Theatre, London, to play the part of Brutus in the forum scene from *Julius Cæsar*. Consult W. Winter, *Shadows of the Stage* (New York, 1892).

WILLARD, EMMA C (HART) (1787–1870). A pioneer in the field of higher education for women, born at Berlin, Conn In 1803 she became a teacher in the village school; three years later she received a position in an academy at Westfield, Conn, but after a few weeks became principal of an academy for girls at Middlebury, Vt. In 1809 she married Dr John Willard In the same year she established at Middlebury a girls' boarding school with improved methods of teaching. Five years later she submitted to Governor Clinton of New York a manuscript entitled *A Plan for Improving Female Education*. The ideas she advanced met with favor, and in 1821 she was able to establish at Waterford, N. Y., a girls' seminary, partly supported by the State. Two years later she removed the school to Troy, where it acquired a wide reputation as the Troy Female Seminary. Afterward, as the Emma Willard School, it was notably prosperous and successful. Mrs. Willard's husband died in 1825, but she continued to manage the institution until 1838, when she placed it in the hands of her son. In 1830 she made a tour in Europe, and three years later published *Journal and Letters from France and Great Britain*. The proceeds from the sale of the book she gave to a school for women that she had helped to found in Athens, Greece. In 1838 she married Dr. Christopher C. Yates, but was divorced from him in 1843. Among her other works are: *The Woodbridge and Willard Geographies and Atlases* (1823); *History of the United States* (1828); *Universal History in Perspective* (1837); *Treatise on the Circulation of the Blood* (1840); and *Last Leaves of American History* (1849). In 1830 she also published a book of poems, of which the best known is *Rocked in the Cradle of the Deep*. Her *Life* was written by John Lord (New York, 1873). In recognition of her services to the cause of higher education for women a statue was unveiled in her honor at Troy in 1895.

WILLARD, FRANCES ELIZABETH (1839–98). An American educator and reformer, born at Churchville, N. Y. She graduated at the Northwestern Female College at Evanston, Ill., in 1859; taught in various Western towns, and in 1866–67 was principal of the Genesee Wesleyan Seminary at Lima, N. Y. After two years of travel in Europe and the East, she became professor of æsthetics at Northwestern University, and dean of the Woman's College there. In 1874 she became corresponding secretary of the Woman's Christian Temperance Union, and from 1879 till her death was its president. Under her guidance the organization of the Union was perfected and its sphere of activity greatly enlarged. In 1882 she became a member of the

executive committee of the Prohibition party; in 1883 she founded the World's Woman's Christian Temperance Union and in 1888 became its president. Besides contributing frequently to the magazines, she wrote a number of books and pamphlets, including: *Nineteen Beautiful Years* (1868); *Woman and Temperance* (1883), and *Glimpses of Fifty Years* (1889). She edited for a time the Chicago *Post and Mail*, and in 1892–98 *The Union Signal* (Chicago), the official organ of the Union. Consult Gordon, *The Beautiful Life of Frances E. Willard* (Chicago, 1898).

WILLARD, JOSEPH (1738–1804). An American clergyman and educator, born in Biddeford, Me., a great-grandson of Samuel Willard (q.v.), who was acting president of Harvard (1701–07). He graduated at Harvard in 1765, and was tutor till 1772, when he became colleague pastor of the Congregational Church at Beverly, Mass. He was president of Harvard from 1781 to 1804. Among his published writings are papers in the *Memoirs of the American Academy* and the *Philosophical Transactions*.

WILLARD, JOSEPH EDWARD (1865–1924). An American diplomat, born in Washington, D. C. He graduated from the Virginia Military Institute in 1886, studied law at the University of Virginia, and was a captain in the United States Volunteers during the Spanish-American War. He served as a Democratic member of the Virginia House of Representatives (1894–1902), as Lieutenant Governor of Virginia (1902–06), and as State corporation commissioner (1906–10). Appointed Minister to Spain by President Wilson in 1913, he was raised to the rank of Ambassador in the same year.

WILLARD, JOSIAH FLYNT. See FLYNT, JOSIAH.

WILLARD, SAMUEL (1640–1707). A Colonial clergyman. He was born in Concord, Mass.; graduated at Harvard in 1659; was minister at Groton from 1663 to 1676, whence he was driven by the Indians during King Philip's War; was pastor of the Old South Church, Boston, from 1678 until his death; strenuously opposed the witchcraft persecutions in 1692; and was acting president of Harvard from 1701 until his death. He published many sermons, including: *The Duty of a People that Have Renewed Their Covenant with God* (1680); *Brief Animadversions upon the New England Anabaptists' Late Fallacious Narrative* (1681); and *Mourner's Cordial against Excessive Sorrow* (1691). A folio volume entitled *A Compleat Body of Divinity* was published posthumously in 1726.

WILLCOCKS, MARY PATRICIA (1869–). An English novelist. Her publications include: *Widdicombe* (1905); *The Wingless Victory* (1907), which made her widely known; *A Man of Genius* (1908); *The Way Up* (1910); *Wings of Desire* (1912); *The Wind among the Barley* (1912); *The Power Behind* (1912); *The Will to Live* (1913); *Change* (1915).

WILLCOCKS, SIR WILLIAM (1852–). A British engineer. He was educated at Roorkee College at Roorkee, India, was connected with the Indian Public Works in 1872–83 and with the Egyptian Public Works in 1883–97, and projected and designed the Assuan Dam in 1898. In 1911 he was connected with the irrigation works of Mesopotamia. His publications include: *Egypt Fifty Years Hence* (1902); *The Drainage of Lower Egypt* (1912); *The Assuan Reservoir and Lake Mœris* (1914).

WILLCOX, CORNÉLIS DEWITT (1861–). An American army officer and scholar, born at Geneva, Switzerland. He graduated from the University of Georgia in 1880, from the United States Military Academy (1885) and Artillery School (1892), and in 1913 studied at the University of Grenoble. As captain and A. A. G. of volunteers he served in the Santiago campaign in 1898. A member of the general staff corps in 1906–10, he witnessed the German fall army manœuvres in 1907, and was chief of the military information division at Manila, P. I., in 1908–10. In the latter year he became professor of modern languages, with the rank of lieutenant colonel, at West Point, and was promoted colonel in 1914. Besides translating from the Spanish *Letters of Montiano during the Siege of St Augustine* (1909), and *Spanish Official Account of Attack on Colony of Georgia* (1913), and contributing to the NEW INTERNATIONAL ENCYCLOPÆDIA, he published *A French-English Military Technical Dictionary* (1900; new ed., 1910); *The Head Hunters of Northern Luzon* (1912); *A Reader of Scientific and Technical Spanish* (1913). He helped to found the *Journal of the United States Artillery* (1892), and in 1915 became an editor of the *International Military Digest*.

WILLCOX, ORLANDO BOLIVAR (1823–1907). An American soldier, born in Detroit, Mich. He graduated at West Point in 1847; served under General Scott in the latter part of the Mexican War; became a first lieutenant in the Fourth Artillery in 1850; resigned from the army in 1857; and then began the practice of law in Detroit. He reentered the service in May, 1861, after the outbreak of the Civil War, as colonel of the First Michigan. In the first battle of Bull Run he was wounded and captured, and was exchanged in February, 1862. He fought at South Mountain, Antietam, and Fredericksburg; commanded the District of Indiana and Michigan for a short time; took part in the operations in East Tennessee in the fall and winter of 1863–64; led a division of the Ninth Corps in the Wilderness and Richmond campaigns; was brevetted major general of volunteers on Aug. 1, 1864; and was the first to break into Petersburg, receiving the surrender of that place. In January, 1866, he was mustered out of the service, but reentered it in the following July as colonel of the Twenty-ninth Infantry. In March, 1867, he was brevetted brigadier general and major general in the regular army for services at Spottsylvania and Petersburg respectively. He reached the regular rank of brigadier general in 1886, and retired in the following year. He published *Shoepack Recollections* (1856) and *Faca: An Army Memoir, by Major March* (1857).

WILLCOX, WALTER FRANCIS (1861–). An American statistician, born at Reading, Mass. He graduated at Amherst in 1884 and at the Columbia Law School in 1887, and studied further at Yale, Berlin, and Columbia (Ph.D., 1891). Thereafter a member of the faculty at Cornell, he became professor of economics and statistics in 1901, and in 1902–07 was also dean of the faculty of arts and sciences. From 1899 to 1901, on leave of absence, he served as one of the five chief statisticians of the twelfth census. He held the presidency of the American Statistical Association in 1911–12 and of the American Economic Association in 1915. Besides essays and magazine articles, and contributions to the NEW INTERNATIONAL ENCYCLOPÆDIA, he published *The Divorce Problem, A Study in*

Statistics (1891; 2d ed., 1897), and *Supplementary Analysis and Derivative Tables*, twelfth census (1906).

WILLCOX, WILLIAM RUSSELL (1863–). An American lawyer and publicist, born at Smyrna, N. Y. He studied at the University of Rochester in 1888, graduated from Columbia Law School in 1889, and after 1890 practiced law in New York City. He was president of the New York Park Board in 1902–03 and postmaster of New York City in 1905–07, and became known for important services as chairman of the New York Public Service Commission (first district) in 1907–15. In 1916 he was appointed chairman of the Republican National Committee, being the personal choice of the presidential candidate, Charles E. Hughes, and also acceptable to Colonel Roosevelt.

WILLE, vĭl'le, JOHAN NORDAL FISCHER (1858–). A Norwegian botanist, born in Haaböl, Smaalenene. After studying in Christiania (Ph.D., 1885), Upsala, Copenhagen, and Berlin, he was professor successively at Stockholm University, at Aas Agricultural College, Norway, and at Christiania, where he was also director of the Botanical Garden and of the Botanical Museum. He reformed the botanical instruction at the university, founded the botanical laboratory, and helped establish the biological station at Drobak. In the interest of his science he traveled widely in Europe, Asia, the United States, and Central America. Wille contributed to scientific periodicals on algæ, plant morphology, plant physiology, plant anatomy, and plant geography. He lectured at the quarter century of the Missouri Botanical Garden at St. Louis in 1914, and in other large American cities, including New York. By the New York Botanical Garden and Museum he was sent to Porto Rico to study algæ (1914–15).

WILLEMITE, wĭl'ĕm-īt (named in honor of William I, Dutch *Willem I*, King of Holland). A mineral zinc silicate crystallized in the hexagonal system. It has a resinous lustre, and is of various shades of light yellow, green, red, and brown in color. It is found in Prussia, in Greenland, and with the zinc deposits in Sussex Co., N. J., where it occurs massive and also intimately mixed with franklinite and zincite. The transparent specimens from New Jersey have been cut as cabinet gems. The reddish-colored crystals found in New Jersey are known as *troostite*.

WILLEMS, vĭl'ĕms, FLORENT (1823–1905). A Belgian genre painter, born in Liége. He was a pupil of the Mechlin Academy, but formed his art chiefly after Terborg and the old Dutch masters, famous for their minute execution. In 1844 he removed to Paris, where he received many medals and other honors. He is well known in the United States, good examples of his works being in the Metropolitan Museum (New York), the Art Institute of Chicago, and other public and private collections. His favorite subjects are taken from the seventeenth century. They show proficiency in line, but are hard and dry in color.

WILLEMS, JAN FRANS (1793–1846). A Flemish philologist, historian, and poet. He was born at the village of Boechout, near Antwerp, and at the age of 12 was sent to the town of Lierre, to learn singing and music. His talents attracted the notice of several influential persons there, through whose agency he was sent to Antwerp, to study in the office of a notary; and in 1812 he won the prize awarded for the best poem on the battle of Friedland and the Peace of Tilsit. From this period his poetical and dramatic compositions followed each other in rapid succession. His ode *Aen de Belgen*, which appeared in 1818, in which he exhorted his countrymen to resume the use of their native Flemish, and his treatise *Over de nederduitsche taal en letterkunde* (1819–24), in which he traced the history of the Flemish and Dutch tongues from their common origin through their gradual but slight divergences, mark an epoch in the literary history of Belgium. The Dutch government gave him the post of keeper of the archives at Antwerp, but the Catholic party in Belgium, resenting the attempt made by Willems to attribute the decline of Belgian national renown to the abandonment of the Flemish vernacular, looked upon his writings with mistrust; and in 1830, when Belgium was definitely separated from Holland, the dominant Belgian party deprived Willems of his office. In 1835 he was, however, promoted to the place of keeper of the archives at Ghent, where he continued to reside until his death. Among the numerous Flemish works published by Willems, special notice is due to his version of the mediæval poem of *Reinaert de Vos*, while among the more important of his strictly national works were his editions of the rhymed chronicles of Jan Van Helu (1836) and Jan de Klerk (1840), *De brabantsche Yeesten* (1839–43), and his *Mengelingen van vaderlandschen Inhoud*, and his posthumous *Oude Vlæmsche liederen* (1848), *Brieven* (1874); and *Keus van dicht- en prozawerken* (1875). He founded and edited the quarterly *Belgisch Museum voor de Nederlandsche taal- en letterkunde* (10 vols., 1837–46). Biographies of Willems have been written by Snellaert (Ghent, 1847) and Rooses (Antwerp, 1874). Consult also Rooses, Buylsteke, and Bergmann, *Jan Frans Willems* (Ghent, 1893).

WILLEMSTAD, vĭl'lĕm-städ. The capital of the island of Curaçao (q.v.).

WIL'LENHALL. A manufacturing town in Staffordshire, England, 3 miles east of Wolverhampton. It has iron foundries, and metal works of all kinds. The town's industrial importance dates from the reign of Elizabeth. Pop., 1901, 18,513; 1911, 18,884.

WILLESDEN, wĭlz'den. A town in Middlesex, England, a suburb of London, 7 miles west-northwest of St Paul's (Map: London, D 5). Dollis Hill House was the occasional residence of William E. Gladstone. Public libraries, several parks and recreation grounds, and an isolation hospital are maintained. Pop., 1901, 114,815; 1911, 154,214.

WIL'LET (so called in imitation of its cry). A large North American snipe or tatler (*Symphemia semipalmata* or *Catoptrophorus semipalmatus*), with long wings and long strong legs, making the bird tall and a fast flyer; it measures about 15 inches in length. It is dark ash color above, spotted with brown, and white on the rump and under surface. It resides in the Southern States, breeding as far north as New Jersey or occasionally farther; and in the fall is seen in flocks along the seacoast, where it is a favorite object of sport. Cf. YELLOWLEGS.

WIL'LETT, MARINUS (1740–1830). An American soldier, born at Jamaica, N. Y. During the French and Indian War he served as a lieutenant in the Ticonderoga and Fort Frontenac expeditions, and subsequently became promi-

nent as a leader of the Sons of Liberty (q v) in New York City He entered the Continental army in 1775, accompanied Montgomery to Canada, served in the vicinity of New York in 1776 and, as second in command under Ganse voort at Fort Stanwix (then Fort Schuyler), distinguished himself and earned the thanks of Congress by making a brilliant sortie (Aug 7, 1777) against the besieging enemy He then penetrated the British lines and procured reinforcements under Arnold, from General Schuyler then facing Burgoyne near Stillwater By successive promotions he attained the rank of colonel in December, 1779 In 1779 he accompanied Sullivan's expedition against the Iroquois, and in 1780–83 commanded the New York militia in the Mohawk valley, making the last attack of the war on the British at Oswego, in February, 1783 After the war he was a member of the New York Assembly in 1783–84, was sheriff of New York from 1784 to 1792, and was Mayor of New York City in 1807–08 Consult *A Narrative of the Military Actions of Col Marinus Willett* (1831), by his son William M Willett

WILLETTE, vē'yĕt', **Adolphe** (1857–) A French lithographer and painter Born at Chalons, he studied painting with Cabanel, and was somewhat influenced by the lithographer Jules Chéret, with whom he worked He is most important as a lithographer His very original art is fantastic, delicate, youthful, dreamy he is thoroughly Gallic, an artistic descendant of Watteau, Boucher, and Fragonard His subjects are in a light vein, Pierrots and Pierrettes, impudent little Parisiennes, and quaint allegorical creatures He figured in most lithographic productions of his day, especially in *Le Chat Noir* and *Le Courrier Français*, and designed many posters and book covers, notably the cover for Arsène Alexandre's *L'Art du Rire*, besides many political cartoons, intended to aid his own political aspirations He exhibited a number of paintings in the academic style, but is more important for decorations in various private houses and in the Hôtel de Ville, Paris He exhibited in the old Salon, and became an officer of the Academy

WILLETTS POINT See Fort Totten.

WILLEY, Arthur (1867–) A British zoologist, born at Scarborough and educated at University College, London, and at Cambridge, where he was Balfour student (1894–99) Afterward he was successively lecturer in biology at Guy's Hospital, director of the Colombo Museum, Ceylon (being also marine biologist to the Ceylon government in 1907), and, from 1910, Strathcona professor of zoology at McGill University, Montreal, Canada. He published *Amphioxus and the Ancestry of the Vertebrates* (1894), *Convergence in Evolution* (1911), and edited *Zoological Results* (1898–1902).

WILLIAM I, The Conqueror (c 1027–87) King of England from 1066 to 1087 He was an illegitimate son of Robert II, Duke of Normandy, by Herleva, or Arlette, a tanner's daughter, and in early life was known as William the Bastard When Duke Robert set out on his pilgrimage to the Holy Land in 1034 he caused William to be chosen by the nobles as his successor, and on Robert's death in 1035 William became Duke of Normandy Rebellions broke out almost immediately, and attempts were made to seize the person of the young Duke These rebellions continued during the whole time of his minority, the most serious taking place in 1047. In that year in alliance with the French King, Henry I (q v), William won a brilliant victory over the rebels at Val-es-dunes In 1051 William visited Edward the Confessor (q v) in England and probably was promised the English crown after Edward's death During the succeeding years until 1060 William was engaged in very frequent warfare with the King of France, the Count of Anjou, and some of his own subjects, but he succeeded in establishing his authority firmly, and by 1063 gained full possession of Maine In 1061 he had established the curfew (q v) in Normandy, whence later it was carried over into England

About 1064 Harold, Earl of Wessex, appears to have spent some time in Normandy, perhaps after a shipwreck which placed him as a prisoner in the hands of the Normans According to the Norman chroniclers, whose story is discredited by Freeman, Harold took an oath to aid William in securing the English crown on the death of Edward the Confessor On Edward's death Harold was chosen King of England and was crowned by the Archbishop of York (1066) William had determined that the crown of England should be his, and at once proceeded to claim it, although he had no valid claim whatever He pretended to be the rightful heir by Edward's bequest and through the failure of Harold to abide by his sworn engagements Through the agency of Hildebrand, later Gregory VII, he obtained the sanction of the Pope for the conquest of England, on the ground that Harold was guilty of perjury He collected an army made up in part of volunteers from France and Flanders, and landed in England on Sept 28, 1066 The size of his army is not known, the most reliable estimates varying from 25,000 to 60,000 At the same time the English had to face an onslaught by the Norwegians. On October 14 William won the battle of Hastings (q v), or Senlac, in which Harold was slain After wasting the whole country about London he finally secured his admission into the city, and on December 25 was crowned King at Westminster, after having been duly elected by the Witan Five more years of ravaging and fighting completed the conquest of England, the revolt under Hereward (q v) being put down only in 1071 In 1070, in order to make all further resistance impossible, he laid waste the whole Vale of York Many thousand people were killed or perished from starvation In 1072 he invaded Scotland and received the homage of Malcolm Canmore See Malcolm

During the next 10 years William divided his time between Normandy and England He was compelled to carry on war against the Count of Anjou, the French King, and his own son Robert In 1075 a serious revolt occurred in England, where the two most powerful earls had plotted treason After subduing them, William put to death Waltheof, the last earl of purely English stock About 1076 William created the New Forest in the southwest of Hampshire In 1082 he imprisoned his brother, Odo, Bishop of Bayeux, whom he had made Earl of Kent and had left as his regent in England during his absences He retained him in captivity almost until the time of his own death In 1085 he prevented an invasion by Canute the Saint (q v), and in the same year ordered a survey of England (See Domesday Book.) In 1086 he required all vassals of mesne lords, as well as direct vassals, to do fealty to him, thus introduc-

ing into England the Norman custom by which the Duke had direct authority over all his subjects This was the most important feudal innovation that William made in England. In 1087, while waging war against Philip I of France, he received an internal injury, and died September 9

William was a man of remarkable ability, and owed his success almost entirely to his own exertions He ruled strictly and kept excellent order, but he was unscrupulous and merciless in punishing any opposition to his own will. He confiscated all of the land held by his opponents under the pretext of law, as he considered them traitors, and he extorted very heavy fines on all possible occasions. The taxation also bore very heavily upon his subjects. He was religious and blameless in his private life. Although very liberal to the Church, he ruled absolutely over its officials, and refused to give up to the papacy anything which he regarded as a royal prerogative. In 1076, when Gregory VII demanded of him fealty and the payment of Peter's pence, he sent the latter, but refused to hold his kingdom as a fief from the papacy. In his later years he became tyrannical and avaricious. His tyranny was all the more oppressive because it was cloaked with a pretense of law, and he accomplished his purposes by legal subtleties, maintaining as far as possible the old English customs, which he shaped to suit his own wishes In his later years he was often called William the Great. His wife was Matilda, heiress of the Count of Flanders. Their marriage was long delayed because forbidden by Leo IX (q.v) on account of consanguinity; but it took place in 1053 in spite of the opposition of the Pope. Finally, in 1059 William secured a papal dispensation sanctioning his marriage. He had four sons and five daughters. The eldest of the sons died before his father; of the others, Robert inherited the Duchy of Normandy, William the Kingdom of England, and Henry, who was later King of England, a considerable sum of money.

Bibliography. E. A. Freeman, *History of the Norman Conquest*, vols. ii–v (Oxford, 1870–76); J. R. Green, *Conquest of England* (London, 1884); E. A. Freeman, *William the Conqueror* (ib., 1894); J. H. Round, *Feudal England* (ib., 1895); William Stubbs, *Constitutional History of England*, vol. i (6th ed., Oxford, 1897); F. W. Maitland, *Domesday Book and Beyond* (Cambridge, 1897); P. G Vinogradoff, *English Society in the Eleventh Century* (Oxford, 1908); F. M. Stenton, *William the Conqueror* (New York, 1908).

WILLIAM II RUFUS (c.1056–1100). King of England from 1087 to 1100. He was the third son of William the Conqueror, and was educated by Lanfranc (q.v.), Archbishop of Canterbury. William was the favorite son of his father, who, after having recommended him to the barons and prelates as successor to the crown, sent him to England the day before he himself died. Landing at Dover, William presented himself to Lanfranc, who brought him before the nobles and prelates as their King. No opposition was offered, and William was crowned on Sept. 26, 1087. But in less than three months his uncle, Odo, headed a rebellion in favor of the King's brother, Robert (q.v.), Duke of Normandy, who was considered less stern. William put down the rebellion by the aid of his English subjects, and in revenge he invaded Normandy in 1090. Peace was made in 1091 and Robert and William then turned their united arms against their brother Henry, later Henry I (q v), who had purchased from Robert the district of Cotentin. The fortune of war went against Henry, who was driven into exile. Returning to England, William's next enterprise was an invasion of Scotland, whose King did homage to him. In 1094 he again invaded Normandy, but accomplished little William was recalled to England by disturbances in Wales and in the North. In the year 1096 Robert, who had resolved to go to Palestine, pledged his Duchy of Normandy to William for 10,000 marks. In 1098 William attempted to conquer Maine, but was only partially successful He was shot while hunting in the New Forest, Aug. 2, 1100. It is not known by whom the arrow was shot, or whether it was done accidentally. William was a stern ruler and was feared by his subjects. His justiciar was the notorious Ranulf Flambard (q.v.). His private life was extremely immoral. After Lanfranc's death in 1089 he oppressed the Church. In February, 1093, he was ill, and, fearing death, became repentant. Then he consented to the appointment of Anselm (q v.) to the see of Canterbury, left vacant by Lanfranc's death, but, soon recovering, he fell back into his evil ways. From this time he was in constant strife with Anselm, and in 1099 was threatened by the Pope with excommunication. When he was buried at Winchester no religious services were held. The English chronicle says "he was loathsome to well-nigh all his people, and abominable to God." Consult: E. A. Freeman, *History of the Norman Conquest*, vol v (Oxford, 1876); id., *William Rufus* (2 vols., ib., 1882); J. H. Round, *Feudal England* (London, 1895).

WILLIAM III (1650–1702). King of England, Scotland, and Ireland from 1689 to 1702. He was the posthumous and only son of William II of Orange, Stadtholder of the United Netherlands. His mother was Mary, eldest daughter of Charles I of England. He was born at The Hague on November 14 (old style, Nov. 4), 1650. The ambitions of the elder William to increase the power of the Stadtholder had aroused an aristocratic reaction under Jan De Witt (q.v.) which created much trouble for the young prince. The alliance of his family with the Stuarts excited the jealousy of Oliver Cromwell, by whose influence William and his descendants were excluded, in 1654, from the Stadtholdership. The restoration of the Stuarts to the English throne, however, caused the revocation of this act, and on the invasion of Holland by Louis XIV of France in 1672 William was elected Stadtholder, Captain-General, and Admiral. By the wisdom and determination of the young Stadtholder the contest with France was brought to a close by the Treaty of Nimeguen (q.v.) in 1678. Before the close of the war he had married his cousin, the Princess Mary, eldest daughter of the Duke of York, who became King James II (q.v.) of England in 1685. As the tyranny of James soon began to estrange the affections of every class of his subjects, the eyes of all were turned towards the Stadtholder as their only hope. Accepting an invitation signed by seven representative leaders of the two English parties, William with an army of 15,000 English and Dutch landed at Torbay, Nov. 5, 1688. His success was rapid and bloodless, and on December 18 he entered London as a national deliverer. On Feb.

13, 1689, William and Mary, after accepting the Declaration of Rights, were proclaimed King and Queen of England. The adherents of James held out for some time in Scotland and Ireland. The death of Dundee (see GRAHAM, JOHN) in 1689 ended their resistance in the former country, but in the latter they kept up a vigorous contest until the battle of the Boyne (July, 1690) broke the power of the Jacobites. William was now able to combat Louis XIV with the united forces of England and Holland. He himself took the field in the Belgian Netherlands, but was unable to cope with Marshal Luxembourg, who defeated him at Steenkerke in 1692 and at Neerwinden in 1693. Reluctantly he signed the Peace of Ryswick (1697), which, however, proved highly popular. In spite of his sterling qualities, and of the debt which they owed him, the English never really liked William III. The death in 1694 of his wife, on whom the crown had been conferred jointly with himself, materially injured his position. His schemes were thwarted by Parliament and continual plots for his assassination were hatched by the adherents of James. The succession of Philip of Anjou to the throne of Spain on the death of Charles II in 1700, tending to the aggrandizement of France, was a blow to William's policy. He persevered with unflagging vigor in his determination to unite Europe against France, and he left England at the head of the Grand Alliance. (See SUCCESSION WARS.) He died on March 19 (old style, March 8), 1702, in consequence of a fall from his horse. The massacre of the Macdonalds of Glencoe (q.v.) is a blot on William's reputation which his most thoroughgoing apologists have been unable to efface. His services, however, both to England and to his native country can hardly be overrated. In his reign the Bank of England was founded, the modern system of finance introduced, ministerial responsibility recognized, and the liberty of the press secured. William's manner was wholly Dutch, and even his countrymen thought him blunt. "In his intercourse with the world in general," says Macaulay, "he appeared ignorant or negligent of those arts which double the value of a favor, and take away the sting of a refusal."

Bibliography. Grimblot, *Letters of William III and Louis XIV* (London, 1848); H. D. Traill, *William the Third* (ib., 1888); Hippold, *William III, Prinz von Oranien, Erbstatthalter von Holland, König von England* (Berlin, 1900); E. S. Grew, *The Court of William III* (London, 1910); Onno Klopp, *Der Fall des Hauses Stuart*, i–ix (Vienna, 1875–78), critical and exhaustive; Gilbert Burnet, *History of My Own Time* (6 vols, Oxford, 1833), Richard Lodge, *History of England from the Restoration to the Death of William III* (New York, 1910). See FRANCE; NETHERLANDS.

WILLIAM IV (1765–1837). King of Great Britain and Ireland from 1830 to 1837. He was the third son of George III, and was born at Buckingham Palace on Aug. 21, 1765. At the age of 14, after receiving an elementary education, he entered the navy as an able seaman and was made lieutenant in 1785. In 1786 he received his commission as captain. In 1780 he was created Duke of Clarence and of St. Andrews, and Earl of Munster. At this time he abandoned active naval service, but was formally promoted through the successive ranks until he was made admiral of the fleet in 1811. For many years he lived with Mrs Jordan (q.v.), a celebrated actress, by whom he had a family of five sons and five daughters, who became known by the surname FitzClarence, and were raised to titular dignities. In 1818 he married Adelaide, eldest daughter of the Duke of Saxe-Meiningen. The issue of this marriage was two daughters, both of whom died in infancy. By the death of his brother, the Duke of York, in 1827, the Duke of Clarence became heir presumptive to the throne, to which he succeeded on the death of George IV, on June 26, 1830. He was mentally incapacitated for the kingly office, but government by the Ministry was now well developed, so that his eccentricities could do no mischief. His utter inability to understand the fitness of things and his incoherence of thought gained for him the name of Silly Billy. So far as William had political sentiments, he probably sympathized with the efforts of his ministers to bring about the reform of Parliament. Although he at first refused to create a new batch of peers to overcome the majority opposed to the Reform Bill (see REFORM BILLS) he finally consented to apply this extreme remedy in case of necessity. Overawed by the threat, the lords passed the bill on June 4, 1832, and three days afterward it received the royal assent. This was the great event of his reign. The first reformed Parliament met on Jan. 29, 1833. The abolition of colonial slavery, and the reform of the poor laws and of the Irish church, were the immediate results of the great constitutional change. King William died after a short illness on June 20, 1837, and was succeeded by his niece, Victoria.

Consult: P. H. Fitzgerald, *Life and Times of William IV* (2 vols., London, 1884); Walpole, *History of England from the Conclusion of the Great War in 1815* (5 vols., London, 1878–86); J. F. Molloy, *The Sailor King, William, the Fourth* (2 vols, London, 1903).

WILLIAM I (Ger. WILHELM) (1797–1888). King of Prussia and German Emperor. He was the second son of Frederick William III of Prussia and Queen Luise, and was born March 22, 1797. He took part in the campaigns of 1814 and 1815 against Napoleon. On the accession of his elder brother, Frederick William IV (q.v.), to the Prussian throne in 1840, William received the title of Prince of Prussia and became Governor of Pomerania. His Absolutist attitude provoked such popular enmity that on the outbreak of the revolution of 1848 he had to flee to England. He returned some months later, and was elected to the Prussian National Assembly, where in a brief address he placed himself on record as favoring a constitution, but took no further part in the discussion. In 1849 he commanded the Prussian forces sent to put down the revolutionists in the Palatinate and Baden. In October, 1857, the King having become mentally incapacitated, William assumed charge of the government temporarily, and in October, 1858, became Regent. While Regent he contended steadily, against the opposition of the Diet, for the reorganization of the Prussian army. On the death of his brother, Jan. 2, 1861, William became King of Prussia, and at his coronation, at Königsberg, October 18, he declared that he "ruled by the favor of God, and of no one else." The result of the elections to the Prussian Diet being in favor of the Liberal party, William declared in his address at the opening of the chambers that he "never could permit the progressive development of our inner, political life to ques-

tion or to endanger the rights of the crown and the power of Prussia." This principle he maintained and the contest over the army continued. At last, in 1862, he found Bismarck a Minister who was able to govern without a parliamentary majority. The struggle between the King and the Liberal majority in the chambers was thrown into the background at the close of 1863, by the strategy of Bismarck, who made Prussia champion the cause of Schleswig-Holstein against Denmark—an intervention in which Austria was forced to participate—and, contriving to make the Schleswig-Holstein question one of German interest, silenced, for the time being, the Liberal opposition in Prussia. In 1866 came the war between Prussia and Austria, in which the King took the field as commander in chief of the Prussian forces. William became the head of the North German Confederation in 1867 At Ems, in July, 1870, took place the memorable interviews between William and the French ambassador, Benedetti, which resulted in the sending of the famous Ems Dispatch to Bismarck. Bismarck's tinkering with this telegram precipitated the outbreak of the Franco-German War (q.v.). William was at the head of the united German army, and commanded personally at the decisive battles of Gravelotte and of Sedan On Jan 18, 1871, he was proclaimed German Emperor in the palace of the French kings at Versailles. On March 21 he opened in Berlin the first Reichstag of the new German Empire. (For the events of his reign as German Emperor, see GERMANY, BISMARCK, KULTURKAMPF, SOCIALISM, and POLITICAL PARTIES, section on *Germany*) In 1878 two attempts were made on the life of the Emperor. The second time he was seriously wounded. These attempts were attributed, directly or indirectly, to Socialist influence William married, June 11, 1829, the Princess Augusta of Saxe-Weimar, by whom he had two children. The son, Frederick William, succeeded his father as Frederick III (q.v.).

Bibliography. Lavisse, *Trois empereurs d'Allemagne· Guillaume I, Frédéric III, Guillaume II* (Paris, 1888); Forbes, *Life of Emperor William* (London, 1889); v. Bernhardi, *Die ersten Regierungsjahre Koenig Wilhelms I.* (Leipzig, 1895); Marcks, *Kaiser Wilhelm I.* (ib., 1899); Oncken, *Das Zeitalter des Kaisers Wilhelm* (2 vols., Berlin, 1890–92); O. Lorens, *Kaiser Wilhelm* (Jena, 1902); Dehn, *Wilhelm der Erste als Erzieher* (Berlin, 1906); F. Delbrueck, *Die Jugend Wilhelm I.* (Berlin, 1907).

WILLIAM II (FRIEDRICH WILHELM VICTOR ALBERT) (1859–). German Emperor and King of Prussia, son of Emperor Frederick III and Victoria, Princess Royal of Great Britain. He was born in Berlin, Jan. 27, 1859. At the age of 14 he entered the Gymnasium at Cassel, and three years later he began to take courses at the University of Bonn, where he specialized in law and political science. In 1881 Prince William married Princess Auguste Victoria of Schleswig-Holstein-Sonderburg-Augustenburg. Of their children the Crown Prince Friedrich Wilhelm (see WILLIAM, CROWN PRINCE OF GERMANY) was born in 1882, Eitel Friedrich in 1883, Adalbert in 1884, August Wilhelm in 1887, Oscar in 1888, Joachim in 1890, and Princess Victoria Luise in 1892. The future Emperor never displayed great affection for either of his parents, but he showed unbounded admiration for his grandfather, Emperor William I. On the death of his father he succeeded to the throne of Prussia and became German Emperor, June 15, 1888, at the age of 29. He soon gave evidence of a restless and active mind, a versatility, and a self confidence that were in strong contrast with the character of his father and grandfather. The motto which he adopted while still a school boy, "*Rast' ich so rost' ich*" (If I rest, I rust) gives the keynote to his restless energy.

At the outset of his reign he asserted unmistakably his divine right to rule in fact as well as in name. He sincerely believed in the divine mission of the house of Hohenzollern. "It is a tradition of our House" he said on one occasion, "to consider ourselves as designed by God to govern the peoples over which it is given us to reign." It was evident that a man of such a character would not be willing long to remain a mere passive tool in the hands of the great Chancellor Bismarck, who had completely dominated the reign of his grandfather, William I. From the beginning friction developed between the Iron Chancellor and the Emperor The break finally came in March, 1890, when Bismarck disputed the right of the Emperor to act directly through any of his ministers except the Chancellor. This statement resulted in a demand for Bismarck's resignation. In the letter accepting the resignation, the Emperor referred to the event as "ordained by God; so I have to bear it even though I sink under the load" There was no successor to Bismarck. The four men, Caprivi (1890–94), Hohenlohe (1894–1900), Von Bülow (1900–09), and Bethmann-Hollweg (from 1909), who have occupied the office of Chancellor have been simply the Emperor's servants. The Imperial will has been the decisive factor in both foreign and domestic policies.

In foreign affairs, William II continued the policy of Bismarck in maintaining the Triple Alliance (q.v.) with Austria and Italy. He abandoned, however, Bismarck's efforts to maintain a close understanding with Russia. He entered energetically the sphere of "Weltpolitik" and determined to obtain for Germany a "place in the sun." With this end in view he encouraged German colonial expansion, cultivated friendly relations with Turkey, and pushed German commercial and financial interests in Asia Minor. To defend these new interests the Kaiser felt that it would be necessary to build a great navy. With the declaration that "Germany's future is upon the waters," he turned with characteristic energy to the development of the German fleet, which soon took rank with that of the first naval powers.

In the internal development of Germany the Emperor pursued a policy which shows strange contradiction in his obstinate adherence to much of the past and his quick sensitiveness to many aspects of modern life. On the one hand he encouraged schools and universities, and a modern industrial régime, and on the other hand vigorously upheld the antiquated Prussian electoral system and the Divine Right Kingship. The rapid transformation of Germany from an agricultural into an industrial state brought with it the many serious problems of the relations of capital and labor. Discontent among the laboring classes led to the rapid development of the Socialist party in Germany. At the beginning of his reign the Kaiser hoped to be able to check this movement by continuing the policy of state Socialism which had been inaugurated by Bismarck (q.v). By adopting measures to ameliorate the condition of the working classes,

he hoped to eliminate the discontent of the workers. At his suggestion an international labor conference was held at Berlin and he attended its sessions. It soon became apparent that this attempt to stop the growth of the Socialist movement by paternalistic interest in the working classes was a failure. The Socialist party grew steadily until it became the largest political group in the Empire, constituting more than one-third of the electorate. This failure to appreciate his well-meant efforts was bitterly resented by the Emperor. He referred to the Socialists as "a horde of men unworthy to bear the name of Germans." On another occasion he said "if the schools did what we have the right to expect from them they would have undertaken the struggle against Socialism." He refused to allow any modification of the grossly unjust representation in the Reichstag, because such a change would increase the representation of the Social Democratic party (see SOCIALISM).

His impetuous spirit and natural gift of eloquence frequently betrayed him into difficult situations. One of these occasions arose in 1908 when the London *Daily Telegraph* published an interview with the Kaiser in which he commented with great freedom upon the relations of Great Britain and Germany. A violent popular protest was made in Germany against such irresponsible utterances of the Emperor, which might involve Germany in serious trouble with foreign countries. In the newspapers and in the Reichstag, persons of all shades of party affiliation censured the Kaiser's action. Demands were made that thereafter all statements of the Emperor on public questions should be approved by the Chancellor. With the consent of the Emperor, the Chancellor stated that "His Majesty would observe thenceforth in his private relations that reserve which is as indispensable for a continuous policy as for the authority of the crown."

Emperor William from the beginning of his reign emphasized his dependence upon the army. In his first proclamation after his accession he said of the army, "We are made for one another and we shall remain closely bound together whether God gives us peace or war"; and on another occasion, "It is the soldier and the army and not the majorities and Parliamentary decisions, that have forged the unity of the German Empire. It is on the army that my confidence rests."

His public speeches display much rhetorical impulsiveness but frequently lack depth of thought and consistency. For many years he interested himself in art and literature. He was personally responsible for the *Sieges-Allee*, or Avenue of Victory in Berlin, with its marble statues of the Hohenzollerns, and he suggested the designs of many of the other statues in Berlin. He opposed strenuously the realistic movement in German literature represented by Hauptmann and Sudermann and the newer tendencies in art represented by Böcklin, Liebermann, and others.

An accomplished pianist, he took an active interest in musical productions, and for many years he devoted attention to the theatre, showing a special liking for brilliant historical pageants. He spoke freely and at length on the subject of education, with especial regard to the advancement of technical and scientific education. While of a deeply religious nature and head of the Lutheran church, he never displayed religious bigotry, but frankly admired Pope Leo XIII and deplored the anti-Catholic policy of Bismarck.

Those who came into close personal contact with the Emperor have agreed as to his magnetic personality. His keen curiosity, his unbounded enthusiasm and energy impressed every one, and despite his somewhat irritable nature he often gave evidences of a kindly and generous spirit. On the death of Marshal McMahon he sent a sympathetic letter to the widow and a similar message went to Madame Carnot at the time of her husband's assassination.

Whatever may be the verdict of history in regard to the influence of this remarkable personality upon the destinies of his country and Europe, there is little question that he will be considered the ablest, most energetic, and most interesting sovereign of his time. For Emperor William's relation to the great European War see WAR IN EUROPE.

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WILLIAM (FRIEDERICH WILHELM VICTOR AUGUST), CROWN PRINCE OF PRUSSIA AND OF GERMANY (1882–). The son of William II, German Emperor, and King of Prussia, and of the Empress Auguste Victoria, he was born at Potsdam and was educated at the University of Bonn. In 1903, with his brother Eitel Friedrich, he traveled in the Orient and in Italy, and in 1910–11 visited India with the Crown Princess, Cecilie Auguste Marie (born 1886)—he had married in 1905 a daughter of the Grand Duke Friedrich Franz III of Mecklenburg Schwerin. The eldest of their sons, Wilhelm Friedrich, was born in 1906. The Crown Prince frequently seemed to be at swords' points with his father the Kaiser. Late in 1913 he was removed from the command of the Death's Head Hussars, and he was bitterly attacked by Radicals and Socialists in the Reichstag and in the press for siding with Colonel Von Reuter, who was on trial for firing on an Alsatian crowd. In the great war which began in 1914 the Crown Prince played a prominent part in the campaigns around Verdun. He commanded the unsuccessful attempt to break through that fortress in 1914 and again commanded the titanic offensive waged against it in the early months of 1916. (See WAR IN EUROPE.) He wrote *Aus meinem Jagdtagebuch* (1912). Consult Paul Liman, *Der Kronprinz* (Minden, 1914), and A. G. Gardiner, *The War Lords* (New York, 1915).

WILLIAM I. Landgrave (as such William IX) and later Elector (William I) of Hesse-Cassel. See HESSE-CASSEL.

WILLIAM II. Elector of Hesse-Cassel. See HESSE-CASSEL.

WILLIAM I (1772–1843). The first King of the Netherlands. He was the son of William,

the last Stadtholder of the Dutch Republic, and was born at The Hague, Aug 24, 1772. He commanded the Dutch army in 1793–95 in the war with France, and after the conquest of his country he went to Berlin. His father in 1802 bestowed upon him the Principality of Fulda, with other districts, but they were taken from him in 1806 because of his refusal to join the Rhenish Confederation. In the same year he succeeded to the hereditary possession of the House of Nassau-Dietz through the death of his father. He held a high commission in the Prussian army, was captured at Jena, and upon his release entered the Austrian service. After the battle of Wagram (1809) he went to Berlin, and in 1813 he returned to Holland, where he was received as legitimate ruler by the people In accordance with the Act of the Congress of Vienna constituting Belgium and Holland the Kingdom of the Netherlands, he was proclaimed ruler of the new kingdom March 16, 1815. His hereditary possessions in Germany were transferred to Prussia, and he received in lieu thereof the Grand Duchy of Luxemburg Belgium revolted in 1830 and achieved its independence in 1832. King William protested ineffectually and obstinately refused to recognize the settlement, which was recognized by the Powers, provoking much bitter feeling. Finally he abdicated, Oct. 7, 1840, took the title of Count of Nassau, went to Berlin, where he married the Countess d'Oultremont in 1841, and died Dec. 12, 1843. His first wife, whom he married in 1791, was Frederike Luise Wilhelmine, daughter of Frederick William II of Prussia.

WILLIAM II (1792–1849). King of the Netherlands from 1840 to 1849. He was the son of King William I and was born at The Hague, Dec 6, 1792 He studied at Berlin and Oxford, and in 1811 joined the English army in the Peninsular War. He served as adjutant and colonel on Wellington's staff, distinguishing himself at Fuentes de Onoro, Ciudad Rodrigo, and Badajoz, Salamanca, and Vitoria, and in the battles of the Pyrenees. On the return of the Orange family to the Netherlands William I made him commander of the army. The last campaign of Napoleon brought the Prince again into active service, and he was wounded at Quatre-Bras and Waterloo. He married, Feb. 26, 1816, Anna Pavlovna, youngest sister of the Emperor Alexander I of Russia. When the Belgian Revolution broke out in 1830 he was called again into public life, and, as governor of the loyal districts, tried by concessions to allay the storm. On the abdication of William I (1840) the Prince of Orange assumed the reins of government as William II. The political movements of 1848 were felt in the Netherlands, as in other countries, and the ministerial plans of reform not having satisfied the party of progress, the King announced his willingness to sanction whatever changes in the constitution were thought necessary, and the storm was averted. The new constitution was proclaimed Nov. 3, 1848. William II died March 17, 1849.

WILLIAM III (1817–90). King of the Netherlands from 1849 to 1890. He was born at The Hague, Feb. 19, 1817, and succeeded to the throne on the death of his father, William II, in 1849. He married, June 18, 1839, Princess Sophie of Württemberg The kingdom enjoyed uninterrupted peace during his reign; material prosperity increased, and the public debt was considerably reduced. By his first wife William had two sons, neither of whom survived him; his second wife, Princess Emma of Waldeck, gave birth to a daughter, Wilhelmina, who succeeded him as Queen He died Nov. 23, 1890. Consult Ling, *William III, Koning der Nederlande* (Luxemburg, 1889).

WILLIAM I (the SILENT) Prince of Orange, Count of Nassau (1533–84) Leader of the revolt of the Netherlands against Spain He was the eldest son of William, Count of Nassau-Dillenburg, and was born at Dillenburg, April 16, 1533 In 1544 he inherited from his cousin, René of Nassau, the Principality of Orange On his succession to the family estates in the Low Countries, he was sent to the Queen Regent's court at Brussels and brought up in the Catholic faith. At the age of 15 he became page to the Emperor Charles V, who in 1555 promoted him to the command of the Imperial army on the French frontier Charles V on his abdication recommended William to his son, Philip II, who employed him in the negotiation of the Treaty of Cateau-Cambrésis with France (1559). On returning to the Low Countries he became the leader of the party which devoted itself to the assertion of the liberties of the country, agitated for the recall of the Spanish troops, and finally entered into open opposition to Cardinal Granvella (q v), the president of the council and the willing agent of Philip's tyranny. The King, nevertheless, proceeded to more extreme measures, the edicts against heretics being made still more stringent. William steadily refused to allow these enactments to take effect in his provinces of Holland, Zealand, and Utrecht, of which he had been made Stadtholder. Up to Alva's arrival as Governor (1567) William had labored conjointly with Hoorn and Egmont, but, failing to convince his two associates of the duplicity of the King, of which he himself was assured by means of the spies in his pay at the Spanish Court, he was compelled to leave them to their fate, and retired to his German estates. Cited as a rebel, he refused to appear, on the ground of being a Knight of the Golden Fleece and a sovereign prince, and was outlawed.

William now became convinced that the only means of resisting the Spanish tyranny was by force. An army under his brother Louis of Nassau gained some success, but was finally driven from the country. William in person invaded Brabant, but failed to effect anything of importance, for lack of means. In 1569 he went to France to aid the Huguenots, and later (1572) made an unsuccessful attempt to relieve his brother Louis, who was besieged by Alva in Mons. In the same year the provinces of Holland, Zealand, Gelderland, Overyssel, and Utrecht proclaimed him as their Stadtholder for the King, whose authority he and they still acknowledged. The fortune of the Spaniards on land, however, was in the ascendant, fortress after fortress fell into their hands despite William's utmost efforts to relieve them, and though Holland and Zealand still remained faithful he found it impossible to raise an army which could fairly cope with the enemy. In April, 1574, Louis and Henry of Nassau were defeated and slain in the battle of Mooker-Heide. William succeeded, however, in rescuing Leyden from the terrible fate which had befallen Haarlem. It was at this period that William openly professed himself a Calvinist, though he disclaimed the fanaticism which characterized his coreligionists and continually urged Calvinists and Lutherans

to harmonize their differences. In October, 1575, the provinces of Holland and Zealand pronounced Philip's deposition, and gave power to William to choose the country under whose protectorate they were to be placed Meantime, the rapacity of the Spanish soldiery had roused the 15 provinces which still remained loyal to Philip, and the league known as the Pacification of Ghent (October, 1576), the object of which was to drive out the Spanish troops, and establish, at least for a time, toleration in religion, was the consequence. This was a brilliant success for William, and Don John of Austria, the new Governor, was compelled to ratify the Pacification by the Perpetual Edict (Feb. 12, 1577). Owing, however, to the Spanish monarch's lack of faith war was resumed, and the patriots suffered a great defeat. At Gembloux (Jan 31, 1578) John of Austria's successor, Alexander Farnese, succeeded in detaching the Walloon provinces from the league On the other hand William brought about the formation of the Union of Utrecht (1579), which comprised the provinces of Holland, Zealand, Utrecht, Gelderland, Groningen, Friesland, and Overyssel, and marked the birth of the Dutch Republic. In 1581 the United Provinces declared Philip deposed and, in accordance with William's desire, chose as their ruler the Duke of Anjou, brother of Henry III of France. The Duke, however, abandoned the country in 1582. In 1580 Philip had, by Granvella's advice, put a price of 25,000 gold crowns on William's head, and on July 10, 1584, he was assassinated at Delft by Balthasar Gerard. In personal relations William was frank and generous. His piety and integrity were unquestioned, and his sagacity, courage, and determined will made him a leader of men

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WILLIAM (commonly called the Lion) (1143–1214). King of Scotland from 1165 to 1214 He succeeded his brother, Malcolm IV. He attended Henry II of England in his Continental wars, and is supposed, while doing so, to have pressed for a portion at least of the long disputed districts of Northumberland, and other territories of what is now the north of England. In 1168 he made an alliance with France. This is the first recorded alliance between Scotland and that kingdom. In 1173 he conspired with the sons of Henry II against their father, and invaded Northumberland. On July 13, 1174, he fell almost by accident into the hands of an English party. For security, he was conveyed to Normandy, and there he consented, as the price of his liberation, to perform that homage for his Kingdom, which the English kings had so long in vain attempted to extract from the government of Scotland. The treaty of Falaise, as the transaction was termed, from the place where it was adjusted, was revoked in the year 1189 by Richard I of England, in consideration of a payment of 10,000 marks, which he wanted for his expedition to Palestine. William secured the freedom of the Scottish church, was one of the early benefactors of the regular ecclesiastics, and founded in 1178 the great Abbey of Arbroath, which he dedicated to St Thomas à Becket He founded many burghs, and extended the boundaries of the Kingdom, especially in the North He died Dec 4, 1214. Consult E W Robertson, *Scotland under the Early Kings* (2 vols., Edinburgh, 1862), and Andrew Lang, *History of Scotland*, vol i (ib, 1900)

WILLIAM I, FRIEDRICH WILHELM KARL (1781–1864). King of Württemberg, born at Luben, Silesia. His father became Frederick I, King of Wurttemberg, and his mother was the Princess Augusta of Brunswick-Wolfenbuttel. In 1800 he entered the Austrian army as a volunteer, and distinguished himself at the battle of Hohenlinden. Having returned to Wurttemberg in 1806, he lived at Stuttgart for six years, and then took command of the Wurttemberg contingent in Russia against the advance of Napoleon, but, on account of illness, was detained for some time at Vilna After the battle of Leipzig (1813) his father joined the Allies, and the Prince commanded the Seventh Corps, which included Austrian and Russian regiments, in the early part of 1814, distinguishing himself at La Rothière, Bar-sur-Aube, Arcis-sur-Aube, and La Fère Champenoise. At Montereau (Feb. 18, 1814) he was defeated by Napoleon. In the campaign of 1815 he commanded the Third Corps in Alsace. Upon the death of his father, in 1816, he succeeded to the throne William was a practical man of liberal tendencies, and soon succeeded in bringing order out of the confused conditions existing in Württemberg as a result of the Napoleonic wars. In 1819, by the promulgation of a constitution, he further advanced the prospects of his country, which passed through the troublous year 1848 undisturbed. William married in 1808 the Princess Charlotte of Bavaria (divorced 1814); in 1816, the Grand Duchess Catherine, widow of Prince George of Holstein-Oldenburg (died 1819); in 1820, his cousin Pauline of Württemberg (1800–73). His daughter Sophie (1818–77) became the consort of William III, King of the Netherlands, and his son Charles (1823–91) succeeded to the throne in 1864

WILLIAM IX, DUKE OF AQUITAINE AND COUNT OF POITOU (as such William VII) (1071-1127). The first Provençal poet whose songs have come down to us. He began his reign in 1087, and much of his life was spent in warfare with his neighbors. He twice conquered Toulouse, led a plundering expedition into Normandy, and engaged in other sanguinary conflicts. In 1100 he undertook a crusade with 60,000 men, but met with a disastrous defeat and fled almost alone. He succeeded, however, in reaching Jerusalem. On his way home he suffered shipwreck, but he reached his native land in 1103. His experience as a warrior of the cross did not amend his life, which was notoriously licentious and irreligious. In his conflicts with the Church he was twice excommunicated. Most of his poetry is as loose as was his life. It is, however, of special historical interest as marking the transition from popular to art forms. A romance dealing with a disreputable adventure is closest to the folk poetry, though some of his songs also are simple in structure. Some, on the other hand, are decidedly conventional and show him making use of the formulas of devoted lady serv-

ice, a fact which tends to demonstrate the existence of a previous lyric literature which has been lost. One song, probably composed just before his death, expresses repentance, renunciation of worldly pleasures, and the turning of his heart to God. An incomplete edition of his works was published by Holland and Kellar (Tubingen, 1850). Consult Sachse, *Ueber das Leben und die Lieder des Troubadours Wilhelm IX, Graf von Poitou* (Leipzig, 1882).

WILLIAM, ORDER OF. 1. A Hessian order with four classes, founded in 1851 by the Elector Frederick William and extinguished in 1866. The red cross of the order shows a golden lion with the inscription *Virtute et fidelitate*, with a crown and the initials W. K. on the reverse. 2. A military order of the Netherlands with four classes, founded by King William in 1815. The decoration is a white cross with Burgundian crosses of laurel between the arms, on which is the legend *Voor moed, beleid, trouw* (for valor, prudence, fidelity). The medallion shows the initial W with a laurel wreath. 3. A Prussian order with one class for men and women, founded in 1896 by King William II. It is designed to commemorate the Imperial proclamation at Versailles and is conferred as a distinction for services in elevating the people. The decoration is a medal surrounded by a wreath, bearing the bust of Emperor William I, and on the reverse the initials of William II with a crown and the legend, *Wirke im Andenken an Kaiser Wilhelm den Grossen.*

WILLIAM AND MARY COLLEGE. An institution of learning at Williamsburg, Va., founded in 1693, the second oldest college in the United States. Grants of land had already been obtained in 1619 for the establishment of a collegiate institution near Richmond, and a collegiate school was established at Charles City in 1621, but the plan was frustrated by the Indian massacres of 1622 In 1660 the plan was renewed and in 1693 a charter was secured from King William and Queen Mary by the Rev. James Blair, who became the first president of the college. The institution received a penny a pound on exports of tobacco and various other privileges, including the profits from the office of Surveyor-General of Virginia. The college attained rapid prosperity, but it suffered heavily in the Revolution through the loss of its endowments and the occupation of its buildings by the contending troops (1781), but with the exception of a short interval it was in session until the Civil War, when it was occupied by the Federal troops and much of its property was destroyed. It was reopened in 1869, but from 1881 to 1888 was so crippled financially that it was forced to suspend instruction. In the latter year an annual state appropriation of $10,000, later increased to $15,000, enabled it to resume work, and in 1893 Congress granted an indemnity of $64,000 for its losses during the Civil War. The college offers two courses—the collegiate, leading to the degrees of B.A., B S., and M.A., and the normal. With the latter the Matthew Whaley Model and Practice School is connected. In 1916 it had a student attendance of 242, 21 instructors, a library of about 15,000 volumes, and an income of $54,000. Its endowment was $154,000, and the buildings and grounds were valued at $300,000. The college has a distinguished list of graduates, among them Presidents Jefferson, Monroe, and Tyler, Chief Justice John Marshall, and Gen. Winfield Scott. The Phi Beta Kappa Fraternity (q.v.) was established at William and Mary in 1776. The president in 1916 was Lyon G. Tyler, LL.D.

WILLIAM AUGUSTUS, DUKE OF CUMBERLAND (1721–65). An English commander. He was the third son of King George II, and was born in London, April 26 (15), 1721. He became Duke of Cumberland in 1726. He was intended by his father for the navy, and in 1740 saw some service in the Channel under Sir John Norris, but in the same year he became colonel of the Coldstream Guards and thenceforth devoted himself to a military career. He fought with distinction at Dettingen in 1743, and, made commander in chief of the British land forces in 1745, was defeated in that year by Marshal Saxe at Fontenoy (q.v). The British troops were now recalled to meet the invasion of the Young Pretender, and in November, 1745, the Duke was placed at the head of an army of some 9000 men to operate against the Highland forces which were then in the north of England. These he drove across the border. After the defeat of General Hawley at Falkirk (January, 1746), the Duke once more assumed command, took Stirling and Perth, and on April 27 (16) crushed the Highlanders at Culloden (q.v.). He followed up his victory by sending detachments of soldiery throughout the country to hunt down the fugitives, and, though he does not seem to have been guilty of the relentless cruelty with which he was charged and which gained him the name of Butcher among the conquered inhabitants, he doubtless did pursue a course of extreme severity. In 1747 he commanded in Flanders and was defeated for a second time by Marshal Saxe at Laffeld, July 2, becoming in consequence extremely unpopular at home. Ten years later he was placed at the head of an army of 40,000 men, composed largely of Hanoverians and Hessians, intended to coöperate with Frederick II of Prussia against the French. On July 26, 1757, he was defeated by Marshal D'Estrées at Hastenbeck, and on September 8 he signed the convention of Kloster Zeven by which he agreed to disband his army, thus leaving Hanover to the French. The English government repudiated these terms, and the Duke thereupon retired to private life. He died Oct. 31, 1765. Consult Evan Charteris, *William Augustus, Duke of Cumberland* (London, 1913).

WILLIAM JEWELL COLLEGE. An educational institution founded by Baptists in 1849 at Liberty, Mo., a suburb of Kansas City. It has three departments—academic, collegiate, and theological, and confers the degrees of A.B. and Th.B. The attendance in 1916 was 460, and the faculty numbered 30. The library contained 28,000 volumes. The productive funds of the college amounted to $400,000, and its property in land, buildings, and equipment was estimated at $550,000. It is the oldest college for men west of the Mississippi River. The president in 1916 was John P. Greene, D.D., LL.D.

WILLIAM OF CHAMPEAUX. See GUILLAUME DE CHAMPEAUX.

WILLIAM (or WYLLYAM) OF CLOUDESLEY. A famous archer and outlaw in an old ballad edited by Bishop Percy. See CLIM.

WILLIAM OF HOLLAND (1227–56). Titular King of Germany. In 1234 he succeeded his father as Count of Holland. In 1247 he was chosen German King by the papal legate, and after he had besieged and taken Aachen he was crowned there in November, 1248. So strong,

however, was the opposition brought against him by the supporters of Frederick II that he returned to Holland Upon the death of Frederick in 1250 William began to regain his influence and when Conrad IV, who had gone to Italy, died there in 1254, he was generally recognized as King by the German princes He was killed in a battle with the Frieslanders

WILLIAM OF LORRIS See GUILLAUME DE LORRIS

WILLIAM OF MACHAULT See GUILLAUME DE MACHAULT

WILLIAM OF MALMESBURY, mäm'zbĕr'ĭ (c 1080–c 1143) An early English historian He was born probably in Somersetshire, and was educated in the monastery whence he derived his name, and of which he became librarian Malmesbury's principal works, which are written in Latin, are *De Gestis Regum Anglorum* (Rolls Series, 2 vols, London, 1887–89), a history of the kings of England from the Saxon invasion to 1127–28 *Historia Novella* (ibidem), a continuation of the first, to December 1142, *De Gestis Pontificum Anglorum* (Rolls Series, London, 1870), containing an account of the bishops and principal monasteries of England from the conversion of Ethelbert of Kent by St Augustine, to 1123 The first of these was translated into English by Sharpe (London, 1815), and has been reprinted in Bohn's Antiquarian Library under the editorship of Giles (1847) In addition Malmesbury wrote a number of other works, including *Lives* of St Dunstan and St Wulfstan, and a work on the *Antiquities of Glastonbury* Consult W de Gray Birch, *Life and Writings of William of Malmesbury* (London, 1874), Sir William Stubbs, in the *Rolls Series* (2 vols, ib, 1887–89) Kate Norgate, *England under the Angevin Kings*, vol I (ib, 1887) Charles Gross, *The Sources and Literature of English History* (2d ed, ib, 1915)

WILLIAM OF NEWBURGH (1136–c 1201) An English chronicler, who was brought up, lived, and died at the Augustinian Priory of Newburgh, near Coxwold, in Yorkshire As far as we know, he never traveled farther from his priory than to the neighboring religious houses of Rievaux, Byland, and Finchale His extant works show, nevertheless, a wide knowledge of ecclesiastical, political, and social affairs which must have come to him through the communication which his house kept up with the great foundations of the Cistercian world His important work is the great *Historia Rerum Anglicarum*, which he undertook at the request of the abbot of Rievaux The history covers the period from 1066 to 1198, and is a marvel of fair-minded and temperate writing Though his statements were often inaccurate, he had such wide interests and such a well balanced mind that his history is one of the most important records of mediæval England The best edition is by Howlett, "Chronicles of Stephen, Henry II, and Richard I," in *Rolls Series* (London, 1884–85) See Charles Gross, *Sources and Literature of English History* (2d ed, London, 1915)

WILLIAM OF OCCAM See OCCAM, WILLIAM OF

WILLIAM OF ORANGE. See WILLIAM I, THE SILENT

WILLIAM OF RUBRUQUIS, FRIAR. See RUBRUQUIS, FRIAR WILLIAM OF

WILLIAM OF SAINT-AMOUR, sān'tà-mōōr' (†1272) A mediæval theologian He was born at Saint Amour in the Comté By 1238 he was a master of arts and canon law at Paris became professor in that university, and led the other monastic teachers in their opposition to the Dominican and Franciscan orders Pope Innocent IV interfered on the side of the friars, and eventually William was banished (1257) He went to Saint Amour, and probably died there His most famous treatise is *De Periculis Novissimorum Temporum* (1255) which describes the perils of the time as signs of the end of the world, and exhorts the prelates to arouse themselves It was one of the earliest pieces printed, both in Latin and in a French translation, and on the basis of its contents the wits of the day built up their satirical verses against the mendicant orders William's works, lacking, however, the important treatise on Antichrist, and containing at least one piece which was falsely attributed to him, appeared with a memoir in Paris (1632) Consult C St Marc, *Etude sur Guillaume de S Amour* (Lons-le-Saunier, 1865)

WILLIAM OF TYRE, tīr (c 1130–c 1186) A mediæval historian and Archbishop of Tyre He was born perhaps in Palestine, but of his family and early life nothing is known In 1167 he was appointed archdeacon of Tyre, and about 1170 tutor to Baldwin son of Amalric, King of Jerusalem Upon the accession of his pupil as Baldwin IV (1174) he was made Chancellor of the Kingdom, and in the following year Archbishop of Tyre In 1179 he represented the Latin church of the East at the Lateran Council The date of his death is unknown His *Historia Hierosolymitana*, from which most of the events of his career are gleaned, breaks off in 1184 This work, the only one of his now extant, is one of the best histories of the Middle Ages It is our chief authority for the history of the Latin kingdom in the East between 1127 and 1184, and except for somewhat faulty chronology is remarkably accurate as well as painstaking and clear-sighted William had the power of depicting the characteristics of men, countries, and events in a manner which few mediæval historians approached. Consult Auguste Molinier, *Les sources de l'histoire de France*, vol II (Paris, 1902).

WILLIAM OF WIED, PRINCE (WILHELM FRIEDRICH HEINRICH) (1876–) King of Albania in 1914 He was born March 26, 1876, at Neuwied, Prussia A member of one of the historic mediatized houses of Germany, the son of the fifth Prince of Wied and of Princess Marie of the Netherlands, second cousin of both the German Emperor and the Czar of Russia, and nephew of Queen Elizabeth of Rumania ("Carmen Sylva"), Prince William early became familiar with Balkan conditions His wife, Princess Sophie, whom he married in 1906, came from an ancient Rumanian family He studied law and political science at Jena, and later graduated with distinction at the Kriegsakademie Late in 1913, the great Powers of Europe, having decided to make Albania autonomous (see ALBANIA, BALKAN WAR), offered the throne to the Prince of Wied On Feb 21, 1914, he accepted it formally at Neuwied, and was saluted as King by the Albanian notables, although the Powers had expected him to take the title of Prince He and his family landed the following March 8 at Durazzo, which he made his capital

From the first his reign was troubled He found the Epirotes in rebellion, but refused to

march against them, doubting the loyalty of the army His chief opponent was Essad Pasha (see ESSAD TOPTANI), who had been Turkish commander at Scutari and who had wanted the throne for himself He had become Minister of War under William, who, fearing treachery, had refused to allow him to repulse the Epirotes. Massacres of Mohammedans followed, and the populace were aroused. Essad resigned, and at the head of 5000 supporters attacked the royal palace On May 19, 1914, Essad was arrested, placed aboard an Austrian warship which had been on guard in the harbor, and deported to Naples. Four days later the Prince and his suite took refuge on another Austrian vessel. He returned to find the country in anarchy. Ineffectual efforts had been made by outsiders, especially by George F. Williams, United States Minister to Greece, to promote a cantonal government for Albania. Williams resigned, since his activities, notably a bitter denunciation of the rule of Prince William, were inconsistent with his office. By September 3 the Prince, forced to leave the country, was on his way to Switzerland. The International Commission of Control, which had been in power after the Balkan War, resumed its duties. Before the end of September the Albanian Senate had elected as ruler the Turkish Prince Burhan Eddin, son of the former Sultan Abd-ul-Hamid.

WILLIAM OF WYKEHAM, wĭk'am (1324–1404). An English prelate, statesman, and architect, one of the most remarkable men of the Middle Ages. He was born at Wickham (or Wykeham), in Hampshire, and was educated at Winchester School. Having won the favor of Bishop Edington and of Sir John Scures, by whom he was recommended to the notice of King Edward III, he was appointed royal chaplain in 1349 and made surveyor and chief warden of Windsor, Leeds, Dover, and Hadleigh castles. Windsor Castle is largely his work, and he was also the builder or architect of Queensborough Castle. Turning from architecture again to divinity, he was promoted through a series of clerical posts and offices of State to be Bishop of Winchester and Lord Chancellor in 1367, being at that time the foremost subject in the Kingdom, "without whom they did nothing," as Froissart declares. He promoted education by founding New College at Oxford and St. Mary's College at Winchester. In 1376, by reason of his patriotic opposition to John of Gaunt and his party, he was deprived of his offices; but on the accession of Richard II (1377) he was pardoned. He was again Chancellor, 1389–91, after which he retired from public life, residing at his seat of South Waltham, Hampshire, until his death, Sept. 27, 1404. His last years were spent in remodeling the interior of Winchester Cathedral, though he did not live to witness its entire completion. He completed the transformation of the heavy Norman nave into one of Perpendicular style begun by his predecessor, Edington, who rebuilt the four bays next the transepts. But while Edington tore down the old work before rebuilding, Wykeham effected his transformation by a skillful recutting of the existing Norman masonry and the addition of a rich vault of stone in place of the earlier wooden ceiling. This achievement did much to fix the tendencies of the style which developed into the perfected Perpendicular of the fifteenth century. Consult G. H. Moberly, *Life of William of Wykeham* (London, 1893)

WILLIAM PENN CHARTER SCHOOL. A noted preparatory school for boys in Philadelphia, founded in 1689, incorporated in 1698, and chartered by William Penn in 1701, on the same day on which he chartered the city. The original corporate title was "The Overseers of the Public School founded in Philadelphia at the Request Cost and Charges of the People of God called Quakers." The subsequent charters from Penn in 1708 and 1711 broadened the scope of the school and rendered it undenominational The school is organized in nine classes, each covering a year, and the senior school (highest four classes) provides for a classical and a modern side. The school has modern buildings in the heart of the city, and, well within the city limits, on the edge of the beautiful Wissahickon valley, playing fields of 22 acres. Its realty and equipment are valued at $500,000, and it has $50,000 available for scholarships The school has about 350 students.

WILLIAMS, ALPHEUS STARKEY (1810–78). An American soldier, born at Savbrook, Conn. He graduated at Yale in 1831; studied law in the same institution, and in 1836 began practice in Detroit. During the Mexican War he served as colonel of the First Michigan Regiment In May, 1861, after the outbreak of the Civil War, he was commissioned brigadier general of volunteers He commanded a division at Cedar Mountain and a corps at South Mountain, Antietam, Fredericksburg, Chancellorsville, and Gettysburg. He then served under General Sherman in the Atlanta campaign and in the march to the sea, and after the capture of Savannah was brevetted major general of volunteers. From 1866 until 1869 he was United States Minister to Salvador; in 1870 was the Democratic candidate for the governorship of Michigan; and from 1874 until his death was a member of Congress.

WILLIAMS, ANEURIN (1859–). A British politician and economist, born at Dowlais, Glamorganshire. He graduated M.A. at St. John's College, Cambridge, in 1880, and was called to the bar at the Inner Temple in 1884. In 1886–90 he was one of the acting partners of the Linthorpe Ironworks, Middlesbrough. As a Liberal candidate he contested seats for Parliament in 1906 and 1910, and was elected for Northwest Durham in 1914. Williams served as chairman of the executive committees of both the Land Nationalisation Society and the International Coöperative Alliance. He published *Copartnership and Profit-sharing* (1913).

WILLIAMS, SIR CHARLES HANBURY (1708–59). An English diplomatist and satirical writer. He was born probably at Pontypool, Monmouthshire. His father was John Hanbury, whose friend, Charles Williams, left him an estate of £70,000 in 1720, with remainder to his son Charles, on condition that the latter should assume the name of Williams when he came of age. The boy was educated at Eton, where he was intimate with Henry Fox, Lyttelton, and Fielding. He was a member of Parliament from 1734 to 1747 and again from 1754 to 1759. In 1740 appeared his *Isabella, or the Morning;* in 1742, *The Country Girl;* and in 1743, several elegant satires, of which the *Letter to Mr. Dodsley, Solomon's Porch,* and *Peter and My Lord Quidam* were among the best. In 1746 Williams entered upon a successful diplomatic career, being successively envoy at Dresden, at Berlin (1750), at Dresden again (1751), and at Vienna (1753). He made a Latin distich

on Maria Theresa, that was repeated throughout Europe. Afterward he was appointed to St. Petersburg with the mission of helping form a triple alliance between Russia, Austria, and England, which did not come about. Williams's occasional verse is worthy to be regarded as a link between that of Prior and Cowper, and his conversation was exceedingly brilliant. His verses were collected in 1763, and were republished in 1775 and, in part, in 1822. Consult Coxe, *Historical Tour in Monmouthshire* (London, 1801).

WILLIAMS, Edward (bardic name, Iolo Morgannwg) (1746–1826). A Welsh bard, born at Penon, Glamorganshire. He was self-taught. From the age of nine he worked for many years as a stonemason, and eventually took up land surveying. After much wandering he finally settled at Flemingston, in the vale of Glamorgan. His published verse comprises mainly *Poems, Lyric and Pastoral*, in English (2 vols., 1794), and *Psalms of the Church in the Desert*, in Welsh (vol. i, 1812; 2d ed., 1827; vol. ii, posthumous, 1834, 2d ed., 1857). With Owen Jones and William Owen Pughe he edited the collection of Welsh verse and prose called the *Myvyrian Archaiology* (3 vols., 1801–07; new ed., 1870). A continuation of the work, known as the *Iolo MSS.*, was issued by the Welsh Manuscripts Society in 1848 (reprint 1888). A treatise called *Cyfrinach y Beirdd (The Mystery of Bardism)*, almost complete at his death, was prepared for the press in 1829 by his son Taliesin Williams (2d ed., 1874). Consult Elijah Waring, *Recollections and Anecdotes of Edward Williams* (London, 1850).

WILLIAMS, Sir Edward Leader (1828–1910). An English engineer. He was born at Worcester, where he began his professional career. Until 1850 he was engaged in improving the waterway between Stourport and Gloucester, afterward he acted as engineer of the Great Northern Railway, and later was engaged on the Admiralty Pier at Dover. In 1856 he became engineer to the River Weaver Trust, and in that connection constructed a lift to raise vessels 52 feet from the Trent and Mersey Canal to the Weaver. When the Manchester Ship Canal was decided upon in 1882, Williams assisted in the preliminary survey. His scheme for the construction of the canal was accepted, and throughout the 12 years required for its accomplishment he served as chief engineer. He was knighted in 1894.

WILLIAMS, Eleazar (1787–1858). An American missionary, who claimed to be the lost dauphin (Louis XVII) of France. He was born probably in Caughnawaga, N. Y., and is supposed to have been the great-grandson of Eunice Williams, who was carried away from Deerfield, Mass., at the time of the massacre of February, 1704. Eleazar was educated at Longmeadow and Westhampton, Mass. He took orders in the Episcopal church and became a missionary among the New York Indians. In 1820 he accompanied the Oneidas, who were removed from New York State to a reservation near Green Bay, Wis., and remained there with them for 30 years. A rather striking likeness to the Bourbons, coupled with the fact that there were some discrepancies in the accounts of his early years, probably gave rise to the story that he was the lost dauphin, the son of Louis XVI and Marie Antoinette, whose fate was shrouded in mystery. His claim that, in 1841, he had an interview with the Prince de Joinville, then in America, who asked him to sign an abdication of the French throne was subsequently denied by the Prince. In 1850 he returned to New York and settled at Hogansburg, where he died. For a statement of his claim consult an article by Hanson in *Putnam's Magazine* for February, 1853, entitled "Have We a Bourbon Among Us?" also *The Lost Prince* (1854), by the same author. Williams was an authority on Indian language and history, and published *A Spelling Book in the Language of the Seven Iroquois Nations* (1813); *A Caution Against Our Common Enemy* (1813, in Iroquois, translated into English, 1815), *Life of Te-ho-ra-gua-ne-gen* (Thomas Williams) (1859), a sketch of his reputed father, the grandson of Eunice Williams. He translated into Iroquois *The Book of Common Prayer* (1853).

WILLIAMS, Ephraim (1715–55). An American soldier and pioneer, founder of Williams College. He was born in Newton, Mass., and after following the sea for several years settled in western Massachusetts, where he distinguished himself in frontier warfare with the Indians. At the outbreak of the war with France in 1744 he commanded a company which took part in the Louisburg expedition, and later commanded the forts in the Connecticut River valley in western Massachusetts. In recognition of his services he received from Massachusetts in 1750 a grant of 200 acres of land near the present sites of Williamstown and Adams. At the beginning of the French and Indian War (1755) he was commissioned a colonel of one of the Massachusetts regiments raised to take part in Sir William Johnson's expedition against Crown Point. While in camp at Albany he made his will, leaving money and lands for the founding of a free academy at Williamstown, which eventually became Williams College (q.v.). He led the advance towards Crown Point and was killed at the head of his troops during a skirmish, known as the "Bloody Morning's Scout," that preceded the battle of Lake George, Sept. 8, 1755.

WILLIAMS, Frederick Ballard (1871–). An American landscape and figure painter. He was born in Brooklyn, and studied in New York at the Cooper Union Art School and the National Academy of Design. His figure compositions are notable for rich, glowing color, highly decorative design, and romantic content. Good examples are: "Happy Valley" and "L'Allegro" (Metropolitan Museum, New York); "Chant d'Amour" and "Spring" (Brooklyn Institute Museum); "Vivacetto" (Albright Art Gallery, Buffalo); "A Glade by the Sea" and "Conway Hills" (National Gallery, Washington). Williams was elected a member of the National Academy in 1909, and received medals there and at the Panama-Pacific Exposition, San Francisco, in 1915.

WILLIAMS, Sir George (1821–1905). The founder of the Young Men's Christian Association (q.v.). He was born in the parish of Dulverton, Somersetshire, England. He was converted to Christianity at Bridgewater in 1837. In 1841 he became junior assistant in the dry goods firm of George Hitchcock & Co., in London. Two years afterward he induced some of the employees to hold a prayer meeting at regular intervals, and in June of the following year 12 persons, including Williams, formed themselves into a society under the name of the Young Men's Christian Association. There can be no doubt that to him belongs the chief credit

of originating the society. From 1863 to 1885 he was treasurer of the organization, and in 1885 became president. He also became head of the firm of Hitchcock, Williams & Co., and in 1894 was knighted. Consult Stevenson, *Historical Records of the Young Men's Christian Association from 1844 to 1884* (London, 1884).

WILLIAMS, GEORGE HENRY (1823–1910). An American lawyer, jurist, and legislator, born in New Lebanon, N. Y. He was admitted to the bar in 1844, and in 1847–52 was judge of the First Judicial District of Iowa. In 1853–57 he was Chief Justice of Oregon Territory, and in 1865–71, United States Senator from Oregon. He served on the joint high commission that adjusted the *Alabama* Claims. In 1872–75 he was Attorney-General in the cabinet of President Grant, by whom in 1873 he was nominated for Chief Justice of the United States Supreme Court, but the nomination was not confirmed. In 1902–05 he was mayor of Portland, Oreg.

WILLIAMS, GEORGE HUNTINGTON (1856–94). An American geologist, born at Utica, N Y. He graduated at Amherst, studied at Gottingen and Heidelberg, and in 1885 was appointed an associate professor in the Johns Hopkins University. In 1892 he was appointed professor of inorganic geology there. He was a member of many American and foreign scientific societies, was vice president of the Geological Society of America, and published in all 72 geological papers, including one on the *Volcanic Rocks of Eastern North America.* He also published *Elements of Crystallography* (1890).

WILLIAMS, HELEN MARIA (1762–1827). An English writer. She was born in London, where, through the influence of Dr. Andrew Kippis, her legendary poem of *Edwin and Eltruda* was published in 1782 and was speedily followed by other works. In 1788, just before the Revolution, she visited a married sister in Paris; there she wrote in favor of the Girondists, and was imprisoned by Robespierre, but was released after his death. The rest of her life was passed in Amsterdam and in Paris. Among her published works relating to France and the Revolution are *Letters Written in France* (1790); *Letters Containing a Sketch of the Politics of France* (1795); *Sketches of Manners and Opinions in the French Republic* (1801). She translated Saint-Pierre's *Paul et Virginie* (1795), Von Humboldt's *Researches* (1814), and several other works: and wrote the favorite hymn, "While Thee I Seek, Protecting Power." Collections of her poems were published in 1786 and 1823. From her story *Perourou* (1801), Lord Lytton adapted his drama *The Lady of Lyons.*

WILLIAMS, HENRY SHALER (1847–1918). An American geologist and paleontologist, born at Ithaca, N. Y. He graduated at the Sheffield Scientific School of Yale in 1868. He was successively assistant professor of geology at Cornell University (1880–92), professor at Yale (1892–1904), and thenceforth professor, head of the geological department, and director of the museum at Cornell. He also had charge of the Devonian section of the United States Geological Survey. His publications include: *The Classification of the Upper Devonian* (1885); *The Cuboides Zone and Its Fauna* (1890); *Correlation Papers, Devonian and Carboniferous* (1891).

WILLIAMS, HENRY SMITH (1863–). An American physician and writer, born at Durand, Ill. Graduating from the Chicago Medical College in 1884, he entered practice as a specialist in nervous and mental diseases, and in New York State was connected with various State hospitals and asylums after 1887. From 1892 he was medical superintendent of Randall's Island Hospital (New York City). Among his publications are: *A History of Science* (10 vols., 1904–10); *The Story of Nineteenth Century Science* (1900); *Alcohol* (1909), *The Science of Happiness* (1910), *Miracles of Science* (1913), *Luther Burbank* (1915); *The Wonders of Science in Modern Life* (10 vols., 1912); and *Modern Warfare* (1915), all with his brother, Dr. E H. Williams.

WILLIAMS, ISAAC (1802–65). A Welsh clergyman and author, born near Aberystwith, Wales, and educated at Harrow and Trinity College, Oxford He took orders in the Church of England in 1829, and became a fellow of Trinity in 1831. Previously he made the acquaintance of Keble and of Richard Hurrell Froude, with whom he was associated in the Tractarian movement. As curate he had charge at Windrush, St. Mary the Virgin's at Oxford, and at Bisley He was a successful imitator of Keble in sacred poetry, contributed to *Lyra Apostolica,* and published *The Cathedral, or the Catholic and Apostolic Church of England,* in verse (1838), *Hymns* (1839), *Harmony and Commentary on the Whole Gospel Narrative* (1842); *The Christian Scholar* (1849); *The Apocalypse* (1852), and *The Psalms Interpreted of Christ* (1864).

WILLIAMS, JAMES (1851–1911) An English lawyer and writer, born in Liverpool. He was educated at Liverpool College, and at Lincoln College, Oxford, and became a barrister in 1875. He received an LL.D. from Yale. His legal writings include: *The Schoolmaster and the Law* (1890); *Wills and Succession* (1890); *Law of Education* (1892); *Institutes of Justinian* (1893); *Dante as a Jurist* (1906), *The Law of the Universities* (1910). He was author also of *A Lawyer's Leisure* (1884); *Simple Stories of London* (1890); *Briefless Ballads* (1895); *Ventures in Verse* (1898).

WILLIAMS, JAMES DOUGLAS (1808–80). An American legislator and public official, born in Pickaway Co., Ohio. His parents moved to Indiana, when he was yet in his teens, and he was largely self-educated. He devoted himself to farming and in 1843 was elected to the State Legislature, where he remained, almost without interruption, until 1874, when he was chosen a member of Congress. In 1876, after an exciting campaign, in which the plainness of his dress and the blunt honesty of his speech won for him the sobriquet "Blue Jeans," he was elected Governor of Indiana. Throughout his entire life Williams was interested in the development of agriculture and served for 17 years in the State Board of Agriculture. He also was instrumental in securing valuable legislation, improving the educational system of the State.

WILLIAMS, JESSE LYNCH (1871–). An American journalist and author, born at Sterling, Ill. He graduated in 1892 at Princeton, where after some years in newspaper and magazine work in New York, he became (1900) editor of the *Alumni Princetonian.* Williams was elected to the National Institute of Arts and Letters. He published: *Princeton Stories* (1895); *The Stolen Story and Other Newspaper Stories* (1899); *The Adventures of a Freshman* (1899); *New York Sketches* (1902); *The Day Dreamer* (1906); *My Lost Duchess* (1908); *The Girl and the Game and Other College Stories*

(1908). *Mr. O'Leland, a Personal Impression* (1909). *The Married Life of the Frederic Carrolls* (1910). *And So They Were Married: a Comedy of the New Woman* (1914); *Romating Time* (1916). With John DeWitt, he wrote a *History of Princeton University* (1898).

WILLIAMS, JOHN (1582–1650). An English archbishop. He was born in Wales, was educated at Ruthin and at St John's College, Cambridge, where he was distinguished in a wide range of studies and graduated in 1603. After being installed in various prebends, he became keeper of the great seal and Bishop of Lincoln in 1621. He offended Charles I, and after eight years' proceedings before the star chamber was condemned on the charge of betraying the King's secrets; suspended from his bishopric; fined £10,000, and imprisoned in the Tower, 1636-40. He was released by the Long Parliament and restored to his diocese, became Archbishop of Canterbury, 1641; was again imprisoned and released 1643, and was one of the King's adherents during the rebellion. He was the author of various theological treatises, of which the chief is *The Holy Table* (1637), directed against Archbishop Laud's ritualistic changes.

WILLIAMS, JOHN (1664–1729). A Colonial clergyman. He was born in Roxbury, Mass., and graduated at Harvard in 1683. In 1686 he became the first minister of Deerfield, then a struggling frontier settlement, and when that place was destroyed in 1704 (see DEERFIELD), the Indians killed two of his children, and started with him and the rest of his family (excepting one son, then absent), along with the other pioneers, towards Canada. On the second day his wife, unable to proceed, was killed. In Canada he was treated kindly and in 1706 was redeemed, with two of his children. Returning to Deerfield, he there remained as pastor, until his death. In 1707 he published a celebrated narrative of his captivity (since frequently reprinted), entitled *The Redeemed Captive Returning to Zion*. He also published a number of his sermons, and left in manuscript many papers on scientific subjects. Consult S. W. Williams, *Biographical Memoir of Rev. John Williams* (Greenfield, Mass., 1837).

WILLIAMS, JOHN (1792–1858). An English scholar and clergyman, born at Ystradmeurig, Wales. He was educated at Balliol College, Oxford, and from 1824 to 1847 was rector of the Academy, a day school at Edinburgh. He took the post at the wish of Sir Walter Scott and Lockhart, the latter a close personal friend; and he had in some respects an even more remarkable career there than did Arnold at Rugby. In 1848 he opened at Llandsbery a new school founded by Thomas Phillips, and in the course of five years made it one of the best known schools in Wales. His studies were largely in the classics and Celtic, and were valuable in their day. They include *Two Essays on the Geography of Ancient Asia* (1829); *The Life and Actions of Alexander the Great* (1829); *Homērus* (1842); *The Life of Julius Cæsar* (1854); *Gomer: or a Brief Analysis of the Language and Knowledge of the Ancient Cymry* (1854); and *Essays on Various Subjects* (1858).

WILLIAMS, JOHN (1796–1839). An English missionary. He was born at Tottenham, London, and at 14 was apprenticed to an ironmonger. In 1816 he offered himself to the London Missionary Society as a missionary to the South Seas, was ordained and sent to Eimeo, one of the Society Islands. After laboring with much success among the natives of the Society group, in 1823 he established missions on Raratonga and others of the Hervey Islands. He translated the New Testament into the Raratongan language, and prepared books for the schools which he established. In a vessel built by himself he visited many of the South Sea Islands, extending his missionary labors to the Samoa Islands. In 1834 he visited England, where he remained for nearly four years, during which he procured the publication of his Raratongan New Testament by the Bible Society, and raised £4000 for the purchase and outfit of a missionary ship for Polynesia. In 1838 he returned, visited many of the islands, and finally the New Hebrides, where he hoped to plant a mission, but was killed, Nov. 20, 1839, by the natives of Erromanga. He published *A Narrative of Missionary Enterprise in the South Sea Islands* (1837). Consult his *Life* by Campbell (London, 1842), and Prout (ib., 1843; 4th ed., 1847).

WILLIAMS, JOHN (1817–99). An American bishop of the Episcopal church. He was born at Deerfield, Mass., and educated at Harvard and at Trinity College, Hartford, where he graduated in 1835. He was ordained in 1841, and held the rectorship of St. George's Church, Schenectady, N. Y., from 1842 to 1848, after which he became president of Trinity College, and at the same time professor of history and literature. In 1851 he was elected Assistant Bishop of Connecticut, and on the death of Bishop Brownell, in 1865, succeeded him in the sole charge of the diocese. At the same time, from 1854 on, he held the office of dean of the Berkeley Divinity School, at Middletown, and was its principal instructor in Church history and theology. He succeeded Bishop Lee, of Delaware, in 1887, as presiding Bishop, and earned the reputation of a wise conservative leader in ecclesiastical affairs. Among his published works are: *Thoughts on the Gospel Miracles* (1848); *The English Reformation* (Paddock Lectures, 1881); *The World's Witness to Jesus Christ* (Bedell Lectures, 1882); and *Studies in the Book of the Acts* (1888).

WILLIAMS, JOHN JOSEPH (1822–1907). An American Roman Catholic prelate. He was born in Boston, and educated at the Sulpician College in Montreal and at the Seminary of St. Sulpice in Paris. After his ordination he became assistant at the Boston Cathedral in 1845, and rector in 1855. In 1857 he took charge of St. James's parish, and in 1866 became Bishop of Boston. His title was changed to Archbishop in 1875, when the see was raised to metropolitan dignity.

WILLIAMS, JOHN SHARP (1854–). An American political leader and legislator. He was born in Memphis, Tenn., of a distinguished and wealthy family. He studied at the Kentucky Military Institute, at the universities of the South and Virginia, and at Heidelberg. Law he studied privately and at the University of Virginia, and in 1877 was admitted to the Tennessee bar. He practiced his profession at Yazoo City, Miss., and was also a cotton planter. Entering Democratic politics, in 1893 he was elected Representative in Congress, where he served continuously until 1909. In the House he had a distinguished career, both as a parliamentarian and as minority leader of the Democrats from 1903 until 1909. He served as temporary chairman of the National Democratic

Convention of 1904 In 1907, as a conservative, he defeated the radical Vardaman (q.v.) in a bitterly contested primary election for United States Senator, and the choice was ratified by the Legislature in 1908 Upon taking his seat in 1911, he promptly became one of the leaders of the party, being regarded by many as the ablest political philosopher in the Senate. He was a consistent supporter of the Wilson administration and was a member of the committees on finance and foreign relations. In 1912 he gave a series of lectures at Columbia University, published as *Permanent Influence of Thomas Jefferson on American Institutions* (1913).

WILLIAMS, JOHN SKELTON (1865–1926). An American financier and railroad organizer, born in Powhatan Co., Va. He was educated at the University of Virginia and entered the firm of John L. Williams & Sons of Richmond. As banker and director of numerous corporations and industrial organizations, he accumulated a fortune Believing that the South should have a trunk-line railroad under Southern control and ownership instead of under the control of Wall Street, to which he was bitterly opposed, he organized the Seaboard Air Line Railroad, and was, from 1894 to 1904, its president. When involved in much litigation and controversy with respect to the control of the road, he denounced Wall Street bankers and financial methods. He was also prominently known for his attempts to develop Southern resources. In 1913 he was made assistant secretary of the Treasury by President Wilson and in 1914 he was appointed Comptroller of the Treasury. In the latter capacity he was ex officio a member of the Federal Reserve Board.

WILLIAMS, JOHN STUART (1820–98). An American soldier and legislator, born in Montgomery Co, Ky. He graduated at Miami University in 1838, and was admitted to the bar in 1840. He served in the war with Mexico, distinguished himself at the battle of Cerro Gordo, and rose to the rank of colonel. A Whig in politics, he was a member of the Kentucky Legislature in 1851–52. Although he opposed secession, Williams accepted a commission as brigadier general in the Confederate army in 1862, and was serving with Gen. Joseph E. Johnston when the latter surrendered. He again served in the Kentucky Legislature in 1873–74, and as a Democrat was a member of the United States Senate in 1879–85.

WILLIAMS, JONATHAN (1750–1815). An American soldier. He was born in Boston, entered business life, made several voyages to England and the West Indies, and was secretary to Franklin, his grand-uncle, when the latter was Ambassador to France. Here he made a careful study of military science, and, after serving as judge of Common Pleas at Philadelphia, from 1785 to 1801, became a major in the artillery and engineer corps, and an inspector of fortifications. He was in command of the military post at West Point in 1801–02, and was superintendent of the United States Military Academy in 1802–03, giving instruction to the engineers and artillerists. In June, 1803, owing to a dispute over a question of rank, he resigned from the army, but in 1805 reëntered the service as lieutenant colonel and chief engineer, and was reappointed superintendent at West Point. He also had charge of the fortifications in New York harbor, planning and building Fort Columbus, Castle Clinton (Castle Garden), and Castle Williams, the last being, at the time of its erection, the only casemated battery in the United States. He was the first to introduce in the United States principles of scientific military engineering, and has therefore been called the "Father of the Corps of Engineers" In 1812 he claimed command of Castle Williams, and, on refusal, resigned. In 1814 he was elected to Congress, but never took his seat He wrote *The Use of the Thermometer in Navigation* (1799), and translated *Elements of Fortification* (1801) and Kosciusko's *Manœuvers for Horse Artillery* (1808)

WILLIAMS, SIR MONIER MONIER-. See MONIER-WILLIAMS.

WILLIAMS, OTHO HOLLAND (1749–1800). An American soldier. He was born in Prince George Co, Md., and in 1775 entered the American army as lieutenant in a Maryland regiment, becoming a major in June, 1776, a colonel in December, 1776, and a brigadier general in May, 1782. At Fort Washington (Nov. 16, 1776) he was badly wounded and was captured, and for 15 months was a prisoner in New York being treated, for part of the time, with great severity. Subsequently he was deputy adjutant general under Gates, and adjutant general under Greene in the South, and served with gallantry at Guilford, Hobkirk's Hill, and Eutaw Springs, where he led a charge. After the war he was collector of the port of Baltimore, and held the position until his death. He wrote an excellent *Narrative of the Campaign of 1780*, printed in the *Appendix* of Johnson's *Life of Greene*. Consult Tiffany, *A Sketch of the Life and Services of Gen. Otho H. Williams* (Baltimore, 1851).

WILLIAMS, ROGER (c.1604–1683). The founder of the State of Rhode Island, born probably in London in either 1604 or 1605. In his youth he attracted the attention of Sir Edward Coke by his shorthand notes of sermons and speeches in the Star Chamber, and was sent by him to Sutton's Hospital, now the Charterhouse School, in 1621. He entered Pembroke College, Cambridge, in 1625, and took the degree of bachelor of arts in 1627. Williams probably took orders in the Church of England, but he soon became an extreme Puritan, and emigrated to New England, arriving at Boston Feb. 5, 1631. He refused to join the congregation at Boston because the people would not make public declaration of their repentance for having been in communion with the Church of England; he therefore went to Salem as assistant preacher, but was soon in trouble for denying the right of magistrates to punish Sabbath breaking and other religious offenses, as belonging to the first table of the law. Being thus in opposition to the Massachusetts Bay government, he went to Plymouth, where he assisted its minister, and studied Indian languages. In 1633 he returned to Salem, and was settled as pastor of the church, but was opposed by the government for denying the validity of the Massachusetts Bay charter and for denying its right to take the Indian's land without purchase, and the right to impose faith and worship. He held that it was not lawful to require a wicked person to swear or pray, which were both forms of worship; and that the power of the civil magistrate extends only to the bodies, goods, and the outward state of man, and not to their souls and consciences. Banished from the colony in 1635 by order of the General Court and threatened with being sent back to England in order to

prevent the spread of his new doctrines, he escaped in midwinter to the shores of Narragansett Bay, accompanied by a few adherents, and here purchased lands of the Indian chiefs, founded the city of Providence in 1636, and established a government founded on complete toleration. Having adopted the belief in baptism of believers by immersion, Williams was baptized by a layman, and then baptized him and 10 others, and founded the first Baptist church in America. Later he doubted the validity of his baptism, and withdrew from the Church he had founded. In 1643 he went to England to procure a charter for Providence and Rhode Island settlements, and while there published a *Key into the Language of America*, and *The Bloudy Tenent of Persecution for Cause of Conscience Discussed* (1644), his chief work on the nature and sphere of civil government (reprinted in the Narragansett Club Publications, 1st series, vol. iii). In 1645 he wrote a tract entitled *Christenings Make Not Christians* (reprinted 1881, as No. 14 of the Rhode Island Historical Tracts). After returning to Rhode Island he went a second time to England on business of the colony in 1651, when he published *Experiments of Spiritual Life and Health and Their Preservations*, also *The Hireling Ministry None of Christ's* and *The Bloudy Tenent Yet More Bloody by Mr. Cotton's Endeavor to Wash It White in the Blood of the Lambe*, a reply to a pamphlet by John Cotton. This last was reprinted in 1870 by the Narragansett Club, 1st series, vol. iv. At this period Williams engaged in an experiment of teaching languages by conversation, and made the acquaintance of Milton. He returned to Rhode Island in 1654, and was elected president of the colony. He refused to persecute Quakers, but engaged in a controversy with them, and published *George Fox Digg'd Out of His Burrowes* (reprinted, 1872, by the Narragansett Club, 1st series, vol. i). Through his influence over the Indians he was of great service to the other Colonies, but they refused to remove their ban, or to admit Rhode Island into the New England Confederation.

Bibliography. J. D. Knowles, *Memoir of Roger Williams* (Boston, 1834); William Gammell, *Life of Williams* (ib., 1845); O. S. Straus, *Roger Williams, the Pioneer of Religious Liberty* (New York, 1894); E. J. Carpenter, *Roger Williams* (ib., 1909); and Williams's letters and other works published by the Narragansett Club (Providence, 1866).

WILLIAMS, Rowland (1817–70). A clergyman of the Church of England. He was born at Halkyn, Wales, graduated B.A. at King's College, Cambridge, in 1841, and was fellow and tutor, 1839–50. He was vice principal and professor of Hebrew in the Welsh theological college of St. David's, Lampeter, 1850–62, and did much to improve the teaching and finances of the college. He was made select preacher at Cambridge in 1854, and vicar of Broad Chalke, Wiltshire, in 1858. His views on inspiration were unacceptable to many of the Welsh clergy; and in 1860 he published an appreciative review of Bunsen's *Biblical Researches* in *Essays and Reviews*, which led to his prosecution for heresy. He was condemned in the Court of Arches in 1862, but the judgment was reversed by the Privy Council in 1864. Among his works were *Rational Godliness* (1855); *Christianity and Hinduism* (1856); *Broad Chalke Sermon Essays* (1867); and *The Hebrew Prophets* (1866–71). Consult his *Life and Letters*, edited by his wife (London, 1874).

WILLIAMS, Samuel Wells (1812–84). An American missionary, Sinologist, and diplomat, born in Utica, N. Y. He studied at the high school there and at the Rensselaer Institute at Troy, and in 1833 went to Canton, China, where he took charge of the newly established mission press of the American Board of Commissioners for Foreign Missions. Unsettled conditions in Canton necessitated his removal to Macao in 1835. In 1845 he returned to the United States. In the fall of 1848 he resumed his labors at Canton. He was interpreter to Commodore Perry in his mission to Japan, 1853–54, severed his connection with the Mission Board in 1857, and was appointed secretary and interpreter to the United States Legation. In this capacity he assisted in negotiating the treaty of 1858, and accompanied Minister Ward to Peking in 1859 to exchange ratifications. In 1861 he again visited the United States, and when, in 1862, the first United States Legation was established at Peking under Burlingame, he took up his residence in that city and remained until 1876, when he resigned and returned to the United States. He settled at New Haven, Conn., and filled the chair of Chinese language and literature at Yale until his death. He edited the *Chinese Repository* during 19 years of its existence (1832–51), and was a voluminous contributor to it. He also carried through the press Medhurst's *Dictionary of the Hokkien Dialect* (1837), and (prepared with Bridgman) brought out *Chinese Chrestomathy* (1841). His independent works include *Easy Lessons in Chinese* (1842); *The Chinese Commercial Guide* (1844); *The Topography of China* (1844); *English Vocabulary in the Court Dialect* (1844); *The Middle Kingdom* (1848; rev. ed., 1901); *A Syllabic Dictionary of the Chinese Language* (1874), his greatest work; *Our Relations with the Chinese Empire* (1877); and *The Journal of S. Wells Williams* (Shanghai, 1911). Consult F. W. Williams, *Life and Letters* (New York, 1889).

WILLIAMS, Seth (1822–66). An American soldier, born at Augusta, Me. He graduated at West Point in 1842, entered the artillery, served on the frontier, and participated in the Mexican War. He was promoted to be first lieutenant in March, 1847, and was brevetted captain for gallantry at Cerro Gordo a month later. In 1861 he was commissioned brigadier general of volunteers, and from Nov. 14, 1862, to March 10, 1864, he served as inspector general in the adjutant general's department of the Army of the Potomac, taking part in the Peninsular, Maryland, Rappahannock, Pennsylvania, Rapidan, and Richmond campaigns. He received several brevets, including that of major general in the regular army for services in the field during the war. In February, 1866, he was appointed adjutant general of the Military Division of the Atlantic, but died less than a month later.

WILLIAMS, Talcott (1849–). An American journalist and educator, born at Abeih, Turkey, the son of Congregational missionaries. He graduated from Amherst in 1873. Entering newspaper work, he was on the staff of the New York *World* in 1873–77, and served as Washington correspondent of the New York *Sun* and the San Francisco *Chronicle* in 1877–79, and as editorial writer for the Springfield (Mass.) *Republican* in 1879–81. Thereafter he was an editor of the Philadelphia *Press* until in 1912

he became director of the new School of Journalism at Columbia University, built and endowed by Joseph Pulitzer (q.v.). With F. M Colby (q.v.), he was associate editor of the second edition of the NEW INTERNATIONAL ENCYCLOPÆDIA. Dr. Williams became known as a speaker on subjects of public interest. He was elected vice president of the Pennsylvania Society for the Prevention of Tuberculosis and an honorary member of the Pennsylvania State Bar Association, and identified himself with various other organizations. In 1913 he served as president of the American Conference of Teachers of Journalism Honorary degrees came to him from Amherst, Western Reserve, Rochester, Hobart, the University of Pennsylvania, Pennsylvania College, Pittsburgh, Franklin and Marshall, and Brown.

WILLIAMS, WALTER (1864–). An American journalist and educator, born at Boonville, Mo. He learned the printer's trade, was editor and part owner of the Boonville *Advertiser* (1884–89), and edited the Columbia (Mo.) *Herald* from 1890 to 1908, when he became dean of the School of Journalism and professor of the theory and practice of journalism at the University of Missouri. He established *The Country Editor* (monthly) in 1895, and edited also the St Louis *Presbyterian* (1897–99), and the *Daily State Tribune* (Jefferson, Mo.) from 1898 to 1902. In 1904 he organized and was secretary of the World's Press Parliament at St. Louis, Mo. His writings include· *How the Cap'n Saved the Day* (1901); *Some Saints and Some Sinners in the Holy Land* (1902); *The State of Missouri* (1904); *History of Missouri* (1908); *Missouri since the Civil War* (1909); *Eloquent Sons of the South* (1909); *From Missouri to the Island of Mull* (1909); *The Practice of Journalism* (1911); *The World's Journalism* (1915).

WILLIAMS, WILLIAM (1717–91). A Welsh hymn writer. He was born at Cefn-y-Coed, Wales, became a deacon in the Church of England in 1740, but was never ordained priest, and served as an itinerant minister in the Methodist body all his life. He published his first volume of hymns in Welsh in 1744, and since then has been accorded first place among Welsh hymn writers. Many of his hymns are still sung by his countrymen, and one of them in its English translation, "Guide Me, O Thou Great Jehovah," is very familiar. The most recent collection of his works is by Cynhafa Jones (Newport, 1891). He himself published two volumes of hymns in English (1759 and 1771). His collected works were edited by J. R. Jones (Glasgow, 1867) and by C. N. Jones (Holywell and Newport, 1887–91).

WILLIAMS, WILLIAM (1731–1811). A signer of the Declaration of Independence, born at Lebanon, Conn. He graduated at Harvard in 1751; in 1755 was on the staff of his relative, Col. Ephraim Williams, in the battle of Lake George; and at the age of 25 became town clerk, a position he held for 45 years. About the same time he became a member of the Assembly, and was reëlected to that body until 1804. In October, 1775, and again in 1776, he was sent to the Continental Congress, and in the latter year was one of the signers of the Declaration of Independence. He also held numerous other positions; was for 40 years a judge of probate for the district of Wyndham; and was a member of the Connecticut convention that ratified the Federal Constitution.

WILLIAMS, SIR WILLIAM FENWICK (1799–1883). A British general, the hero of Kars. He was born at Annapolis, Nova Scotia, was educated at the Royal Military Academy, Woolwich, and entered the British army as second lieutenant in the Royal Artillery, 1825 After serving on various European stations, in 1841, then being a captain, he was employed in diplomatic work in Turkey, and was brevetted major and colonel. In 1848 he was appointed a commissioner for the settlement of the Turco-Persian boundary, and in 1854, during the Crimean War, British commissioner with the Turkish army in Asia, of which, with the brevet of a ferik or lieutenant general and the dignity of a pasha, he virtually took the command. In 1855 he heroically defended Kars against the Russians under Muravieff, who was repulsed in a great assault on September 29. After Williams was forced by famine to surrender (November 28) he was created Baronet of Kars, and received a pension of £1000. From 1856 to 1859 he was a member of Parliament and general commandant at Woolwich. He was subsequently in command of the forces in Canada, 1859–70, and at Gibraltar, 1870–76. In 1881 he received the appointment of constable of the Tower of London.

WILLIAMSBURG, wĭl'yamz-bûrg. A former city of King's Co., N Y., united with Brooklyn in 1855 and now forming part of the borough of Brooklyn in the city of New York.

WILLIAMSBURG. A city and the county seat of James City Co., Va., 48 miles by rail east by south of Richmond, on the Chesapeake and Ohio Railroad (Map: Virginia, H 4). It is on a peninsula about midway between the James and York rivers, in a region of great historic interest. The chief feature of the city is William and Mary College (q.v.), the second oldest college in the United States, having been opened in 1693. There are also the Eastern State Hospital for the Insane, erected in 1769, and the Williamsburg Female Institute. Other features are Bruton Parish Church, dating from 1678 and rebuilt in 1715; the Powder Horn building (1714); the old court house (1769); and Fort Magruder. Williamsburg manufactures knit goods, brick, lumber, etc. There are also important fish and oyster interests. Pop., 1900, 2044; 1910, 2714. Williamsburg was settled in 1632, and was called Middle Plantations until 1699. In 1698 it supplanted Jamestown as the capital of Virginia, and in 1722 obtained a city charter, the oldest in the State. Here in 1765 Patrick Henry offered his resolution against the Stamp Act, and delivered his famous Cæsar-Charles I speech. In 1779 the capital was removed to Richmond. At Williamsburg, on May 5, 1862, during the Civil War, occurred the first serious engagement of the Peninsular campaign, a part of Johnston's Confederate troops under Longstreet, which had evacuated Yorktown on May 3, checking the pursuit of a part of the Army of the Potomac, under General Sumner. The fighting began at about 7:30 A.M. and continued during the greater part of the day, gallant though ill-organized attacks being made by Federal divisions under Hooker and Hancock; but neither side gained any decisive advantage, and during the night the Confederates continued their retreat towards Richmond. The Federal loss in killed, wounded, and missing was 2228; the Confederate, as reported by Longstreet, 1560. Consult L. G. Tyler, in L. P. Powell, editor, *Historic Towns of the Southern States* (New York,

1900); and for the battle, Webb, *The Peninsula*, in "Campaigns of the Civil War Series" (ib., 1881).

WILLIAMS COLLEGE. An institution of higher learning at Williamstown, Mass., chartered in 1793. It was developed from a free school established by the will of Col. Ephraim Williams (q.v.). The studies of the Freshman year are prescribed, with a moderate election of courses in the remaining years. The degrees of B.A. and M.A. are conferred in course. All examinations are conducted on the honor system. The astronomical department possesses two observatories, the Hopkins and the Field Memorial. In addition to prizes and honor scholarships, there is a large number of endowments, the income of which, amounting to about $11,000 annually, is available for distribution among needy students. In 1915–16 the college had an attendance of 515 students and 47 instructors. Its endowment in 1914–15 was $1,947,522, its income $231,161. The estimated value of the college property was $2,708,028, and of the grounds and buildings $1,747,525. The college library contained in 1916, 84,000 volumes and 20,000 pamphlets. The high rank of Williams is in large part due to the influence of Mark Hopkins (q.v.), who was its president from 1836 to 1872. The president in 1916 was Harry A. Garfield. Consult J. H. Hewitt, *Williams College and Foreign Missions* (Boston, 1914).

WILLIAM SMITH COLLEGE. See HOBART COLLEGE.

WILLIAMSON. A city and the county seat of Mingo Co., W. Va., 75 miles south by east of Huntington, on the Norfolk and Western Railroad (Map: West Virginia, B 4). The city hall, courthouse, and school buildings are noteworthy. Coal mining is the chief industry, the city being situated in the most productive coal region in the State. Williamson adopted the commission form of government in 1916. Pop., 1910, 3561.

WILLIAMSON, ALEXANDER WILLIAM (1824–1904). An English chemist, born at Wandsworth, near London. He was educated at Heidelberg, Giessen, and Paris. In 1849 he became professor of practical chemistry in University College, London, and in 1855 was chosen also to fill the chair of pure chemistry in the same institution. He retired in 1887. A memoir published in 1850 on *Etherification and the Constitution of Salts* attracted attention in the scientific world, and had a great influence on the theories of chemical action. In addition to *Chemistry for Students* (1865; 3d ed., 1873), he was the author of memoirs and papers on etherification, the atomic theory, and the composition of gases, in which he advanced new and original views, later generally accepted as distinct contributions to chemical knowledge. He was twice chosen president of the London Chemical Society, was president of the British Association in 1873, and was elected a corresponding member of the French Institute.

WILLIAMSON, ALICE MURIEL (LIVINGSTON). See WILLIAMSON, CHARLES NORRIS.

WILLIAMSON, BENJAMIN (1827–1916). An Irish mathematician. Born at Cork, he was educated at Kilkenny College, and at Trinity College, Dublin, of which he became a fellow in 1852 (senior fellow, 1897), and where he was professor of natural philosophy from 1884. He was elected a fellow of the Royal Society in 1879, and received the honorary degree of D.Sc. from Dublin in 1890, and that of D.C.L. from Oxford in 1892. His publications include *An Elementary Treatise on the Differential Calculus* (1872, 9th ed., 1899), *An Elementary Treatise on the Integral Calculus* (1874, 7th ed., 1896), *Introduction to the Mathematical Theory of the Stress and Strain of Elastic Solids* (1894).

WILLIAMSON, CHARLES NORRIS (1859–1920). An English journalist and author, born at Exeter, and educated at University College, London. Until his 22d year his studies turned to science and engineering, but it was as journalist and author that he became known. He began work on the *Examiner* and afterward was for eight years on the *Graphic*. *Black and White* was founded by him in 1891. Alone he wrote many articles on travel, automobiling, and other subjects and also a *Life of Thomas Carlyle* (2 vols., London, 1881). But he became best known for stories written in collaboration with his wife, Alice Muriel (Livingston) Williamson, an American woman, born at Livingston Manor House, near Poughkeepsie, N. Y. She shared her husband's enthusiasm for motoring. Jointly (as "C. N. and A. M. Williamson") the two produced a group of lively, breezy, popular novels in several of which a motor car is conspicuous: *The Lightning Conductor* (1903); *The Princess Passes* (1905); *My Friend the Chauffeur* (1905); *The Car of Destiny* (1906); *Set in Silver* (1909); *The Motor Maid* (1910); *The Princess Virginia* (1907); *The Heather Moon* (1912), *It Happened in Egypt* (1914), *The Lightning Conductor Discovers America* (1916).

WILLIAMSON, GEORGE CHARLES (1858–). An English writer on art. He was born at Guildford, Surrey; commenced as a writer on local archæological matters, and traveled widely in his art studies. He is best known as an authority on portrait miniatures, especially the English. His principal works on this subject are: *Portrait Miniatures from the Time of Holbein* (1897); *Andrew and Nathaniel Plimer* (1903), *History of Minature Painting* (2 vols., 1904). He wrote detailed catalogues of several private collections, including the miniatures of J. P. Morgan (4 vols., fol., 1906), which he was instrumental in assembling. He edited Bryan's *Dictionary of Painters and Engravers* (4 vols., 1903–05).

WILLIAMSON, HUGH (1735–1819). An American physician and legislator. He was born in West Nottingham, Pa., graduated at the College of Philadelphia (now the University of Pennsylvania) in 1757, studied theology and preached for two years (1759–61), was professor of mathematics in the College of Philadelphia from 1760 to 1763, studied medicine at Edinburgh and Utrecht, and subsequently attained eminence as a physician in Philadelphia. He visited the West Indies (1772) and England (1773) in behalf of the Newark (Del.) Academy and in February, 1774, was examined on colonial matters by the Privy Council. He served as surgeon in the North Carolina militia in 1780–82, was a member of the Continental Congress from 1782 to 1785 and in 1787–88, was a delegate to the Constitutional Convention of 1787 and to the State convention which ratified the Federal Constitution in 1789, and was a member of Congress from 1790 to 1793, when he removed to New York City. He published several essays on *Paper Currency* (1786); a *Discourse on the Benefits of Civil History* (1810); *Observa-*

tions on the Climate of America (1811): and a *History of North Carolina* (1812).

WILLIAMSON, WILLIAM CRAWFORD (1816–95). An English naturalist, born at Scarborough, Yorkshire. Having attracted attention in 1834 by a paper on Mesozoic fossils, he became curator of the Manchester Natural History Society Museum in 1835, and six years later graduated in medicine at University College, London. He practiced as a surgeon, was chief founder of the Manchester Institute for diseases of the ear in 1855 and was its consulting surgeon until 1870. From the founding of Owens College at Manchester in 1851 until 1892 he held the chair of botany. In zoölogy he made valuable investigations of the development of the teeth and bones of fishes, in geology he studied the zones of distribution of Mesozoic fossils and the part played by microscopic organisms in the formation of marine deposits; and by his work on the structure of fossil plants established British paleobotany on a scientific basis. His *Reminiscences of a Yorkshire Naturalist* (1896) contains a nearly complete bibliography of his writings.

WILLIAMSON FREE SCHOOL OF MECHANICAL TRADES. An educational institution at Williamson School Station, Pa., 16 miles from Philadelphia, founded in 1888 by Isaiah V. Williamson for the education of poor and deserving boys. Candidates for admission must be between 16 and 18 years of age, preference being given in the following order: to natives of Philadelphia; of Bucks, Montgomery, and Delaware counties; of other parts of Pennsylvania; of New Jersey; of other States. The school is only for pupils who intend to follow for a livelihood the trades there acquired. After a moderate preliminary trial all who prove satisfactory are bound as indentured apprentices to the trustees for the term of three years from their entrance. In addition to the academic training, the following trades are taught, the selection being made by the trustees, and each scholar taking but one trade: carpentering, bricklaying, machine trade, pattern making, steam and electrical engineering, and agriculture. The school and shops are in session eight hours a day for five days a week and three hours on Saturday, the proportion of shop work gradually increasing towards the close of the apprenticeship. The school term continues 11 months of the year. The pupils live in families of 24 in distinct cottages. In 1915 the school had 14 instructors, 6 assistant instructors, 245 students, a library of 3500 volumes, an endowment of $2,900,000, and an income of $108,000. The plant was valued at $650,000.

WIL'LIAMSPORT. A city and the county seat of Lycoming Co., Pa., 94 miles north by west of Harrisburg, on the West Branch of the Susquehanna River, and on the New York Central, the Philadelphia and Reading, and the Pennsylvania railroads (Map: Pennsylvania, G 4). It is in a region of attractive scenery, and is well laid out. Among the prominent features are Dickinson Seminary, the city hall, the United States government building, the Masonic Temple, the Scottish Rite Cathedral, public hospital, State Armory, Brown Library, and the Home for the Friendless. There are three parks—Brandon, Way's Gardens, and Vallamont. Williamsport was for a long time known for its extensive lumber interests, but is now a city of varied industries. In 1915 they were capitalized at $16,484,000, and had an output valued at $20,626,000. There are large clothing factories, foundries and machine shops, tanneries, furniture factories, dye works, silk mills, and manufactories of boilers and engines, lumber, steel, rubber goods, boots and shoes, mirrors, sandpaper, wire rope, building, paving, and fire brick, stacks, tanks, band instruments, nails, radiators, wood-working machinery, woolen goods, heaters, gas and gasoline engines, pumps, etc. The city adopted the commission form of government in 1912. Pop., 1900, 28,757; 1910, 31,860; 1915, 33,495; 1920, 36,198.

WIL'LIAMSTOWN. A town in Victoria, Australia, 9 miles southwest of Melbourne, on Port Phillip Bay (Map: Victoria, D 5). It is interested in shipbuilding. Basalt and coal are mined in the vicinity. It is noted for its Prince Alfred Graving Dock, and its government railway workshops at Newport. Pop., 1901, 14,083; 1911, 15,642.

WILLIAMSTOWN. A town, including several villages, in Berkshire Co., Mass., 5 miles west of North Adams, on the Hoosac River, and on the Boston and Maine Railroad (Map: Massachusetts, A 2). It is the seat of Williams College (q.v.), opened in 1793. Mission Park is an attractive feature. Although primarily residential, Williamstown has a cotton mill, a corduroy factory, and freight yards. Williamstown was permanently settled in 1753 and was called West Hoosick until 1765, when it was incorporated under its present name, which was given in honor of Colonel Ephraim Williams. Pop., 1900, 5013; 1910, 3708. Consult Perry, *Origins in Williamstown* (New York, 1894); id., *Williamstown and Williams College* (Norwood, Mass., 1899).

WILLIAMSTOWN. A borough in Dauphin Co., Pa., 58 miles by rail northeast of Harrisburg, on the Pennsylvania and the Williams Valley railroads (Map: Pennsylvania, H 6). There are several anthracite coal mines and hosiery mills. Pop., 1900, 2904; 1910, 2934.

WILLIAM TELL. See GUILLAUME TELL.

WIL'LIBRORD, WIL'BRORD, or **WIL'BROD,** SAINT (c.658–739). The apostle of the Frisians. He was born in the Kingdom of Northumbria, and began his education at the monastery at Ripon, near York. At the age of 20 he was sent to the schools of Ireland. After a sojourn of 12 years in that country, he resolved to devote himself to the conversion of Friesland. In 690 he sailed with 11 companions, and arrived soon after the victory of Pepin of Herstal over the Frisians. They were warmly received by Pepin. Willibrord, having established the first beginnings of his mission, went to Rome in 692, whence he returned, with the sanction of the Pope, Sergius I, and continued his labor till 695, when he again visited Rome, and received Episcopal consecration, together with the pallium of an Archbishop. Fixing his see at Utrecht, he converted a large number of the inhabitants, and, although he received some check upon the death of Pepin in 714, yet the successes of Charles Martel enabled him soon afterward, under similar favorable auspices, to resume the work, which, after many alternations, ended in the successful establishment of Christianity. Willibrord died in 739 at the monastery which he had founded at Echternach, near Treves. His festival is November 7. His *Life* was written by Alcuin (Eng. trans., London, 1877).

WIL'LIMAN'TIC. A city and one of the

county seats of Windham Co., Conn., 16 miles northwest of Norwich, on the Natchaug River, and on the New York, New Haven, and Hartford, and the Central Vermont railroads (Map: Connecticut, G 3). It has a State normal school, a public library, the Dunham Hall Library, St. Joseph's Hospital, and fine post-office and high-school buildings. The city is favored with excellent water power, and is noted for the manufacture of cotton thread. Other important products are cotton and silk goods, velvet, plumbers' supplies, boxes, and fine machinery. Pop., 1900, 8957; 1910, 11,230; 1915, 12,438; 1920, 12,330.

WILLING, Thomas (1731–1821). An American merchant and financier. He was born in Philadelphia, was educated at Bath, England, and in the Temple, London, and, returning to Philadelphia, organized, with Robert Morris (q.v.), the famous mercantile firm of Willing and Morris, which, during the Revolutionary War, supplied naval and military stores to the government. He was elected mayor of Philadelphia in 1763, was an associate justice of the Pennsylvania Supreme Court from 1767 to 1774, was a member of the Pennsylvania Committee of Correspondence, was a delegate to the Assembly in 1775, and was a member of the Continental Congress in 1775–76. In 1780 he, with several associates, organized the Pennsylvania Bank as a means of procuring supplies for the Continental army, he himself subscribing £5000. He was president of the Bank of North America from 1781 to 1792, and was the first president of the Bank of the United States, organized in 1791.

WILLIS, Bailey (1857–). An American geologist, born at Idlewild-on-Hudson, N. Y., son of Nathaniel P. Willis (q.v.). He graduated in 1878 at the Columbia School of Mines, and in 1879–81 was an expert on iron ores for the Tenth Census. In 1881–84 he was geologist of the Northern Transcontinental Survey, undertaken by the Northern Pacific Railway and other companies; and was then appointed geologist of the United States Geological Survey, in charge of the Appalachian division, and afterward of the Cascade Range and Puget Sound division. In 1903–04 he made geological explorations in China under the auspices of the Carnegie Institution. He lectured on geology at Johns Hopkins (1895–1902) and at the University of Chicago (1909), served as consulting geologist to the Minister of Public Works of Argentina in 1911–13, and became professor of geology in Leland Stanford Junior University in 1915. Willis edited the *Geologic Atlas of the United States*, and published *Northern Patagonia: Character and Resources* (1914).

WILLIS, H(enry) Parker (1874–). An American financial expert, born at Weymouth, Mass. He attended Western Reserve University, in 1894 graduated from the University of Chicago (Ph.D., 1897), and studied also at Leipzig and Vienna. He taught economics and political science at Washington and Lee University (1898–1901; 1903–05), and was professor of finance (1905–06; 1907–12) at George Washington University, where he was also dean of the College of Political Sciences (1910–12). Willis was an assistant to the Monetary Commission in 1897–98, served as an expert to the Ways and Means and Banking and Currency committees of the United States House of Representatives between 1911 and 1913, became secretary to the Federal Reserve Board in 1914, and in 1916 was appointed by the Philippine Commission president of the Philippine Insular Bank at Manila. Besides contributions to the New International Encyclopædia, his writings include: *History of the Latin Monetary Union* (1901); *Reciprocity* (1903), with J. L. Laughlin, *Our Philippine Problem* (1905); *Principles and Problems of Modern Banking* (1910), *Principles of Accounting* (1910); *Life of Stephen A. Douglas* (1911); *The Federal Reserve* (1915); *American Banking* (1916).

WILLIS, Nathaniel Parker (1806–67). An American author, born in Portland, Me. He graduated in 1827 at Yale College, where, as an undergraduate, he became known as a writer of religious verse, some of it published as *Scripture Sketches* (1827). For S. G. Goodrich (q.v.), of Boston, he edited two annuals, *The Legendary* (1828) and *The Token* (1829). In the latter year Willis established at Boston *The American Monthly Magazine;* this in 1831 was merged with the New York *Mirror*, of which he became associate editor. From 1831 to 1836 he traveled in Europe and Asia Minor and contributed sketches to the *Mirror*, which were later published in *Pencillings by the Way* (3 vols., 1835). On his return to America he conducted a short-lived weekly journal, *The Corsair* (1839–40), and later two papers of brief existence, *The New Mirror* (1843–44) and *The Evening Mirror* (1844–45). In 1845 he went again to Europe, returning in 1846. The same year he established *The Home Journal*, which occupied him until his death at his estate, "Idlewild," at Cornwall-on-Hudson, N. Y. His works include: *Inklings of Adventure* (1836, 3 vols.); *Loiterings of Travel* (1839, 3 vols.), *Lady Jane, and Other Poems* (1844); *People I Have Met* (1850); *Life Here and There* (1850); *Hurry-graphs, or Sketches of Scenery, Celebrities, and Society* (1851); *A Summer Cruise in the Mediterranean on Board an American Frigate* (1853); *A Health Trip to the Tropics* (1854); *Famous Persons and Places* (1854); *Out-Doors at Idlewild* (1854); *The Rag-bag, a Collection of Ephemera* (1855); *Paul Fane* (1856), a novel; *The Convalescent* (1859); and others, chiefly prose. His complete poems appeared in 1868. His work was ready, fluent, light, graceful, and various, in the main that of a dilettante, and it was exceedingly popular during Willis's lifetime. His prose yields interesting sketches of contemporaries. Willis was generous to contemporary authors, but made many hostile critics by his indiscreetly personal tone of writing. Consult: his *Life* by H. A. Beers in the "American Men of Letters Series" (Boston, 1885); *Selections* from his prose writings (New York, 1885) edited by H. A. Beers; and M. A. de Wolfe Howe, in *American Bookmen* (ib., 1898).

WILLIS, Robert (1800–75). An English archæologist and professor of mechanism, born in London. He graduated at Caius College, Cambridge, in 1826, was soon afterward elected Frankland fellow and in 1829 foundation fellow. After his graduation he gave his attention chiefly to mechanism, and in 1837 he was chosen Jacksonian professor of applied mechanics at Cambridge. Meanwhile he devoted his spare time to the study of architecture and archæology, and his *Remarks on the Architecture of the Middle Ages* (1835) won a high place among works on the subject. In 1844 he became a member of the newly organized Archæological Institute, before which he delivered some of his most important lectures. Among his publications are: *Prin-*

ciples of Mechanism (1841); *Architectural History of the Church of the Holy Sepulchre of Jerusalem* (1849); *The Architectural History of the Conventual Buildings of the Monastery of Christ Church, Canterbury* (1869); an epoch-making "Essay on Vaults" in the *Transactions of the Royal Institute of British Architects* (1842); and a series of lectures on the English cathedrals delivered between 1844 and 1865

WILLIS, THOMAS (1621–75). An English anatomist and physician, born at Great Bedwin, Wiltshire. He graduated in 1639 at Oxford, where he began practice in 1646. He fought as a Royalist in the Revolution, studied medicine during the Protectorate, and at the Restoration was made Sedleian professor of natural philosophy at Oxford (1660). In 1666 he settled in London, where he became a founder of the Royal Society, and physician in ordinary to Charles II. Willis made important medical discoveries concerning the brain. A system of connecting arteries at the base of the brain is called the circle of Willis and the eleventh cranial nerve, which he described, is called the nerve of Willis He was buried in Westminster Abbey. Besides many other works, he published *Cerebri Anatome, cui Accessit Nervorum Descriptio et Usus* (1664); *Pathologiæ Cerebri, etc.* (1668); *Affectionum quæ Dicuntur Hystericæ et Hypochondriacæ Pathologia Spasmodica Vindicata* (1671); and *De Anima Brutorum* (1672). His complete works, *Opera Omnia*, were published in Geneva (1676), and a translation into English in London (1684).

WILLISON, SIR JOHN STEPHEN (1856–1927). A Canadian journalist. He was born in Huron County, Ontario. For several sessions he was parliamentary correspondent of the Toronto *Globe* and in 1890 was appointed editor in chief. Under his management the editorial policy characteristic of the control and the posthumous influence of George Brown (q.v.) was altered. Willison made the *Globe* more responsive to the varieties of Liberal opinion and more urbane in its attitude towards opponents, an advantage afterward maintained. In 1902 he became editor in chief of the Toronto *News*, an Independent Conservative newspaper. He opposed the Taft-Fielding reciprocity agreement of 1911, and in the ensuing political campaign the *News* contributed more effectually than any other journal to the downfall of the Laurier administration. He was elected president of the Parliamentary Press Gallery, Ottawa, in 1890 and president of the Canadian Press Association in 1900; and was appointed Canadian correspondent of the London *Times* in 1910. In 1913 Willison was knighted. He published: *The Railway Question in Canada* (1897); *Lessons from the Old World* (1897); *Sir Wilfrid Laurier and the Liberal Party: A Political History* (2 vols., 1903), a work of great ability; *Anglo-Saxon Amity* (1906); *The United States and Canada* (1908); *The New Canada* (1910).

WILLISTON, SAMUEL (1861–). An American legal scholar. He was born in Cambridge, Mass., and, after attaining high honors as a student at Harvard College and Harvard Law School, he became in 1890 assistant professor of law at the latter institution. From 1895 he was professor, and from 1903 Weld professor of law. He contributed largely to legal periodicals and was prominently connected with the preparation of the Uniform Sales Act and similar codifications of the Law of Warehouse Receipts and the Law of Stock Transfer. Williston wrote: *The Law of Sales* (1909); *Commercial Law* (1915); *Negotiable Instruments* (1915); and he edited several important works, especially on contracts.

WILLISTON, SAMUEL WENDELL (1852–1918). An American paleontologist and anatomist, born in Boston. He graduated from the Kansas Agricultural College in 1872, and studied also at Yale (M.D., 1880; Ph.D., 1885), where he was professor of anatomy from 1886 to 1890. Afterward he served as professor of historical geology and anatomy and as dean of the Medical School at the University of Kansas until 1902, when he became professor of paleontology at the University of Chicago. At various times he was also connected with the United States Geological Survey, the journal *Science*, and the Kansas Board of Health and Board of Medical Examiners. In 1903 he served as president of the Society of Vertebrate Paleontology. Williston received the honorary degree of Sc.D. from Yale and was elected to the National Academy of Sciences in 1915. Besides about 250 scientific papers, and reports of the University Geological Survey of Kansas, he published *Manual of North American Diptera* (1896; 3d ed., 1908) and *Water Reptiles of the Past and Present* (1914)

WILLMAR. A city and the county seat of Kandiyohi Co., Minn., 90 miles west of Minneapolis, on the Great Northern Railroad (Map: Minnesota, B 5). It has grain elevators, brick works, a creamery, and manufactories of gasoline farm tractors, lumber products, etc. Willmar Seminary and the State Hospital for Inebriates are here; and there are a handsome courthouse, Carnegie library, fine city hall and school buildings, and public parks.. Pop., 1900, 3409; 1910, 4135.

WILL-O'-THE-WISP. See IGNIS FATUUS; ROBIN GOODFELLOW.

WILLOUGHBY, wĭl'ō-bĭ, SIR HUGH (?1500–54). An English Arctic explorer. He was born at Risby, Derbyshire, and was knighted for his services in the expedition to Scotland in 1544. In 1553 he was made admiral of a fleet of three vessels sent out at the expense of the merchants of London with license from Edward VI "to discover strange countries and a northeastern passage to Cathay and India." The vessels took out 136 persons, of whom 18 were merchants having a share in the expenses of the expedition. In July, 1553, a storm on the coast of Norway dispersed the fleet. Two of the ships went into the harbor of Arzina, in Lapland, where the crews and passengers, 62 in number, perished of scurvy, the ships and bodies being found in 1554 together with Willoughby's journal and will The third vessel, under Richard Chancellor (q.v.), reached the Dvina on the White Sea. Chancellor visited Moscow, and opened up a sea route to Russia. This was of vast importance to England, which through the Muscovy, or Russian Company (organized 1554), was the first western nation to establish trade relations with Russia.

WILLOUGHBY, WESTEL WOODBURY (1867–). An American political scientist, born at Alexandria, Va. He was educated at Johns Hopkins University (A.B., 1888; Ph.D., 1891), and was admitted to the bar in 1891. He practiced law in Washington, D. C., until 1897, also teaching at Johns Hopkins, where by 1906 he had become professor. His views on American

history and constitutional development are strongly federalistic in tone. In 1904 he became managing editor of the *American Political Science Review*, and in 1913 served as president of the American Political Science Association. He published: *An Examination of the Nature of the State—A Study in Political Philosophy* (1896; rev. ed., 1903), *The Political Theories of the Ancient World* (1905), *The American Constitutional System* (1904); *The Constitutional Law of the United States* (2 vols., 1910); *Principles of the Constitutional Law of the United States* (1912). He also edited the "American State Series," and became coeditor of the "Johns Hopkins Studies in Historical and Political Science."

WILLOW (AS. *welig*, of uncertain etymology). A genus of trees and shrubs of the family Salicaceæ. There are fully 160 species, but their precise number is not likely to be soon determined, as varieties are very numerous and many hybrids are known to exist. They are mostly natives of the colder temperate regions of the Northern Hemisphere, although some are found in warm countries, as *Salix tetrasperma* in the hottest parts of India. Most



SHINING-LEAVED WILLOW (*Salix lucida*).

of them are shrubs, and some are of very low growth, particularly those of arctic and alpine regions. Thus, *Salix herbacea*, which is common on the mountains of Scotland and farther north, also occurring in alpine and arctic portions of America, seldom rises more than an inch from the ground. *Salix arctica* and *Salix polaris* are the most northern woody plants. Other small species are also found at the limits of perpetual snow in various countries. Some of those which more generally receive the popular name willow are trees of considerable size and remarkably rapid growth. The wood of some of them, as the white willow or Huntingdon willow (*Salix alba*), and the crack willow (*Salix fragilis*), is used for many purposes, being remarkably light and soft, but tough and durable, especially in damp situations. It is used for making paddles of steamboats, because it wears better in water than any other kind of wood. The cricket bat willow is *Salix cærulea* which is believed to be a hybrid between the white and the crack willow. Willows are often planted as ornamental trees, especially near streams and in moist grounds. Many kinds are also planted on the banks of rivers to retain the soil in its place and restrain the encroachment of the water. They are peculiarly adapted for this purpose, as they grow readily from cuttings. Willow stakes driven into a moist soil strike root, and soon become luxuriant.

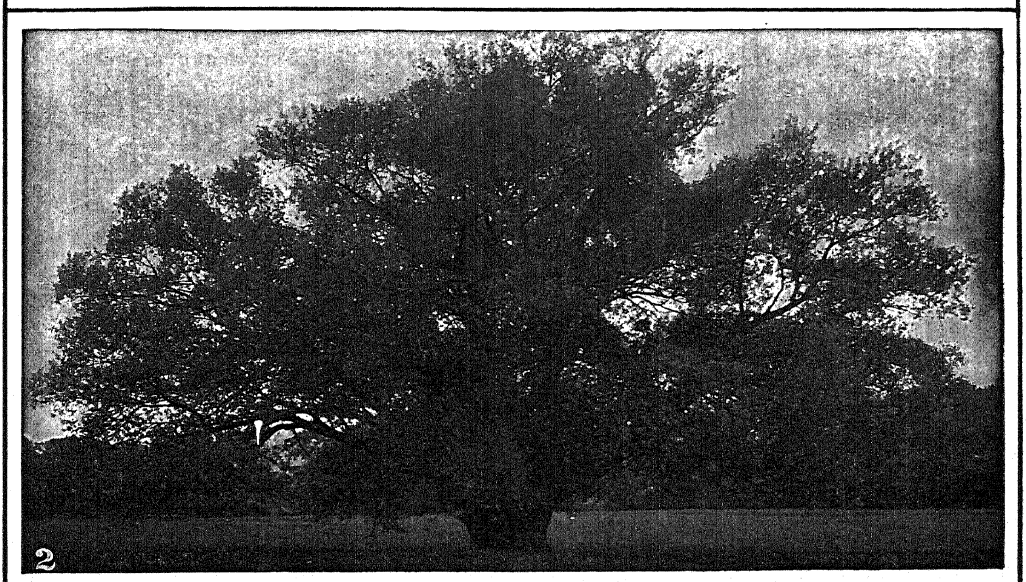
The twigs of most of the willows are very tough and flexible, and are used by coopers for making hoops, and by gardeners for tying large plants. They are much used for basket making and other kinds of wickerwork. (See OSIER.) Willow trees are often treated as pollards (q.v.) and grown in copses, because they stand cutting remarkably well, and the stems are useful for many purposes, such as hoops, poles, fuel, etc. The bark of most species contains tannin and salicin and is used in domestic medicine. A fragrant water is distilled in northern India from the catkins of the Egyptian or caliph willow (*Salix ægyptiaca*). The flowers of the willow, which in many species appear before the leaves, are much sought after by bees. The male catkins of many species are very beautiful, the prominent anthers being yellow, or in *Salix purpurea* of a rich purple. The weeping willow (*Salix babylonica*) is a very ornamental species, a native of the East, now much planted in America and on the continent of Europe, on account of its beautiful pendant twigs. (See WEEPING TREE.) The so-called Napoleon's willow is a variety of it. The white willow or Huntingdon willow (*Salix alba*) is one of the largest species known in America. It grows with great rapidity to a height of 80 feet, with a diameter of 5 to 8 feet. Its head is much branched and spreading, its leaves narrow, elliptical-lanceolate, silky beneath, and sometimes also above.

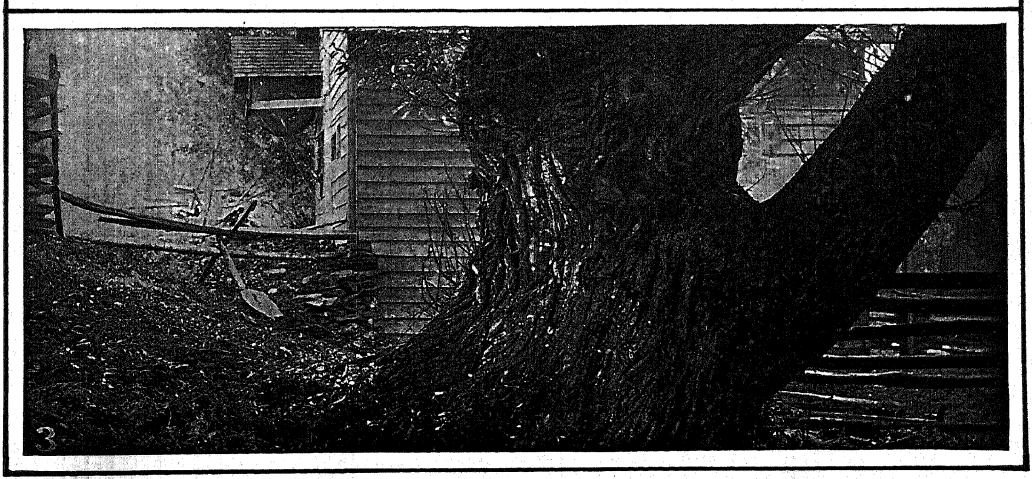
The popular name sallow is given to a number of species, among them the gray sallow (*Salix cinerea*), the round-leaved sallow (*Salix caprea*), the round-eared sallow (*Salix aurita*), and the long-leaved sallow (*Salix grandifolia*). These are common British species. They are not as pliable as the osier willows, but are used for hoops, implements, etc. At least half of the known species of willow occur in the United States. Among the best known are the black willow (*Salix nigra*), a tree 100 to 140 feet high, and *Salix cordata* and *Salix lucida*, shrubs or small trees along streams from New England to Virginia and westward to British Columbia and California. A considerable industry in willow lumbering has been developed along the lower Mississippi River and its tributaries, the black, white, and crack willows furnishing most of the lumber, more than 20,000,000 feet of black willow alone being used in 1913. It is used for furniture, interior finishing, boxes, cooperage, etc. See Plate of FLOWERS.

WILLOW GROUSE. See PTARMIGAN.

WILLOW INSECTS. In Europe 386 species of insects feed upon the various willows; in the United States Packard records 223, but this list has recently been largely increased. Many species which attack poplar, especially lepidopterous larvæ, attack the willows. The American cimbex (*Cimbex americana*), the largest of the native sawflies, lays its eggs in the leaves and the larvæ sometimes cause excessive defoliation. Among other sawflies dependent upon these trees, *Nematus ventralis*, whose yellow-spotted black larva is the yellow-spotted wil-







1. POLLARDED WILLOWS. 2. WHITE WILLOW (Salix alba).
3. BARK OF WHITE WILLOW.

low slug, is especially injurious There are at least five generations annually, and the insect frequently multiplies excessively, sometimes menacing the willowware industry through its destruction of the osier willow. The willow-shoot horntail (*Phyllœcus integer*) lays its eggs in the twigs and the larvæ burrow in the terminal shoots, causing them to wilt. The wilting is begun by the mother insect, which girdles the twigs below the place where the egg is laid. The cocoon is spun within the burrow and the larva remains in it through the winter, changing to pupa in the early spring Several leaf beetles attack the foliage, and the larvæ of two longicorn beetles (*Xylotrechus annosus* and *Pogonocherus mixtus*) bore in the wood. A number of plant lice affect the leaves and twigs; several species of scale insects are found upon the bark, and two gall mites produce excrescences upon the leaves Consult A. S. Packard, *Insects Injurious to Forest Trees* (Washington, 1890).

WILLOW WARBLER. See WARBLER.

WILLOW WREN. See CHIFFCHAFF.

WILLS, WILLIAM GORMAN (1828–91). A British playwright and painter. He was born in County Kilkenny, Ireland, and studied at Trinity College, Dublin. His early life was divided between painting and story writing. About 1868 he established himself as a portrait painter in London and attained a considerable reputation, while he was noted for the Bohemian eccentricities of his life. He began play writing about 1856, and among his dramatic works are: *The Man o' Airlie* (1867); *Charles I* (1872), in which Henry Irving secured one of his early triumphs; *Eugene Aram* (1873); *Marie Stuart* (1874); *Olivia* (1878), based on *The Vicar of Wakefield,* and a great success; *Nell Gwynne* (1878), *Faust,* as produced at the Lyceum (1885); and *A Royal Divorce* (1891). He died in London. Consult: Archer, *English Dramatists of To-Day* (London, 1882); Cook, *Nights at the Play* (ib., 1883); Freeman Wills, *W. G. Wills, Dramatist and Painter* (ib., 1898).

WILLS, WILLIAM JOHN (1834–61). An Australian explorer, born at Totnes, in Devonshire, England. He studied medicine in London, and in 1852 emigrated with his brother to Victoria, where for a time he was a shepherd. In 1855 he became a surveyor of crown lands, and in 1860 was appointed third in command of an expedition sent out under Robert O'Hara Burke (q.v.) to discover a route to the north across Australia. Soon after the expedition started Wills was made second in command, and in February, 1861, he and Burke succeeded in reaching tidal water on the Flinders River. They then turned back, but on the return journey both died of starvation near Cooper's Creek, and only one man, John King, succeeded in getting back to the settlements. The bodies of the two leaders were recovered and were given a public funeral in 1863. A national memorial to them was erected at Melbourne. Consult: *Wills's Successful Exploration Through the Interior of Australia,* consisting of Wills's recovered journal edited by his father (London, 1863); William Howitt, *History of Discovery in Australia* (ib., 1865); Ernest Favenc, *The History of Australian Exploration* (ib., 1888).

WILL'S COFFEE HOUSE. A famous resort of the wits during Queen Anne's reign, situated on the corner of Bow and Russell Streets, London. Dryden's corner in it is celebrated in literary history, and it was also the resort of Wycherley and Waller, who lived on Bow Street, near by. It was so called from the first name of its original proprietor and was succeeded by Button's.

WILLSON, HENRY BECKLES (1869–). A Canadian author He was born in Montreal and graduated at the Boston Law School in 1886 He joined the staff of the Boston *Globe,* in 1889 went to Cuba as correspondent of the New York *Herald,* and later went to London, England, where he took an editorial position and contributed to leading periodicals, principally on Canadian topics. He returned to Canada in 1896 as special correspondent of the London *Daily Mail,* and traveled through Newfoundland and through the Canadian provinces to Vancouver. His writings include: *The Tenth Island* (1897), a description of Newfoundland: *The Great Company* (1899), a history of the Hudson's Bay Company; *The Story of Lost England* (1902); *Lord Strathcona* (1902; 2d ed., 1915); *Ledger and Sword* (1903); *The Romance of Canada* (1907). *The Life and Letters of James Wolfe* (1909); *Nova Scotia: the Province that has been Passed By* (1910); *Quebec: the Laurentian Province* (1913).

WILLSTÄTTER, RICHARD (1872–). A German chemist. He was born in Karlsruhe, Baden, and studied chemistry under Von Baeyer (q.v.) in the University of Munich, where he was docent and then assistant professor till 1905, when he was called to a chair in the Zurich Technical School. In 1912 he accepted an appointment as fellow in the Kaiser Wilhelm Institute in Berlin and an honorary professorship in the University of Berlin. Willstätter specialized in the investigation of complex organic compounds, notably on the coloring substances in plants, in which field he became probably the foremost authority of his time. His achievements brought him the Nobel prize in chemistry for 1915. Besides contributing numerous articles to chemical journals he published: *Untersuchungen über Chlorophyll; Methoden und Ergebnisse* (1913), with A. Stoll; *Ueber die Verwandtschaft der Anthocyane und Flavone* (1915), with H. Mallison.

WILLUGHBY, wĭl'lŭ-bĭ, FRANCIS (1635–72). An English naturalist, born at Middleton, Warwickshire. He studied at Trinity College, Cambridge, 1653–59, became much interested in natural history, and about 1662, with his former teacher, John Ray (q.v.), planned a work on natural history, the botany to be written by Ray and the zoölogy by Willughby. The two traveled on the Continent and in England collecting material, but before the work was completed Willughby died. Ray later published some of the results of Willughby's study, first in Latin in 1676, and then in English in 1678, under the title of *The Ornithology of Francis Willughby.* In the work there was for the first time a rational system of classifying birds, which has been asserted to be the basis of the Linnæan classification. In 1686 Ray published also the results of Willughby's study of ichthyology. Other results of his researches were collected by Ray in the *Methodus Insectorum* (1705), and by Derhorn, in his *Historia Insectorum* (1710).

WILMERDING. A borough in Allegheny Co., Pa., 12 miles southeast of Pittsburgh, on the Pennsylvania Railroad (Map: Pittsburgh

and vicinity). It has the extensive foundries and machine shops of the Westinghouse Air Brake Company Pop., 1900, 4179; 1910, 6133.

WILMETTE'. A village in Cook Co., Ill., 14 miles north of Chicago, on the Chicago and Northwestern Railroad (Map: Illinois, J 1). It is essentially a residential suburb of Chicago, having many fine homes, a public library, and an attractive town hall. There are important floricultural interests. Pop., 1900, 2300, 1910, 4943.

WIL'MINGTON. The largest city in the State of Delaware, and the county seat of New Castle County, 27 miles southwest of Philadelphia and 69 miles northeast of Baltimore, at the junction of the Delaware River and Christiana and Brandywine creeks, and on the Pennsylvania, the Baltimore and Ohio, and the Philadelphia and Reading railroads (Map: Delaware, H 1). It is picturesquely situated on hilly ground, the abundant provision of shade trees adding to the beauty of the streets. Holy Trinity (Old Swedes') Church was built in 1698. Other notable edifices are the fine county and municipal building, the post office and United States government building, and the home of the Wilmington Trust Building Corporation. In or near the city are the Delaware, Physicians' and Surgeons', and Homœopathic hospitals, the State Hospital for the Insane, the Ferris Industrial School for Boys, the Delaware Industrial School for Girls, and the Home for Friendless and Destitute Children. The Friends' School is an old and prominent institution. The free library, begun in 1788 as the Library Company of Wilmington, and incorporated in 1857 as the Wilmington Institute, but now public, contains more than 85,000 volumes. Other collections are those of the Law Library Association of the county and the Historical Society. Wilmington is the leading industrial city in the State, its manufactures in the year 1914 having an aggregate capital of $46,400,000 and a product valued at $39,358,000. Important industries are the shipbuilding yards, car works, a paper-making plant, and morocco works. The paper-making plant is one of the largest in the country, while the morocco industry is centred in the city. About 2 miles from the city is one of the largest powder-manufacturing establishments in the world, that of E. I. Dupont de Nemours and Company, founded in 1801 by Pierre Samuel Dupont (see DUPONT DE NEMOURS) and his sons. Large quantities of foundry and machine-shop products and iron and steel are also manufactured. The Pennsylvania Railroad and the Pullman Company maintain extensive car shops at Wilmington. The city is a prominent distributing centre and a port of entry, its foreign trade in 1915 being valued at $24,000,000, including exports to the amount of $22,500,000. The government is vested in a mayor, elected every two years, and a unicameral council of 13 members. The mayor appoints the board of directors of the street and sewer departments and the board of water commissioners. Besides the mayor and council, the city treasurer, tax collectors, and board of education (a member from each ward) are chosen by direct popular vote. Wilmington spends annually in maintenance and operation about $1,200,000, the principal items of expenditure being: schools, $275,000; police department (including police courts, jails, etc.), $110,000; interest on debt, $182,000; water works, $152,000; fire department, $69,000. The water works, which are owned by the municipality, were constructed in 1827. Pop., 1900, 76,508; 1910, 87,411, 1915, 93,161; 1920, 110,168.

In 1638 Peter Minuet, with the first Swedish expedition to America, cast anchor in the Christiana, or Minquas, as the Indians called it, and erected a fort named Fort Christina in honor of the infant daughter of Gustavus Adolphus. He also founded a little village, Christinaham, where Wilmington now stands. Peter Stuyvesant, the Dutch Governor of New Netherland, stirred by the activity of Minuet's successor, Printz, bought the region from the Indians, and in 1655 took Fort Christina and ended Swedish supremacy in Delaware. The Dutch rulers were in their turn succeeded nine years later by the English. Under William Penn's proprietorship the city acquired the sober Quaker character which it has never entirely lost. In 1737 Thomas Willing laid out a new town which bore his name, though Willingstown became Wilmington eight years later in honor of the English peer of that name. The battle of Brandywine (q.v.) was fought at Chadd's Ford, about 12 miles away. The first borough charter was issued in 1739. Consult Ferris, *History of the Original Settlements on the Delaware* (Wilmington, 1846), and L. P. Powell (editor), *Historic Towns of the Middle States* (New York, 1899).

WILMINGTON. A city, port of entry, and the county seat of New Hanover Co., N. C., 148 miles south by east of Raleigh, on the Cape Fear River and on the Seaboard Air and the Atlantic Coast lines (Map: North Carolina, E 3). It is situated 20 miles from the mouth of the Cape Fear River, and has steamship connection with New York and other Atlantic ports. Among the prominent structures are the United States government building, the city hall, the county court house, the Murchison Bank Building, and the Masonic Temple. There are also a public library, the City and County Hospital, and the United States Marine Hospital. Wilmington is primarily a commercial city. Cotton and lumber constitute the principal shipments. In manufacturing the city ranks fifth in the State, its various industries in 1914 having $3,699,000 capital and a production valued at $3,155,458. There are lumber mills, cotton presses, cotton mills, cottonseed-oil mills, dye works, wood-working plants, railroad shops, and manufactories of fertilizers, tea chests, wood distilling plants, metal goods, hosiery, etc. Wilmington has adopted the commission form of government providing for a mayor and six councilmen. Pop., 1890, 20,056; 1900, 20,976; 1910, 25,748; 1915 (U. S. est.), 29,384; 1920, 33,372.

Settled as Newtown in 1730, Wilmington was incorporated in 1739 as a town under its present name. In 1743 it became the capital of the province. It was occupied by the British in 1781–82. During the Civil War it was the centre of communication between the Confederate States and foreign governments. Consult L. P. Powell (editor), *Historic Towns of the Southern States* (New York, 1900).

WILMINGTON. A village and the county seat of Clinton Co., Ohio, 55 miles by rail northeast of Cincinnati, on the Baltimore and Ohio Southwestern and the Pennsylvania railroads (Map: Ohio, C 7). It is the seat of Wilmington College (Friends), opened in 1870, and has a Carnegie library. The city manufactures auger bits, bridge work, bent-wood products, furnaces, and butter. Pop., 1900, 3613; 1910, 4491.

WILMOT, ALEXANDER (1836–). A British South African statesman and historian, born in Edinburgh, and educated at the universities of Glasgow and Edinburgh. For many years he served in various offices in Cape Colony, and in 1889 became a member of the Legislative Council. In politics he adhered to the Progressive (Rhodes) party. Among his published works are: *The History of the Cape Colony* (1869), with J. C. Chase, *The Geography of Cape Colony* (1882); *The Story of the Expansion of South Africa* (2d ed., 1895); *The History of Our Own Times in South Africa* (3 vols., 1897–99); *The History of South Africa* (1901).

WILMOT, DAVID (1814–68). An American political leader and jurist, born in Bethany, Pa. He was admitted to the bar at Wilkes-Barre in 1834, and practiced at Towanda. In time he became prominent as a Democratic politician, and from 1845 to 1851 was a member of the National House of Representatives. Although elected as a Democrat, he opposed the extension of slavery into the territory that it was expected the United States would acquire from Mexico, and in 1846 he moved his famous amendment, known as the Wilmot Proviso (q.v.). In 1848 he supported Van Buren for the presidency instead of the regular Democratic candidate, and afterward became a Republican. He was president-judge of the thirteenth district of Pennsylvania during 1853–61; was defeated as a candidate for Governor on the Republican ticket in 1857; served in the United States Senate, 1861–63; and then held the office of judge of the United States Court of Claims until his death.

WILMOT, HENRY. See ROCHESTER, EARL OF.

WILMOT, LEMUEL ALLAN (1809–78). A Canadian statesman. He was born in Sunbury County, New Brunswick, and was educated at the University of King's College, Fredericton. Called to the bar in 1832, he was two years later elected a Liberal member of the provincial Legislature. He supported the demand for responsible government, and in 1836 went to England as a delegate in behalf of popular control of the provincial crownlands His mission was successful. In 1844 he became a member of the Executive Council, but resigned upon the appointment of a new member by the Lieutenant Governor without consulting his advisers. Four years later the Assembly passed a resolution favoring responsible government, and Wilmot became Premier, resigning three years later on his appointment as a judge of the Supreme Court of the province. He supported the movement for Canadian confederation, and was the first Lieutenant Governor of New Brunswick (1868–73) after it had become part of the Dominion of Canada.

WILMOT, ROBERT DUNCAN (1809–91). A Canadian statesman, born at Fredericton, New Brunswick, and educated at St. John. After engaging in shipping, and after a short period spent in England, he entered the Parliament of his province in 1846, holding his seat, except in 1861–65, down to confederation in 1867. He was mayor of St. John (1849); surveyor-general of New Brunswick (1851–54); provincial secretary (1856–57 and 1865–67); and in 1866–67 was a member of the conference of colonial delegates with the British government in London concerning the terms of Canadian confederation. Wilmot, who began his career as a Liberal, afterward joined the Conservatives of his province and opposed confederation; but after the latter was accomplished he was appointed to the Dominion Senate, of which he was Speaker in 1878–80 In 1880–85 he was Lieutenant Governor of New Brunswick

WILMOT PROVISO. The name applied to an amendment proposed in the United States Congress in 1846 by David Wilmot (q.v.), a Democratic Representative from Pennsylvania, to a bill appropriating money for the purchase of territory from Mexico. On Aug. 8, 1846, President Polk sent to Congress a special message asking that body to appropriate money to be used in adjusting the boundary dispute between the United States and Mexico. In response a bill appropriating $2,000,000 was introduced in the House, and it was expected that the money would be used in buying the Mexican claims to the disputed territory. In the debate that followed, Wilmot moved an amendment which provided "that neither slavery nor involuntary servitude shall ever exist in any part of said territory, except for crime, whereof the party shall first be duly convicted" This amendment was adopted in the House by a vote of 83 to 64, and the entire bill was then passed. When it was taken up in the Senate, however, Lewis, of Alabama, moved to strike out the proviso; but Davis, of Massachusetts, spoke against the motion, and continued his opposition until Congress adjourned. In the following December the President again asked for the measure, and, as most of the Northern State Legislatures had declared in favor of it, bills were soon reported in both Houses. On Feb. 8, 1847, Wilmot again moved his proviso to one of these bills (appropriating $3,000,000 instead of the original $2,000,000), and it was again adopted, on February 15, by a vote of 115 to 106. Meanwhile, however, the Democratic Senate had passed a similar bill without the proviso, and this bill came up before the House. That body in committee of the whole voted to amend the Senate bill by adding the proviso, but the proviso was rejected by the Senate and the bill was finally passed without it.

In the contest the proslavery men had naturally fought the proviso, and in the effort to preserve harmony between the Northern and Southern wings of their party the Democrats were forced to evolve the doctrine of popular sovereignty (q.v.). Those who, like Wilmot, were unwilling to accept this doctrine split off from the party. The principle contained in the proviso continued to be a burning issue even after its temporary rejection. Attempts were made to apply the principle in organizing the territory that was acquired from Mexico, and it formed the basis, in part, of the Free-Soil party, and later of the Republican party. It was rejected in the Compromise of 1850, and its previous application in the Missouri Compromise (q.v.) of 1820 was wiped out by the Kansas-Nebraska Bill (q.v.) of 1854; and in the famous case of Dred Scott it was held to be out of harmony with the Constitution. Ultimately, however, it was established by the Act of June 19, 1862, which forbade slavery in "any of the Territories of the United States now existing, or which may at any time hereafter be acquired." Consult: Henry Wilson, *History of the Rise and Fall of the Slave Power in America* (3 vols., Boston, 1872–77); Schouler, *History of the United States of America under the Constitution* (New York, new ed., 1899);

Von Holst, *Constitutional and Political History of the United States* (Chicago, new ed., 1899), and G. P. Garrison, *Westward Extension, 1841–1850* (New York, 1906).

WILNA, vil'na, RABBI ELIAS (1720–97). A name applied to Elijah or Elias ben Solomon, one of the greatest of Hebrew scholars, born at Wilna (Vilna), in Lithuania; also known as Elijah Gaon and The Gaon of Wilna. As a child he displayed remarkable gifts of memory and reasoning powers, and, beginning the study of the Talmud at the age of seven, he speedily mastered the subject. He was almost entirely self-taught, and to this was probably due the originality of method which he applied to Talmudic study. Unlike most Talmudists, whose efforts were directed to weaving about the text elaborate webs of the most subtle casuistry leading nowhere in particular, he made it his chief object always to arrive at the simple meaning of words. He even applied, in some degree, the methods of philology and higher criticism to the emendation of the Talmudic text, and at a time when the Talmud was practically the exclusive subject of study among the Jews, he laid great stress on the value of the biblical literature and the importance of Hebrew grammar. He went further still in advocating the cultivation of the profane sciences, a view at that time amounting almost to heresy, and himself did work of a very high order in the fields of mathematics and astronomy. He had also a great fondness for the Cabbala. With the exception of some travels in his youth he spent his entire life in semi-seclusion at Wilna, declining numerous calls which his great reputation brought him, and content to impart instruction in grammar, the Bible, and the Mishna to a select number of pupils. The only event of moment in his life was his struggle with the Chasidim (q.v.), of whom he was one of the most inveterate persecutors, he repeatedly excommunicated them and forbade intermarriage with them. He wrote commentaries in every classic field of Hebrew literature, none of which, however, were published during his lifetime. These include commentaries on the Pentateuch, the Prophets and the Hagiographa, on portions of the Babylonian and Jerusalem Talmud, and on the Halacha, Haggada, and Cabbala (qq.v.), e.g., the Shulchan Aruch and the Zohar. He was also the author of a Hebrew grammar and treatises on geometry, algebra, trigonometry, and astronomy.

WIL'SON. A city and the county seat of Wilson Co., N. C., 49 miles east by south of Raleigh, on the Atlantic Coast Line and the Norfolk Southern railroads (Map: North Carolina, E 2). The district is engaged in farming and cotton growing, and especially in the cultivation of tobacco, in which it carries on an extensive trade. The industrial establishments of the town include cotton and oil mills, carriage and wagon factories, foundries and machine shops, lumber mills, tobacco factories, etc. Wilson has adopted the commission form of government. Pop., 1900, 3525; 1910, 6717; 1920, 10,612.

WILSON, ALEXANDER (1766–1813). An American ornithologist, born at Paisley, in Scotland. He worked for some time as a weaver and then became a peddler. In 1790 he published a volume of poems, and in 1792 the anonymous narrative poem *Watty and Meg*, which was ascribed by some to Burns. Later, for writing satires on the Paisley master weavers in a trade dispute, he was imprisoned. In 1794 he emigrated to America, where for several years he worked as a weaver, peddler, and school teacher. William Bartram (q.v.) interested him in the drawing of birds, and he evolved a plan to illustrate the ornithology of the United States. In 1804 partly to collect material, he and two friends walked to Niagara from Philadelphia, a trip which he described in a long poem, "The Foresters." Two years afterward he became assistant editor of an American edition of Rees's *Cyclopædia*, the publisher of which, Thomas Bradford, undertook to issue Wilson's *American Ornithology*. The first volume of the latter appeared in 1808 and the second in 1810. To collect material and get subscriptions, the author traveled in various parts of the country, undergoing many hardships. After his return he completed five more volumes, but died before the work was finished, at the age of 47. Volumes eight and nine were edited by George Ord in 1814, and four supplementary volumes were prepared by Prince Charles Lucien Bonaparte (1825–33). Collected editions were published by Jameson (4 vols., 1831), Jardin (3 vols., 1832), and Brewer (1851). Wilson's *Miscellaneous Prose Works and Poems*, with a memoir, were published in two volumes at Paisley in 1876. His scientific work was not systematic, but his descriptions were good, his pictures were superior to most of those of his day, and he was a pioneer in his chosen field. Consult J. S. Wilson, *Alexander Wilson, Poet-Naturalist* (Washington, 1906); Witmer Stone, in D. S. Jordan, ed., *Leading American Men of Science* (New York, 1910).

WILSON, ALLEN B. (1824–88). An American inventor, born in New York. He learned the trade of a cabinetmaker. In 1849 he invented a sewing machine (q.v.), in which the material was carried forward by a feeding plate. By this means an endless seam could be formed at any curve. The feeding device he greatly improved in 1850 by giving the roughened feeding plate four motions. He also introduced the rotary hook and stationary bobbin. In 1850 he, with Nathaniel Wheeler, formed the Wheeler & Wilson Manufacturing Company for the manufacture of sewing machines, with works at Bridgeport, Conn.

WILSON, AUGUSTA JANE (EVANS) (1835–1909). An American novelist, born in Columbus, Ga. She lived as a child in Texas, and after 1841 in Mobile, Ala. She wrote her first novel, *Inez, A Tale of the Alamo* (pub. 1856), at the age of 17. During the Civil War she opened a private hospital for the Confederate wounded. She wrote several novels, of which the chief were: *Beulah* (1859); *Macaria* (1864); *Saint Elmo* (1866); *Vashti* (1869); *Infelice* (1875); *At the Mercy of Tiberius* (1887); *A Speckled Bird* (1902); *Devota* (1907).

WILSON, SIR CHARLES RIVERS (1831–1916). A British financier, born in London. He graduated at Balliol College, Oxford, in 1853; entered the Treasury as a clerk in 1856; was a private secretary to Disraeli in 1867–68, and was Comptroller General of the National Debt Office from 1874 till 1894. From 1876 to 1895 he served on the Council of the Suez Canal Company, and he was Finance Minister to the Khedive of Egypt in 1877–80. From 1895 until his death he was president of the Grand Trunk Railway, Canada. He was made G.C.M.G. in 1895.

WILSON, Sir Daniel (1816–92). A Scottish-Canadian archæologist and educational reformer, born at Edinburgh, Scotland. He graduated at Edinburgh University, worked in London in 1837–42 as a journalist, and then returned to Edinburgh, where five years afterward he published the archæological work *Edinburgh in the Olden Time*, illustrated with sketches made by himself In 1851 he followed up this work with the highly praised *Archæology and Prehistoric Annals of Scotland*. Two years later he went to Canada to become professor of history and English literature in the University of Toronto, of which he was president from 1881 until his death In 1854 he became editor of the *Journal of the Canadian Institute;* in 1859 and 1860 was president of that body, in 1885 was president of the Royal Society of Canada; and in 1888 was knighted. To Wilson's efforts are largely due the success of the undenominational as opposed to the sectarian idea in university education in Canada. His publications, other than those already mentioned, include *Prehistoric Man: Researches into the Origin of Civilization in the Old and New Worlds* (1863; 3d ed, 1876), *Chatterton: A Biographical Study* (1869); *Caliban, the Missing Link* (1873), *Spring Wild Flowers*, a collection of poems (1875); *Reminiscences of Old Edinburgh* (1878), *Anthropology* (1885); and *The Right Hand: Lefthandedness* (1891). Consult J C Dent, *Canadian Portrait Gallery* (Toronto, 1880), and William Kingsford, "Sir Daniel Wilson" in *Transactions of the Royal Society of Canada* (Ottawa, 1893)

WILSON, Edmund Beecher (1856–). An American zoölogist, born at Geneva, Ill. He graduated from Yale in 1878 and obtained his doctorate at Johns Hopkins in 1881. He was lecturer at Williams College in 1883–84 and at the Massachusetts Institute of Technology in 1884–85; served as professor of biology at Bryn Mawr College from 1885 to 1891; and at Columbia was adjunct professor of biology (1891–94), professor of invertebrate zoölogy (1894–97), and professor of zoology after 1897. In 1900 he was president of the American Society of Naturalists and in 1913 president of the American Association for the Advancement of Science. His publications include, besides many special papers on embryology: *An Introduction to General Biology* (1887), with W. T. Sedgwick; *The Embryology of the Earthworm* (1889); *Amphioxus, and the Mosaic Theory of Development* (1893); *Atlas of Fertilization and Karyokinesis* (1895); *The Cell in Development and Inheritance* (1896; 2d ed., 1915).

WILSON, Edward A (1872–1912). An English physician and explorer. He graduated at Cheltenham College and later at Caius College, Cambridge. He was appointed chief of the scientific staff of Captain Robert F. Scott's (q.v.) last antarctic expedition (1910–13), and was one of the party of five which reached the South Pole. With his commander and sledge comrades he perished of cold and starvation during the return sledge journey from the Pole. Consult *Scott's Last Expedition* (New York, 1913).

WILSON, Sir (William James) Erasmus (1809–84). A British surgeon, born at Marylebone. He studied at St. Bartholomew's Hospital, London, and was elected a fellow of the Royal College of Surgeons in 1843 and of the Royal Society in 1845. In 1869 he founded, and thereafter held until 1877, the chair of dermatology at the Royal College of Surgeons, of which institution he was president in 1881. He was especially noted for his work in behalf of the very poor who were afflicted with skin diseases. In 1877–78 he paid the expenses of the transportation of Cleopatra's Needle (q.v.) to London. Wilson was knighted in 1881. His publications include: *Practical and Surgical Anatomy* (1838; 2d ed, 1853), *The Anatomist's Vade Mecum* (1840; 11th ed., 1892), *Diseases of the Skin* (1842, 6th ed., 1867); *A Healthy Skin* (7th ed., 1866).

WILSON, Francis (1854–). An American actor, born in Philadelphia. He began his career in a minstrel show, but by 1878 was playing at the Chestnut Street Theatre, Philadelphia, and the next year appeared in *M'liss* with Annie Pixley After several years in regular comedy, he took up comic opera. In 1889, leaving the New York Casino, he made his appearance as a star in *The Oolah*. Plays in which he starred subsequently include: *The Lion Tamer* (1891); *The Little Corporal* (1898); *The Bachelor's Baby* (1909–11), written by himself. He is the author of *Joseph Jefferson: Reminiscences of a Fellow Player* (1906), *The Eugene Field I Knew* (1898), and several plays of which *The Bachelor's Baby* was the most successful. Consult Clapp and Edgett, *Players of the Present* (New York, 1901).

WILSON, George Grafton (1863–). An American international law scholar, born at Plainfield, Conn. He was educated at Brown (A.B., 1886, Ph.D., 1889), where, after studying at Heidelberg, Berlin, Paris, and Oxford, he was associate professor (1891–94) and professor (1894–1910) of social and political science. Thereafter he held the chair of international law at Harvard. After 1900 he lectured also on international law at the United States Naval War College, after 1907 served on the board of editors of the *American Journal of International Law*, and in 1912–13 went to France as exchange professor. He wrote: *Town and City Government in Providence* (1889); *Insurgency* (1900); *Submarine Telegraph Cables in Their International Relations* (1901); *International Law* (1901; 6th ed., 1915), with G. F. Tucker: *International Law Situations* (11 vols., 1902–12); *International Law* (1910); *The Hague Arbitration Cases* (1915).

WILSON, Harry Leon (1867–). An American author. He was born at Oregon, Ill., and from 1896 to 1902 was editor of *Puck*. Wilson became a member of the National Institute of Arts and Letters. His writings include: *Zig Zag Tales* (1896); *The Spenders* (1902); *The Lions of the Lord* (1903); *The Seeker* (1904); *The Boss of Little Arcady* (1905); *Ewing's Lady* (1907); *The Man from Home* (1908; new ed., 1915), written with Booth Tarkington and dramatized with great success; *Bunker Bean* (1912); *Ruggles of Red Gap* (1915), also dramatized.

WILSON, Henry (1812–75). An American political leader, Vice President of the United States in 1873–75. He was born at Farmington, N. H., and his original name was Jeremiah Jones Colbath, but when he reached manhood he legally assumed the name of Henry Wilson. From the age of 10 till that of 21 he served an apprenticeship to a farmer. He then learned the shoemaking trade at Natick, Mass., where he later established a prosperous manufactory.

In 1840 he was elected to the Massachusetts House of Representatives as a Whig; was re-elected in the following year; and then served two terms in the State Senate. About this time he began to be an active opponent of slavery, and in 1848 he bought the Boston *Recorder* and edited it in the interests of the Free-Soil party. In 1850 he was again elected to the State Senate, and was chosen president of that body. In 1852 he presided over the Free-Soil Convention at Pittsburgh. In 1865 he was chosen by a combination of Free Soilers and Americans or Know Nothings to succeed Edward Everett in the United States Senate, and retained his seat until 1873. He denounced the assault of Preston B. Brooks upon Charles Sumner, and was challenged by Brooks, but declined, although he expressed his determination to defend himself if attacked. Before the Civil War he was considered one of the most effective speakers against slavery, and one of the foremost leaders of those who believed in fighting that institution through the machinery supplied by the Federal Constitution. In March, 1861, he was made chairman of the Committee on Military Affairs. After hostilities began he raised the Twenty-second Massachusetts Regiment and took it to the field, serving on the staff of General McClellan until Congress met. In 1872 he was nominated for the Vice Presidency by the Republicans on the ticket with Grant and was elected. In the following year he was stricken with paralysis, and died two years later. He was widely known during his political career as the "Natick Cobbler," a nickname given to him in allusion to his early life. Among his published works are: *History of the Anti-Slavery Measures of the Thirty-seventh and Thirty-eighth Congresses, 1861–64* (1864); *History of the Reconstruction Measures of the Thirty-ninth and Fortieth Congresses, 1865–68* (1868); and the almost completed *History of the Rise and Fall of the Slave Power in America* (3 vols., 1872–77), an exceedingly valuable work. Consult Russell and Nason, *Life and Public Services of Henry Wilson* (Boston, 1872), and Stowe, *Men of Our Times* (Hartford, 1868).

WILSON, Henry Lane (1857–). An American diplomat, born at Crawfordsville, Ind. He graduated from Wabash College in 1879. He was editor of the Lafayette (Ind.) *Journal* in 1882–85 and then removed to Spokane, Wash., where he was engaged in the practice of law and in banking until 1896. From 1897 to 1905 he was Minister to Chile, from 1905 to 1910 Minister to Belgium, and in 1910–13 Ambassador to Mexico. He had charge of American interests during the turbulent period marking the close of the Díaz régime and during the whole of the Madero administration; he advocated the recognition of Huerta by the United States. In 1913, recalled by President Wilson, he resigned. Later he criticized the administration's policy in Mexico.

WILSON, Horace Hayman (1786–1860). An English Orientalist, born in London, and educated for the medical profession. In 1808 he went to India as assistant surgeon on the Bengal Establishment, and a short time afterward obtained an appointment in the Calcutta mint as assistant to Leyden. He applied himself diligently to the study of Sanskrit, and in 1811 was appointed secretary of the Asiatic Society of Bengal. At Calcutta in 1813 Wilson published his first work, an edition of Kalidasa's *Mēghadūta* (new edition, 1901). His *Dictionary, Sanskrit and English* (1819–40) was followed by many other contributions. A complete edition of his works was published in 12 volumes (1862–71). Among them as written, edited, or translated by him are *Select Specimens of the Theatre of the Hindus* (2 vols., 1826–27, 3d ed., 1871); *The Raghu Vansa, or Race of Raghu, a Historical Poem, by Kálidása* (ib., 1832); *The Vishnupurāna* (1840, new ed., 1864–77); *Sanskrit Grammar* (1841); *Ariana Antiqua, a Descriptive Account of the Antiquities and Coins of Afghanistan* (1841); *History of British India from 1805 to 1835* (1844–48); *Rig-Veda-Sanhita* (6 vols., 1850–58); *Glossary of Judicial and Revenue Terms, from Arabic, Persian, Hindustani, etc.* (1855). He became professor of Sanskrit in Oxford in 1832, and librarian of the East India Company, London, in 1836, and held both of these positions till his death.

WILSON, Ida Lewis. See Lewis, Ida.

WILSON, Jack. See Wovoka.

WILSON, James (1742–98). An American jurist, and a signer of the Declaration of Independence. He was born near St Andrews, Scotland, was educated at St. Andrews, Glasgow, and Edinburgh, and in 1763 emigrated to New York, whence he removed to Philadelphia in 1766. He taught Latin in the Philadelphia College (now University of Pennsylvania), studied law under John Dickinson (q.v.), and was admitted to the bar in 1767. He was a delegate to the Provincial Convention of 1775; was appointed Indian commissioner for the middle department in the same year; was a member of the Continental Congress in 1775–77 and in 1782–83, and of the Confederation Congress in 1785–87; was advocate-general for the French government from 1779 to 1783; was appointed brigadier general of militia in 1782; and, in the same year, was Pennsylvania's counsel in the suit with Connecticut over the possession of the Wyoming valley. He was a delegate to the Constitutional Convention of 1787 and took a foremost part in the debates, emphasizing the contention that sovereignty rests ultimately with the people rather than with the constituent States. Subsequently he was a member of the Pennsylvania Convention, and with Thomas McKean secured the ratification of the Constitution by that State. His opening speech is still regarded as one of the clearest expositions ever made of the general character of the Constitution. Of this and his other speeches in the two conventions James Bryce has said that "They display an amplitude and profundity of view in matters of constitutional theory which place him in the front ranks of political thinkers of his age." In 1789–90 he was a prominent member of the convention which remodeled the State constitution; in 1791 he became professor of law in the Philadelphia College; and from 1789 until his death he was an associate justice of the United States Supreme Court. He wrote several pamphlets, including *Considerations on the Nature and Extent of the Legislative Authority of the British Government* (1774) and *An Address to the Citizens of Philadelphia* (1784). His *Works* have been edited by his son, Bird Wilson (1803–04), and by James D. Andrews (Chicago, 1896). Consult an article by Justice J. M. Harlan, "James Wilson and the Formation of the Constitution," in the *American Law Review*, vol. xxxiv, and *James Wilson Memorial Volume* (1907).

WILSON, JAMES (1805–60). A British economist, born at Hawick, Roxburghshire, Scotland. His father was a member of the Society of Friends, and the son, after three years and a half in the Friends' schools, began a business career at Hawick, but removed in 1824 to London, where he was a merchant until 1844. He published in 1839 *Influences of the Corn Laws as Affecting All Classes of the Community* (3d ed, 1840), in which he showed that the duty on corn was really no more beneficial to the agricultural interest than it was to the manufacturing interest. In 1840 he published *Fluctuations of Currency, Commerce, and Manufactures*, in which he pointed out the evil effects of the artificial operation of the corn laws. In the following year appeared his *The Revenue, or What Shall the Chancellor Do?* Two years afterward he founded *The Economist*, in which he advocated the anticorn-law movement. In 1847 he published *Capital, Currency, and Banking* (2d ed, 1859), which was a collection of essays already printed in *The Economist*. In the same year he was returned to Parliament from Westbury, and from 1853 to 1858 held the position of Financial Secretary to the Treasury. In October, 1859, he became financial member of the Council of India, where he carried through a budget that provided for an income tax, and established a sound paper currency redeemable in silver. A memoir was written by his son-in-law, Walter Bagehot (London, 1861).

WILSON, JAMES (1835–1920). An American agriculturist. He was born in Ayrshire, Scotland, came with his parents to the United States in 1851, lived for a short time at Norwich, Conn., and in 1855 removed to Tama Co., Iowa, where for many years he was engaged in farming. He was a member of the State Assembly for three terms, during the last of which he was Speaker, and from 1873 to 1877 and again in 1883–85 was a member of Congress. In 1870–74 he was regent of the State University of Iowa and from 1890 to 1897 was director of the Agricultural Experiment Station and also professor of agriculture in the Iowa Agricultural College. In 1897 he became Secretary of Agriculture in the cabinet of President McKinley, being retained by Presidents Roosevelt and Taft, and serving continuously in that capacity for 16 years.

This was a period of remarkable development of the Federal Department of Agriculture, from a small and relatively unimportant institution to the greatest institution of its kind in any country, working in close contact with all branches of the industry. The interest and confidence Secretary Wilson aroused in agricultural investigation enabled him to secure rapidly increasing appropriation for expanding the department's work and influence. The appropriations grew from a little over $3,000,000 in 1897 to over $24,000,000 the year he retired, and the personnel from under 2500 to nearly 14,000 persons. In his administration a national forest policy was inaugurated and millions of acres set aside for forest reserves, a system of soil survey for the whole country was begun, Federal experiment stations were established in Alaska, Porto Rico, Hawaii, and Guam, farm management surveys were undertaken, and farm demonstration work started and developed upon a national scale. The regulatory work of the department was also very greatly extended. A review of the progress during his administration is given in the *Year Book of the Department of Agriculture* for 1912 (Washington, 1913).

WILSON, JAMES CORNELIUS (1847–). An American physician, born in Philadelphia. He graduated from Princeton in 1867, and in 1869 from Jefferson Medical College, where until his retirement he was professor of the practice of medicine and of clinical medicine. He was also identified with various Philadelphia hospitals. He served as president of the American Academy of Medicine (1897), of the American Association of Physicians (1902), and of other professional bodies. His publications include: *The Summer and its Diseases* (1879); *A Treatise on the Continued Fevers* (1881); *Fever Nursing* (1888; 8th ed., rev. and enl., 1915); *The Complete Medical Pocket Formulary and Physician's Vade-Mecum* (1892; 5th ed, rev., 1907), *A Handbook of Medical Diagnosis* (1909; 4th ed., rev., 1915).

WILSON, JAMES GRANT (1832–1914). An American soldier, editor, and author, born in New York City. He was educated chiefly by private tutors and through European travel, founded (1857) the Chicago *Record*, a journal of art and literature, and entered the Union army as major and left it as brigadier general (1865). He afterward lived in New York, was a popular speaker, a frequent contributor to periodicals, president of the Society of American Authors, and, after 1885, of the New York Genealogical and Biographical Society. He edited Fitz-Greene Halleck's *Poems* (1868); *A Memorial History of the City of New York* (4 vols., 1892–93); *Appleton's Cyclopædia of American Biography* (6 vols., 1887–89, with John Fiske, vol. vii, 1900), an excellent book of reference; *The Great Commanders Series* (18 vols., completed 1913); *The Presidents of the United States, 1789–1914* (4 vols., 1914), the work of many distinguished writers. His chief books include: *Biographical Sketches of Illinois Officers* (1862–63); *Life of Fitz-Greene Halleck* (1869); *Sketches of Illustrious Soldiers* (1874); *Poets and Poetry of Scotland* (1876); *Centennial History of the Diocese of New York, 1775–1885* (1886); *Bryant and his Friends* (1886); *Commodore Isaac Hull and the Frigate Constitution* (1889); *Love in Letters* (1896); *Life of General Grant* (1897); *Thackeray in the United States* (2 vols., 1904).

WILSON, JAMES HARRISON (1837–1925) An American soldier, born near Shawneetown, Ill. He graduated at West Point in 1860 and entered the topographical engineers. During the Civil War he acted as aid-de-camp to General McClellan in the Maryland campaign; was chief topographical engineer of the Army of the Tennessee from October, 1862, until March, 1863; was assistant engineer and inspector general of the Army of the Tennessee at Vicksburg and took part in the operations about Chattanooga. He was made brigadier general of volunteers in October, 1863. In February, 1864, he was put in charge of the cavalry bureau at Washington; then commanded the Third Cavalry Division under General Sheridan; was brevetted major general of volunteers on Oct. 5, 1864, for services during the war; and on Oct. 24, 1864, was put in command of the cavalry corps of the Military Division of the Mississippi. He participated in the battles of Franklin and Nashville, and in March, 1865, was sent on a cavalry expedition into Georgia and Alabama, and in 28 days captured Selma, Montgomery, Columbus,

Macon, and other places, with 288 guns and 6820 prisoners, including Jefferson Davis For these services he was made a major general of volunteers in 1865 He resigned from the army in 1870 and engaged in large railroad and engineering operations at home and abroad In May, 1898, he commanded the First Division of the First Army Corps in the campaign in Porto Rico He took part in the China relief expedition of 1900, and retired in 1901 as a brigadier general in the regular army From 1907 he was a trustee of the Mutual Life Insurance Company He published among other things *Life of General U S Grant* (1868), with Charles A Dana, *China Travels and Investigations in the Middle Kingdom* (1887, new ed, 1900), *Life of Charles A Dana* (1907), *Under the Old Flag* (1912)

WILSON, JOHN (1588–1667) A New England clergyman He was born at Windsor, England, graduated at Cambridge in 1606, obtained a fellowship and studied law three years He was ordained in the Church of England, became chaplain to Lady Scudamore, preached at Mortlake, Henley, Bumsted, Stoke, Candish, and Sudbury, but was repeatedly suspended by the Bishop's court because of his Puritan sympathies He embarked for America (1630) at the Isle of Wight, with Winthrop and others of the Massachusetts Colony, and landed at Salem, Mass At Charlestown he organized a church, which afterward became the First Church of Boston, was ordained teacher in this church by the imposition of the hands of the members and ordained as its pastor (1632) In 1634 he visited England, returning the next year with his wife, and Hugh Peters (q v), who was compelled to leave for nonconformity With Governor Winthrop, Wilson opposed the Antinomian sentiments of John Wheelwright and Anne Hutchinson. He was chaplain to the troops sent against the Pequot Indians of Connecticut (1636), and was associated with John Eliot in his missionary labors among the Indians He published in England *Some Helps to Faith* (1625) and a poem, *Famous Deliverances of the English Nation* (1626), in America, a Latin poem to the memory of John Harvard, and *The Day Breaking, if Not the Sun-Rising, of the Gospel*, relative to the Indians in New England (1647, new ed, New York, 1865)

WILSON, JOHN, the CHRISTOPHER NORTH of *Blackwood's Magazine* (1785–1854) A Scottish writer, born May 18, 1785, at Paisley, and educated at Glasgow and Oxford Inheriting from his father an estate of £50,000, he purchased the property of Elleray overlooking Lake Windermere, where he settled as gentleman and poet There, in the Lake District, he associated intimately with Wordsworth and came to know well De Quincey, Southey, and Coleridge To this period belong two volumes of graceful verse—*The Isle of Palms* (1812) and *The City of the Plague* (1816). Having lost his fortune through a dishonest uncle, he migrated to Edinburgh, where he took a memorable hand with J. G Lockhart (q v) in the *Blackwood's Magazine* (q v.) for October, 1817 Thereafter, till near his death, he was a leading writer for this famous Tory magazine, though he was never strictly its editor In 1820 he was appointed professor of moral philosophy in the University of Edinburgh, defeating in the contest Sir William Hamilton. His only claim to the post was his rampant Toryism, then regarded as sufficient Wilson nevertheless was an enthusiastic teacher and inspired his pupils, even if he had nothing very profound to impart to them In 1822 he began in *Blackwood's* the symposium known as the *Noctes Ambrosianæ* (q v) Here Wilson is seen at his best—his wit, humor, and pathos The Ettrick Shepherd,' of the *Noctes*, an idealized portrait of James Hogg (q v), is a masterly creation The death of the Shepherd in 1835 necessarily put an end to these delightful banquets In the earlier days Wilson also contributed to *Blackwood's* a good deal of prose fiction, afterward published separately *Lights and Shadows of Scottish Life* (1822), *The Trials of Margaret Lyndsay* (1823), and *The Foresters* (1825) Later came the substantial essays on Homer, Spenser, and all manner of papers on contemporary writers and subjects For 1834 the number reached fully 54 distinct contributions In 1837 Wilson lost his wife and never recovered from his grief On resigning his professorship in 1851 he was granted a pension of £300 a year He died in Edinburgh, April 3, 1854 In 1865 a statue was erected to his memory in Princes Street Gardens His brother, James Wilson (1795–1856), was known as a zoologist Consult his *Works*, edited by P J Ferrier (12 vols, Edinburgh, 1855–58), the *Noctes Ambrosianæ*, edited by R S Mackenzie (5 vols, New York, 1854), *Memoir* by his daughter, M W Gordon (2 vols, Edinburgh, 1862), and for a good estimate, G Saintsbury, in *Essays in English Literature* (London, 1890), C T Winchester, "John Wilson," in *Group of English Essayists of the Early Nineteenth Century* (New York, 1910)

WILSON, JOHN (1804–75) A British missionary and Orientalist, born at Lauder, Berwick, Scotland, and educated at the University of Edinburgh In 1828 he went to Bombay as a missionary His mastery of the languages of western India, his knowledge of the literature and the faiths of India, combined with his energy and sympathy with native feeling, enabled Wilson to exercise a wide influence His linguistic labors, especially in Avestan, were valuable He was twice president of the Bombay Branch of the Royal Asiatic Society, and was vice chancellor of the Bombay University Among his writings other than those connected with his missionary work are *The Parsi Religion* (1843), *The Lands of the Bible* (2 vols, 1847), *History of the Suppression of Infanticide in Western India* (1855), *India Three Thousand Years Ago* (1858), *Indian Caste*, edited by Peter Peterson (2 vols, 1877, new ed, 1878) Consult George Smith, *Life of Wilson* (London, 1878), and J Marrat, *Two Standard Bearers in the East* (ib, 1882)

WILSON, JOHN (1837–1915) An English labor leader, born at Greatham He began work at the age of 10 in the quarries of Durham, and later was employed in the mines of Durham and in the United States. Wilson was instrumental in organizing in 1869 the Miners' Association, and was its treasurer in 1882–90, financial secretary in 1890–96, and corresponding secretary thereafter He was a member of Parliament in 1885–86, and after 1890 represented Mid Durham until his death He was a leader of the Labor party, but cooperated with the Liberals, who assisted in his reelection in 1906 He gained an international reputation Consult his *Memories of a Labor Leader* (London, 1910)

WILSON, JOHN MOULDER (1837–1919). An American soldier and military engineer, born in the District of Columbia. He graduated at West Point in 1860. He served throughout the Civil War, first in the artillery, then in the topographical engineers, and finally in the corps of engineers, distinguishing himself at Gaines's Mill, Malvern Hill, and in the campaign against Mobile, and by the end of the war had been brevetted colonel in both the volunteer and the regular service. Afterward he was engaged on important engineering works for the United States government, was assistant to the Chief of Engineers at Washington from 1882 to 1886, was in charge of the public buildings and grounds in the District of Columbia in 1885–89, had charge of the completion of the Washington Monument and of the building of other memorials and monuments, and in 1889–93 was superintendent of the United States Military Academy at West Point. In 1897 he was made Chief of Engineers of the army, with the rank of brigadier general, and in 1901 he was retired.

WILSON, LUTHER BARTON (1856–). An American Methodist Episcopal bishop, born in Baltimore, Md. He graduated from Dickinson College in 1875 and from the Medical College of the University of Maryland in 1877. After entering the ministry in 1878, he served several pastorates, and was a presiding elder in the Baltimore Conference when elected Bishop in 1904. He became President of the Anti-Saloon League of America and President of the Board of Trustees of Drew Theological Seminary, and was connected with many important movements in his denomination.

WILSON, RICHARD (1713–82). An English landscape painter. He was born in Pinegas, Montgomeryshire, and after studying for six years with Thomas Wright in London began as a portrait painter. In this field he attained some success, and about 1748 executed a group picture of the Prince of Wales, the Duke of York, and their tutor (in the National Portrait Gallery). In 1749 he went to Italy, where he remained six years. Here, upon the advice of Zuccarelli and Joseph Vernet, he devoted himself entirely to landscape painting, achieving considerable success. Upon his return to England he painted for the Duke of Cumberland his famous "Niobe" (1760), of which there is a replica in the National Gallery. His landscapes were not appreciated, however, and he had a continual struggle with poverty. In 1776 he was appointed librarian to the Royal Academy, receiving a small pittance which kept him from starvation. In 1781 he fell heir to his brother's little estate at Llanberis, North Wales, where he spent the remainder of his life. Wilson was the founder of classic landscape painting in Great Britain and was one of the original members of the Royal Academy. Though he painted some of England's rivers and the mountains of Wales, the influence of his study under Italian skies is always present, as is also the classic manner of Claude Lorraine. His originality lay chiefly in his treatment of light, air, and color. His pictures usually contain distant hills and classic ruins beyond placid water, with a foreground of trees. In the National Gallery are 15 examples, including "The Ruins of the Villa of Mæcenas"; "Hadrian's Villa"; "The Castle of St. Angelo, Rome"; and "Lake Avernus." Others are in South Kensington Museum, and the Metropolitan Museum, New York, possesses three, including a fine Italian Landscape (Hearn collection).

WILSON, SIR ROBERT THOMAS (1777–1849). An English general and military writer, born in London and educated at Westminster and at Winchester. When scarcely 17 he served with distinction as a volunteer under the Duke of York in Belgium. He was appointed to command the small force of cavalry which served under Sir Ralph Abercromby in Egypt, and at the conquest of the Cape of Good Hope in 1806 he again commanded a small cavalry force. As a member of the staff of Lord Hutchinson, he was present at the battle of Eylau (q.v.), in 1807. Under Wellington he commanded a Spanish brigade at the battle of Talavera, in 1809. As British representative with the Russian army in the campaign of 1812, Wilson fought against the French in the battle of Smolensk, and participated in several engagements during the French retreat. At Lutzen (1813) he took command of the Prussian reserve, and at a crisis of the battle succeeded in checking the enemy. At Bautzen he also distinguished himself, and a day or two after, the Emperor of Russia presented to him publicly the cross of the Order of St. George.

In 1841 he attained the rank of general; and from 1842 to 1849 he held the post of Governor of Gilbraltar. In 1818–31 he sat in Parliament as a Liberal for Southwark. His publications include: *An Inquiry into the Military Force of the British Empire* (1804); *Campaigns in Poland, with Remarks on the Russian Army* (1811); and a *Sketch of the Military Power of Russia* (1817). His nephew, the Rev. Herbert Randolph, edited his private diaries (1861), and a *Life* (1863), based on autobiographical materials.

WILSON, SIR ROLAND KNYVET (1840–). An English lawyer, born at Swaffham, Norfolk, and educated at Eton and at King's College, Cambridge. From 1878 to 1892 he was reader in Indian law at Cambridge University. He became well known for his important treatises on legal subjects, especially Anglo-Indian practice. Among his publications are: *A Short History of Modern English Law* (1874); *An Introduction to the Study of Anglo-Muhammadan Law* (1894); *A Digest of Anglo-Muhammadan Law* (1895; 4th ed., 1912); *The Province of the State* (1911); *The First and Last Fight for the Voluntary Principle in Education* (1915).

WILSON, THOMAS (1663–1755). An English bishop, born at Burton, in Cheshire, and educated at Trinity College, Dublin. He was appointed chaplain to William, ninth Earl of Derby, and tutor to his only son. In such esteem did Lord Derby hold him that the next year he offered him the rich living of Badsworth, which Wilson would not accept because of his disapproval of nonresident rectors. Toward the end of 1697 Lord Derby insisted upon his taking the bishopric of Sodor and Man, and he was consecrated early in 1698. He was strict in discipline and is perhaps best known for the unusual exercise of his rights as head of the ecclesiastical courts. Between 1713 and 1736 this led him into frequent collisions with the Governor of the Isle of Man. Wilson was fined and in 1722 was imprisoned in Castle Rushen for two months. To atone for this and to reimburse him for fines and other pecuniary losses the King offered him the bishopric of Exeter, which he refused. Among his writings were:

The Principles and Duties of Christianity (1699) *A Short and Plain Instruction for the Better Understanding of the Lord's Supper* (1736), *Essay Toward an Instruction for the Indians* (1740) and *Sacra Privata* (1781) Consult the *Life* by John Keble (Oxford, 1847–63) and J W Stubbs, *History of the University of Dublin* (London, 1889)

WILSON, WILLIAM BAUCHOP (1862–) An American cabinet officer and labor leader, born in Blantyre, Scotland Brought as a child to the United States, he became a miner in Pennsylvania, and at 11 was a junior member of a labor union He was reared in the midst of labor disputes By 1888 he had become president of the District Miner's Union and a member of the executive board of the United Mine Workers, and by 1900 secretary and treasurer of the National Union of Miners In 1907 he was elected Representative in Congress, and served until 1913 as a Democrat While chairman of the committee on labor he drafted the bill to create a department of Labor, and in the year that it was adopted (1913) he was made a member of President Wilson's cabinet as Secretary of Labor As such, he sought to better labor conditions, establishing a government bureau of employment and giving aid to similar agencies and bureaus in the States

WILSON, WILLIAM LYNE (1843–1900) An American political leader and educator, born in Jefferson Co, Va He graduated at Columbian College at Washington, D C, in 1860, then studied for a year at the University of Virginia, served in the Confederate army was professor of Latin in Columbian College in 1865–71, and then practiced law until 1882 In the following year he became president of the University of West Virginia, and from 1883 to 1895 was a Democratic member of Congress from West Virginia In 1893–95 he was chairman of the Committee of Ways and Means, and he carried through the House the repeal of the Sherman Silver Purchase Law, and also framed the well-known Wilson Tariff Bill, which with some modifications became a law in August, 1894 (See TARIFF) During his congressional career he won a high reputation as an eloquent and forceful speaker and as an authority on the tariff and other financial subjects. In 1892 he was chairman of the Democratic National Convention In 1895 he became Postmaster General in the cabinet of President Cleveland, and held that office until 1897, when he became president of Washington and Lee University

WILSON, (THOMAS) WOODROW (1856–1924) The twenty-eighth President of the United States, known also as a publicist, party leader, educator, speaker, and historian. He was born at Staunton, Va, Dec 28, 1856, son of Rev Joseph R Wilson and Janet (Jessie) Woodrow, of Scotch-Irish ancestry His paternal grandfather, James Wilson, came from Ireland in 1807 and became a publisher and the owner of a chain of newspapers His father was a Southern Presbyterian minister. Woodrow Wilson studied for about a year at Davidson College (N C), and graduated from Princeton in 1879 He was known at Princeton for debating and literary ability and was editor of the *Princetonian* While an undergraduate he published a widely noticed article in the *International Review* on cabinet government in the United States In 1881 he graduated in law from the University of Virginia, for a year practiced in Atlanta, Ga, and then entered Johns Hopkins University, newly founded, for post-graduate courses in political science There he published (1885) his thesis for the degree of Ph D (conferred 1886) as *Congressional Government* This, the first attempt to describe the actual workings of the executive and legislative system of the United States, developed apart from the theory of the Constitution, was at once accepted as authoritative Many of the changes urged in it, Wilson, as President, later brought about He was associate professor of history and political economy at Bryn Mawr College (1885–88), serving also as lecturer at Johns Hopkins in 1887, and (1888–90) was professor of history and political economy at Wesleyan University, Middletown, Conn At Wesleyan he completed *The State*, an analysis of various national governments, which established his reputation as a scholar and political philosopher and which is in use in many institutions

Called to Princeton, Wilson was professor of jurisprudence and political economy (1890–95), of jurisprudence (1895–97), and of jurisprudence and politics (1897–1910), his courses being notably popular In 1902, on the resignation of President Patton, Wilson was elected his successor, the first layman to hold the office His presidency (1902–10) was a period of notable reforms (see PRINCETON UNIVERSITY) He was successful until he undertook to eliminate the exclusive senior-junior clubs and establish "colleges" or "quadrangles" in order to coordinate the social and intellectual life of the university The plan met organized opposition from alumni members of the clubs, and the president was asked to withdraw it Friction developed also, in 1909, over the plans and purpose of the proposed graduate school In 1910 a popular demand was made that Wilson be nominated for Governor of New Jersey He was a Democrat in politics, and though he was not known as a party man the leaders of the party favored him, and he was nominated There followed a campaign remarkable for dignity, absence of acrimony, and clear, forceful statement of progressive democracy Wilson was elected by a plurality of 49,056 in a State Republican for 16 years before A movement was immediately begun to secure for him the Democratic nomination for President of the United States

As Governor of New Jersey (1910–13), Wilson became known as a progressive statesman and a skillful politician He held it the duty of his office to be the party leader, and to stand responsible for the legislative programme outlined in the platform Despite a Republican majority in the Senate and opposition in his own party, he secured the enactment of various important laws designed to remedy political and economic conditions (see NEW JERSEY, *History, Government*). In his support of J E Martine for United States Senator in 1911, the Governor won a victory over James Smith, a party leader who wanted the nomination for himself This contest focused public attention on New Jersey In 1911 Wilson spoke throughout the West, and announced approval of the commission form of municipal government, and of the initiative, referendum, and recall (though opposing the recall of judges and judicial decisions) As an avowed candidate for the Democratic presidential nomination, his conservatism pleased the East, and his progressive ideas and his record attracted

the West During the campaign occurred a break between Wilson and George Harvey, editor of *Harper's Weekly*, whose support, since his journal was reported to be connected with certain interests, embarrassed the candidate At the Baltimore Convention Wilson supported Bryan in the latter's opposition to the election of Alton B Parker as temporary chairman, and in the balloting greatly profited by the contest between Clark and Bryan On the forty-sixth ballot Wilson was nominated. In November, 1912, he was elected President. He received 435 electoral votes against 88 for Roosevelt (q.v.) and 8 for Taft (q.v.) During the campaign and in his inaugural address he set forth the principles of the New Freedom (q.v.) Thomas R. Marshall of Indiana was elected Vice President

The Wilson administration was concerned with the enactment of important domestic legislation promised in the Democratic platform and with the conduct of foreign affairs that were particularly difficult and delicate The President revived a custom long in disuse by presenting messages to Congress in person before both Houses in joint session. The extraordinary session summoned by him in April, 1913, was the longest in the history of that body. The most important bills passed were: The Underwood-Simmons Tariff Law (1913), The Glass-Owen Currency Act (1913), the trust legislation (1914), and the Panama Canal tolls legislation (1914). (For details, see UNITED STATES, *History*) The success with which this programme was carried through enhanced the President's reputation and affected the congressional campaign of 1914. His attitude towards the national Legislature marked a departure from the custom of most presidents, for it was that of the party leader, demanding support from the Democratic members in Congress.

In diplomacy, Wilson's task was much more difficult. At the outset, the most perplexing question concerned Mexico. (See MEXICO, *History;* UNITED STATES, *History.*) His Mexican policy was based on a desire to allow Mexico to settle her own problems, but it was savagely criticized as unpractical and as an abandonment of American rights. In his efforts to foster friendly relations with South American countries and particularly to dispel uneasiness as to the attitude of the United States towards them he was more successful.

The great war had an important influence on legislation and on the President's policies. Marine insurance under government supervision, additional internal taxes, and the shipping bill (1914–15) were the immediate consequences. In advocating a merchant marine Wilson experienced his first important defeat in Congress (1915). At the beginning of the war he opposed the demand for greater military preparedness, but as the struggle continued he modified his attitude in view of the series of crises precipitated by submarine warfare. (See UNITED STATES, *History;* WAR IN EUROPE.) Despite scathing criticism of his foreign policy and of his consistency as to the preparedness programme, Wilson's personality deeply impressed itself on the American mind, and held the allegiance of his party.

In party politics a remarkable situation developed in 1916. On the eve of the assemblage of the Republican convention there was no outstanding candidate who seemed likely to secure the nomination. A strong movement had been started early in the year for Justice Charles E. Hughes, but he remained silent as to the issues and as to his willingness to accept the nomination Another movement had been for conciliation between Republicans and Progressives and for the nomination of Roosevelt on the issue of Americanism and preparedness. Both conventions met at Chicago simultaneously, and, with no one having a majority of the Republican convention, unsuccessful negotiations were carried on between the two Finally Hughes and Fairbanks were nominated by the Republicans. Wilson was nominated by acclamation for reelection by the Democratic convention For his victorious campaign see UNITED STATES. For the entrance of the United States into the World War and President Wilson's part, see VOLUME XX

Mr. Wilson's first wife, Ellen Louise Axson, died at the White House in 1914. He was married the next year to Mrs. Norman Galt of Washington. Two daughters, Jessie and Eleanor, were married in the White House, the former to Francis B. Sayre and the latter to William G McAdoo, Secretary of the Treasury. Wilson's literary distinction was recognized by admission to the American Academy of Arts and Letters, and he was the seventh President to be a member of the American Philosophical Society before his election as chief executive. He published, besides the works already mentioned: *An Old Master, and Other Political Essays* (1893); *Division and Reunion, 1829–89* (1893; expanded, 26th ed., 1909); *Mere Literature, and Other Essays* (1893); *A History of the American People* (1902; reprinted 1903, 1910); *George Washington* (1896 and 1903); *Constitutional Government in the United States* (1908); *The New Freedom: A Call for the Emancipation of the Generous Energies of a People* (1913); and numerous periodical articles and addresses.

Bibliography. William Bayard Hale, "Woodrow Wilson, a Bibliography," in *World's Work* (New York, 1911–12); H. E. Hosford, *Woodrow Wilson: His Career, his Statesmanship, and his Public Policies* (2d ed., ib., 1912); A. G. Gardiner, in *Pillars of Society* (London, 1913); Harry Clemons, *An Essay towards a Bibliography of the Published Writings and Addresses of Woodrow Wilson, 1875–1900* (Princeton, 1913); J. G. Wilson, ed., *Presidents of the United States, 1789–1914*, vol. iv (New York, 1914); Henry Jones Ford, *Woodrow Wilson: The Man and his Work* (1916).

WILSON'S CREEK, BATTLE OF. A battle fought near Wilson's Creek, about 10 miles south of Springfield, Mo., on Aug. 10, 1861, between a Federal force of about 6000 men under General Lyon and a Confederate force of about 10,000 under General McCulloch. McCulloch had advanced to Wilson's Creek, 10 miles from Springfield. Having resolved to attack him, Lyon on the evening of the 9th sent a column of 1200 men and six pieces of artillery under Col. Franz Sigel with orders to strike the Confederate right flank next morning; while he himself, with about 4200 men, including eight companies of regulars and 10 pieces of artillery, prepared to fall upon the Confederate left wing. The two attacks were delivered as planned, but Sigel's column was completely routed, and the Confederates were then able to concentrate superior numbers against Lyon. While leading a charge that general was killed; but his troops under Major Sturgis continued to fight with great determination, repulsed all the assaults

made against their position, and succeeded in effecting a retreat to Springfield and from there to Rolla. The Federal losses in the battle were about 1235; those of the Confederates about 1095. By the Southerners this victory was called "Oak Hills." As a result of the battle the Confederates were able to capture Lexington, Mo. Consult Johnson and Buel (eds.), *Battles and Leaders of the Civil War*, vol. i (New York, 1887).

WILTON, MARIE EFFIE. See BANCROFT, MARIE EFFIE WILTON, LADY.

WILT'SHIRE, or **WILTS.** An inland county of South England, bounded by Gloucester, Berkshire, Hampshire, Dorsetshire, and Somerset (Map: England, E 5). Area, 864,101 acres. The surface features are chiefly those of a rolling open country with some stretches of woodland, and the county is watered by the lower and southern Avon. The greater portion is in pasture land, though wheat, oats, turnips, and cabbage are raised. The mechanical industries are chiefly centred around the great railroad shops at Swindon, and there are iron mines and blast furnaces in several places. Wiltshire is very rich in archæological remains, among which is the famous Stonehenge (q.v.). Pop., 1901, 271,394; 1911, 286,822. County town, Salisbury.

WIM'BLEDON. A town in Surrey, England, 8 miles southwest of St. Paul's, London (Map: London, F 6). It is a favorite suburban residence of Londoners, and was formerly the meeting place of the British Rifle Association. It has remains of an early British earthwork, and is regarded as the scene of the defeat of King Ethelbert of Kent by King Ceawlin of Wessex in 586. Pop., 1901, 41,652; 1911, 58,003.

WIMBORNE, IVOR CHURCHILL GUEST, second BARON (1873–). A British administrator. He was educated at Eton, and at Trinity College, Cambridge; served in the South African War in 1900, and was a member of Parliament for Plymouth in 1900–06 and for Cardiff District in 1906–10. In 1910–12 he was Paymaster-General, and in January, 1915, became Lord Lieutenant of Ireland. He was created Baron Ashby St. Ledgers in 1910, and succeeded to his father's barony in 1914.

WIMMER, vĭm'mĕr, LUDVIG FRANDS ADALBERT (1839–). A Danish philologist, born at Ringkjöbing, in Jutland. He was educated at the University of Copenhagen, where he took his degree in 1868. In 1871 he became docent, and from 1886 to 1910 he was professor of Norse philology in the same institution. His contributions to the study of Scandinavian languages, and particularly to the study of runic writing, place him among the foremost scholars in Norse philology. His writings include *Oldnordisk Formlære* (1870; Ger. ed., 1871); *Runeskriftens Oprindelse og Udvikling i Norden* (1874, enlarged Ger. trans. as *Die Runenschrift*, 1887); *Dobefonten i Aakirkeby Kirke* (1887), and his great collection of Danish runes, *De danske Runemindesmærker* (4 vols., 1895–1908).

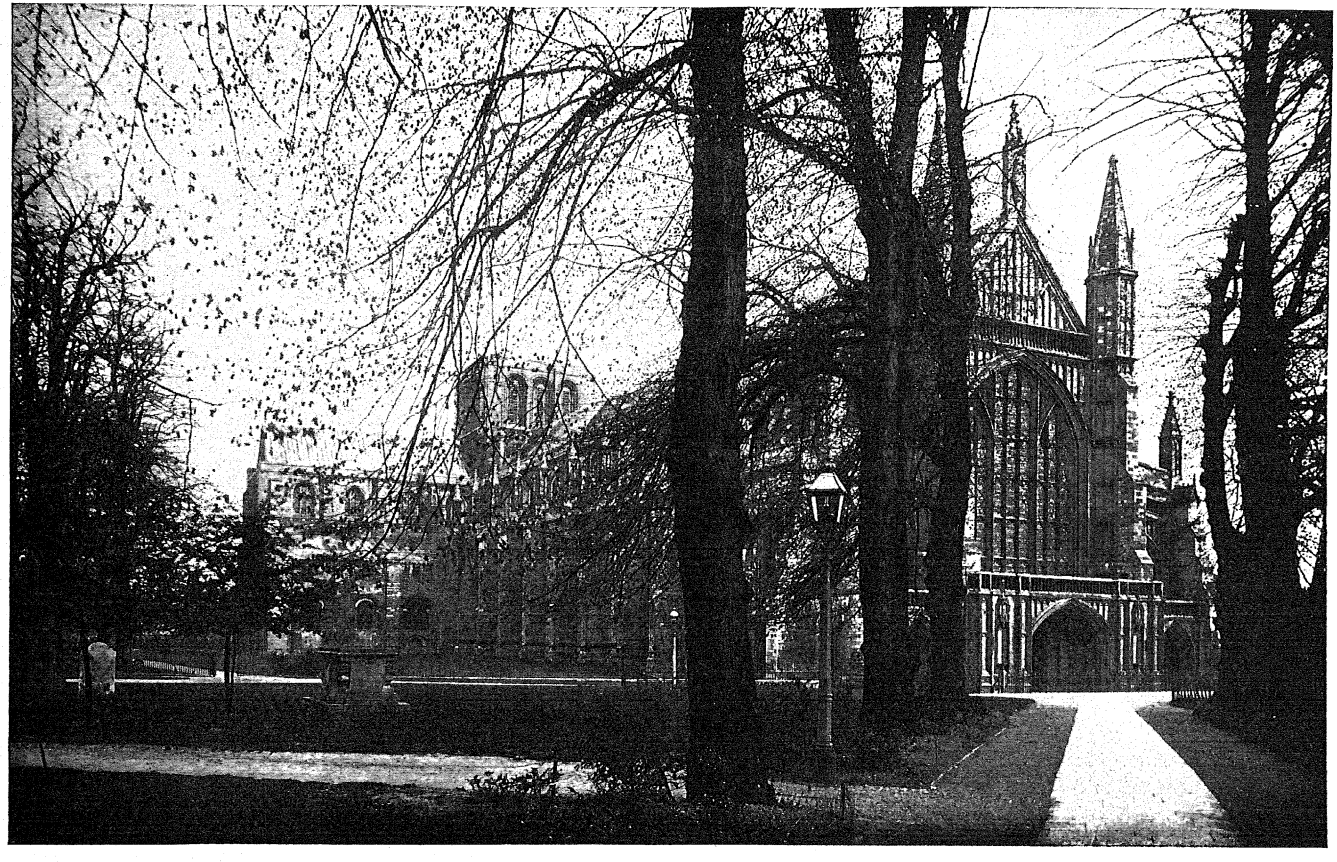
WIMPFFEN, văNp'fĭN'; *Ger. pron.* vĭmp'fen, EMMANUEL FÉLIX DE, BARON (1811–84). A French general. He was born at Laon, Department of Aisne. His first military service was in Algeria. In the Crimean War he displayed great bravery. He became brigadier general of the Imperial Guard in 1855, and a general of division four years later. Later he held the posts of commandant at Lyons, and of Governor of the provinces of Algiers and of Oran. In the Franco-German War he was at the head of the Twelfth and Fifth army corps, took the chief command at Sedan after MacMahon was wounded, and signed the capitulation September 2. After the war he resided in Algiers. He published two papers relating to the disaster in which he had so prominent a part: *Sedan* (1871) and *Réponse au Général Ducrot* (1871). He was engaged in a bitter controversy with Cassagnac's journal, *Le Pays*, and lost a libel suit against its editor. He also published *La situation de la France et les réformes nécessaires* (1873) and *La nation armée* (1876).

WIN'ANDERMERE. See WINDERMERE.

WINCH (AS. *ƿince*, winch). A form of hoisting machine in which an axle carrying a spool or drum is rotated by means of a crank handle and simple gears so as to wind and unwind a rope or cable to the free end of which is attached the article to be hoisted or hauled. Generally it is smaller than a windlass (q.v.), and frequently it is operated by steam or electricity.

WINCHELL, wĭn'chel, ALEXANDER (1824–91). An American geologist, born at North East, Dutchess Co., N. Y. He graduated at Wesleyan University in 1847 and was appointed professor of physics and civil engineering in the University of Michigan in 1853. Two years later he was transferred to the chair of geology, zoölogy, and botany. He was State Geologist and Naturalist of Michigan in 1859–62 and again in 1869–71. In 1873 he was chosen chancellor of Syracuse University, but resigned this post the following year and assumed the chair of geology, zoölogy, and botany. In 1875 he received a like appointment in Vanderbilt University and filled both positions till 1878, dividing his time between the two institutions. His advocacy of the theory of evolution met with the disapproval of the authorities of the Methodist church and led to his dismissal from Vanderbilt. In 1879 he was recalled to the University of Michigan as professor of geology and paleontology. He was one of the founders of the Geological Society of America (its president, 1891), and aided in the establishment of the *American Geologist*. He was best known as an entertaining lecturer and author of numerous books aiming to popularize science, especially geology. Among his works were: The *First Biennial Report of the Geological Survey of Michigan* (1861); *Geological Map of Michigan* (1865); *The Grand Traverse Region* (1866); *Genealogy of the Family of Winchell in America* (1869); *Geological Chart* (1870); *Sketches of Creation* (1870); *Geology of the Stars* (1872); *The Doctrine of Evolution* (1874); *Reconciliation of Science and Religion* (1877); *Preadamites* (1880); *Sparks from a Geologist's Hammer* (1881); *World-Life, or Comparative Geology* (1883); *Geological Excursions* (1884); *Geological Studies* (1886). For his brother, see WINCHELL, NEWTON HORACE.

WINCHELL, NEWTON HORACE (1839–1914). An American geologist, brother of Alexander Winchell, born at North East, Dutchess Co., N. Y. He graduated at the University of Michigan in 1866, was superintendent of public schools at Adrian, Mich., in 1866–69, and served as Assistant State Geologist of Michigan in 1869–70. In 1870–72 he was an assistant on the Ohio Geological Survey; from 1872 until 1900 was State Geologist of Minnesota; and



WINCHESTER CATHEDRAL

from 1873 to 1900 held the chair of geology and mineralogy at the University of Minnesota. After 1906 he served as archæologist of the Minnesota Historical Society. In 1902 he was president of the American Geological Society. He published a *Catalogue of the Plants of the State of Michigan* (1861), *Geology of Ohio and Minnesota* (1872–1900); *The Iron Ores of Minnesota* (1891), with his son, Horace V. Winchell, an economic geologist, *Elements of Optical Mineralogy* (1909), with another son, Alexander N. Winchell, professor of mineralogy and petrology at the University of Wisconsin; *The Aborigines of Minnesota* (1911); *Weathering of Aboriginal Stone Artifacts* (1913). He was also editor of the *American Geologist*.

WINCHELSEA, wĭn'chel-sē. A small English town, one of the Cinque Ports, 7 miles from Hastings, in Sussex (Map. England, G 6). It was formerly an important walled town. In the Roman and Saxon periods Old Winchelsea stood at the mouth of the Rother, 2 miles from the present town. It was frequently inundated by the sea and was submerged in 1250 and finally destroyed in 1287. New Winchelsea, built on a regular quadrangular plan, was founded by Edward I. This town was practically ruined by the gradual recession of the sea, amounting to a mile and a half since the sixteenth century. The salt marshes thus formed are now drained Pop., 1911, 693.

WINCHELSEA, or **WINCHILSEA**, ANNE FINCH, COUNTESS OF (c.1660–1720). An English poet. She was a daughter of Sir William Kingsmill, of Sidmonton, Hampshire She married Heneage Finch, who became, in 1712, fourth Earl of Winchelsea. Rowe composed in her honor an epistle, and Pope an impromptu, but Pope later ridiculed her as a bluestocking. After she had been long forgotten, Wordsworth praised her "Nocturnal Reverie" for its original images of external nature at a time when descriptive poetry was mostly artificial (essay appended to vol. i of *Poems*, 1815). Her verse consists of "The Spleen, a Pindaric Ode" (in Gildon's *Miscellany*, 1701; republished in 1709); *Miscellany Poems*, including the tragedy *Aristomenes* (1713); and scattered pieces. Consult: Myra Reynolds, *The Poems of Anne Countess of Winchilsea* (edited with introduction and notes, Chicago, 1903); also Edmund Gosse, in Ward's *English Poets* (New York, 1880) and in his own *Gossip in a Library* (ib., new ed., 1901); E. Dowden, *Essays, Modern and Elizabethan* (ib., 1910).

WINCHELSEA, DANIEL FINCH, sixth EARL OF. See FINCH.

WINCHENDON, wĭn'chen-don. A town, including several villages, in Worcester Co., Mass., 68 miles northwest of Boston, on the Boston and Maine and the Boston and Albany railroads (Map: Massachusetts, C 2). It has a public library, a fine high-school building, the gift of Capt. Ephraim Murdock, and Monument Park. Winchendon is chiefly an industrial town, the most important manufactures being cotton goods, woodenware, saws, toys, and wood-working machinery. Pop., 1900, 5001; 1910, 5678. Winchendon was first settled in 1752 and was known as Ipswich Canada until 1764, when it was incorporated as a township under its present name (from Winchendon, England). Consult Marvin, *History of the Town of Winchendon* (Winchendon, 1868).

WIN'CHESTER. The capital of Hampshire, England, on the Itchen, 66 miles by rail southwest of London (Map: England, E 5). In the fourteenth century it was the principal seat of England's woolen manufactures and had an extensive continental trade, but since the fifteenth century its prosperity has gradually declined. The city consists of one main thoroughfare, crossed by a number of streets running at right angles to it and was in early times surrounded by a wall, remains of which still exist. The castle hill is the site of the mediæval castle or royal palace, part of which survives in a magnificent hall, which is used for the county court; King Arthur's Round Table, a sixth-century relic, hangs on one of its walls. Charles II commenced a palace here, the completed part of which, used as a barracks, accommodated 2000 men until its destruction by fire in 1894; new barracks have since been built. The city cross in the High Street, dating from the fifteenth century, is very beautiful in design. A colossal bronze statue, erected in 1901 in connection with the King Alfred millennial celebration, typifies the great monarch, and stands in the Broadway. "Seinte Marie College of Wynchestre," now St. Mary's or Winchester College (q.v.), was founded by William of Wykeham, Bishop of Winchester, and completed in 1393. Winchester's chief glory is the cathedral. A church is said to have been built in the year 169, to have been destroyed in 266, restored in 293, and converted into a temple of Dagon or Wodin. In 635 the desecrated church was pulled down, and a new one commenced From the year 674 the succession of bishops of Winchester, which includes the celebrated St. Swithin (q.v.), has continued unbroken. Of the ancient cathedral, in which most of the Saxon kings of Wessex (see HEPTARCHY) were interred, no portion remains. The present cathedral was built by Bishop Walkelin (1070–98). William of Wykeham greatly enlarged and beautified the building and began the remarkable transformation of the nave from the Norman to the Perpendicular. The cathedral is 560 feet long; its breadth at the transepts is 208 feet, length of nave 351 feet, and height 86 feet. There is a low central Norman tower 186 feet high. In 1905 extensive restorations were made, and a large part of the foundations were relaid. The interior is magnificent, and contains many objects of the highest interest—as the tomb of William Rufus; the golden shrine of St. Swithin, with some excellent specimens of sculpture, both ancient and modern; the tomb of Edmund, the son of King Alfred; and the tomb of Izaak Walton. There are other churches of interest and buildings of a religious and educational character, including the remains of Hyde Abbey, where King Alfred was buried. About a mile from the town is the famous Hospital of St. Cross, founded in 1136 by Henry de Blois, Bishop of Winchester. The city possesses a public library and a museum. Pop., 1901; 20,919; 1911, 24,146.

Winchester, the Roman *Venta Belgarum*, was the site of a British city before it became a Roman station, and a place of considerable importance. Taken by the Saxons in 495, the town was called Wintanceaster. As the capital of Wessex, Winchester became the capital of England, and even after the Norman Conquest was long a chief royal residence. In 1265, during the Barons' War, Winchester was sacked. It was taken by Cromwell in 1645; the castle was

desecrated and the cathedral pillaged and vandalized. Consult G. W. Kitchin, *Winchester* (London, 1890); Telford Varley, *Winchester* (New York, 1910); S. H. Heath, *Winchester* (Boston, 1912).

WINCHESTER. A city and the county seat of Randolph Co., Ind., 24 miles north by west of Richmond, on the White River, and at the junction of the Cleveland, Cincinnati, Chicago, and St. Louis and the Grand Rapids and Indiana railroads (Map: Indiana, G 4). It has the Randolph County Law Library, a Carnegie library, and attractive school and courthouse buildings. The principal manufactures include bricks, flint glass, flour, wagons, and lumber products. Pop., 1900, 3705; 1910, 4226.

WINCHESTER. A city and the county seat of Clark Co., Ky., 106 miles east by south of Louisville, on the Chesapeake and Ohio and the Louisville and Nashville railroads (Map: Kentucky, F 4). It is the seat of the Kentucky Wesleyan College (Methodist Episcopal, South), opened in 1866, and has a Carnegie library and a hospital. Farming is the leading industry of the surrounding country. The manufactures are planing-mill products, hemp, furniture, foundry products, spokes and rims, flour, gasoline engines, etc. Pop., 1900, 5964; 1910, 7156.

WINCHESTER. A town in Middlesex Co., Mass., 8 miles north by west of Boston, on the Boston and Maine Railroad (Map: Massachusetts, B 5, Insert). It is largely a residential place, and is the home of many business men of Boston. Middlesex Fells, a State park of more than 3000 acres, lies partly in the town. There are also a large public library, a hospital, and the Home for Aged People. The industrial interests of the town are confined chiefly to the manufacture of leather machinery, soda fountains, gelatine, felt goods, and watch hands. Pop., 1900, 7248; 1910, 9309; 1915 (State census), 10,005; 1920, 10,485. The successive names of Winchester since the settlement of the country have been: 1638, Waterfield; 1640, Charlestown Village; 1642, Woburn; 1850, Winchester. Consult Hurd, *History of Middlesex County* (2 vols., Philadelphia, 1890).

WINCHESTER. A city and the county seat of Frederick Co., Va., 80 miles by rail west by north of Washington, D. C., on the Baltimore and Ohio and the Cumberland Valley railroads (Map: Virginia, F 2). It is the seat of Fort Loudoun Seminary (nonsectarian), and has the Shenandoah Valley Academy, the Handley Public Library, Memorial Hospital, and a fine city hall. The National and Confederate cemeteries are also of interest. Winchester is the commercial centre of a farming, stock-raising, and lumbering region. There are immense apple orchards here. Winchester is especially noted for its extensive glove and leather interests. Flour, woolen and knit goods, vinegar, and lumber products are also manufactured. The municipality adopted the city-manager form of government in 1915. Pop., 1900, 5161; 1910, 5864.

After Braddock's defeat (1755) Washington took command at Winchester of the British and Colonial troops. Fort Loudoun, built by him, still remains, and his headquarters can also be seen in one section of the town. During the Civil War several engagements were fought at and in the vicinity of Winchester, which by reason of its location was an important strategic point. On March 23, 1862, the Federal General Shields defeated General Jackson, with an inferior Confederate force, at Kernstown, 4 miles south of Winchester. On Aug. 17, 1864, General Early, with a Confederate force, drove a Federal force under General Torbert from Winchester. On Sept. 19, 1864, in the battle of Winchester or Opequon Creek General Sheridan, with a Federal force of about 38,000, defeated General Early, with a Confederate force of about 15,000, the Federals losing in killed, wounded, and missing about 5000, and the Confederates about 4000. This was followed by another engagement at Fisher's Hill, near this place, on September 22, in which Sheridan was again victorious. On Oct. 19, 1864, Sheridan started from Winchester on his famous ride to Cedar Creek (q.v.).

WINCHESTER, Caleb Thomas (1847–1920). An American English scholar, born at Montville, Conn. He graduated in 1869 from Wesleyan University, where he was librarian till 1873 and thereafter professor of English literature. He also became known as a lecturer in his special field. The years 1880–81 he spent in study at Leipzig. Besides serving on the committee which revised *The Methodist Hymnal*, he published: *Five Short Courses of Reading in English Literature* (1892; 3d ed., rev., 1911); *Some Principles of Literary Criticism* (1899), *Life of John Wesley* (1906); *A Group of English Essayists* (1910); *Representative English Essays* (1914).

WINCHESTER, Elhanan (1751–97). An American Universalist minister, born at Brookline, Mass. He joined the open communion Baptists, at Canterbury, Conn., in 1770, and was installed as pastor of a church at Rehoboth, Mass., in 1771; a year later he became a close communionist and was excommunicated. He resided in Charleston, S. C. (1774–80), became pastor of the First Baptist Church, Philadelphia, in 1780; and in 1781 became a preacher of universal restoration, and with a majority of his people formed a new church. He went to England in 1787, remaining till 1794, and preaching with great success. Among his numerous publications were: *New Book of Poems on Several Occasions* (1773); *Hymns* (1776), *The Face of Moses Unveiled* (1787); *The Universal Restoration, Exhibited in Four Dialogues* (1788); *The Restitution of All Things Defended* (1790); *Course of Lectures on the Prophecies that Remain to be Fulfilled* (1789–90); and *Five Letters on the Divinity of Christ* (1810). He was a forerunner of the present Universalist denomination. Consult his *Life* by Stone (Boston, 1836).

WINCHESTER, James (1752–1826). An American soldier, born at White Level (now Westminster), Md. He became a second lieutenant in the Second Maryland in 1777, and first lieutenant in 1778, was captured at Charleston in 1780, but was exchanged the same year, and became a captain in the Third Maryland in 1781. In March, 1812, he was appointed a brigadier general, and in September superseded William Henry Harrison at Fort Wayne. In command of the left wing of the army, Winchester moved from Fort Defiance to Maumee Rapids, but on Jan. 22, 1813, was defeated at the river Raisin by a greatly superior force of British and Indians under Colonel Proctor. Winchester was himself taken prisoner, and was induced to send an order to those of his men who were still resisting to surrender. The sick and wounded Americans were massacred on

the 23d by the savages (See FRENCHTOWN.) Winchester himself was taken as a prisoner to Quebec, and was not exchanged until the spring of 1814. In March, 1815, he resigned his commission in the army.

WINCHESTER, OLIVER FISHER (1810–80). An American manufacturer, born in Boston. He resided for a time in Baltimore, and in 1848 he removed to New Haven, where he opened one of the first shirt factories in the United States. When the Volcanic Arms Company was organized to manufacture the Henry magazine rifle, Winchester became a stockholder, and in 1860 bought it out and reorganized it as the New Haven Arms Company. Five years later he again reorganized it as the Winchester Repeating Arms Company, and gave the rifle his own name. In 1872 he began the manufacture of metallic cartridges. He was elected Lieutenant Governor of Connecticut in 1866. He gave large sums of money to Yale University and founded there an observatory which for some time bore his name.

WINCHESTER, WILLIAM PAULET (PAWLET, or POULET), first MARQUIS OF (c.1485–1572). An English nobleman, eldest son of Sir John Paulet of Basing, Hampshire. He held several positions in the royal household, was created Baron St. John in 1539, and was nominated by the will of Henry VIII one of the council of regency for the period of young Edward's minority. In 1550 he assisted Northumberland in overthrowing Somerset; was created Earl of Wiltshire five days later; and in the following year became Marquis of Winchester. He pretended to acquiesce in Northumberland's plan for setting aside the claims of Mary and giving the throne to Lady Jane Grey, but after Northumberland left London to put down the revolt, Paulet joined other noblemen in proclaiming Mary. She confirmed him in all his offices, and also made him Lord Privy Seal. Under Elizabeth he also continued to hold his offices, and was Speaker of the House of Lords in 1559 and in 1566. The head of this family is premier marquis of England.

WINCHESTER COLLEGE. One of the oldest public schools in England, situated at Winchester. It was founded by William of Wykeham in 1382, and opened in 1393, as a feeder for New College, Oxford. Originally the foundation consisted of a warden, 10 fellows, three chaplains, an usher, and 70 scholars; but in 1862 the number of fellowships was reduced to six. A certain number of outside pupils were admitted from the very beginning, and their number increased gradually. About 12 vacancies for foundationers occur every year, which are filled by competitive examination. Four exhibitions of the annual value of £50 each, tenable for four years at the universities of Oxford and Cambridge, are awarded every year. There are also six scholarships tenable at New College, Oxford. The original building with several additions is still extant. The attendance is about 450. Consult: A. F. Leach, *History of Winchester College* (London, 1899); L. L. Shawell, *Enactments in Parliament* (4 vols., Oxford, 1912); John Vaughan, *Winchester Cathedral Close* (New York, 1914).

WINCHILSEA. See WINCHELSEA.

WINCKELMANN, vĭn'kel-măn, JOHANN JOACHIM (1717–68). A German classical archæologist and art historian. Born at Stendal, Brandenburg, on Dec. 9, 1717, the son of a poor cobbler, he was educated as a charity scholar in his native town, and then graduated from the Köllnisches Gymnasium in Berlin. From 1738 to 1740 he studied theology and the classics at Halle, then mathematics and medicine at Jena, and was tutor at Hadmersleben, and associate rector in the grammar school at Seehausen in 1743. In 1748 chance brought him employment in the library of the Saxon ex-minister and historian Count Bünau, at Nöthnitz, near Dresden, where he remained six years. His association with eminent artists and scholars at Dresden and the valuable instruction and advice which he received there, especially from Oeser, determined him to follow the career of a classical archæologist. His conversion to Roman Catholicism, the court religion at Dresden, through the papal nuncio at Dresden, Count Archinto, furnished the opportunity to prosecute this career. After a year in Dresden devoted solely to his studies, he published his first work, *Gedanken über die Nachahmung der griechischen Werke in der Malerei und Bildhauerkunst* (1755), well illustrated by Oeser, which brought him a royal stipend for two years in Rome. In November, 1755, he arrived at Rome, and immediately began the study of its treasures of classical antiquities, in which he was greatly aided by the friendship of Raphael Mengs. In 1757 he became librarian to Archinto, who in the meanwhile had been made a Cardinal and Secretary of State. In 1758 he visited Naples, Herculaneum, and Pompeii, and then spent nine months in Florence, cataloguing the unique collection of antique gems and intaglios of Baron Stosch.

After the death of Cardinal Archinto he became librarian to Cardinal Albani, the passionate art lover and most famous collector of his time, under whose roof he henceforth lived as a friend and confidant. Repeated visits to Naples resulted in several publications which greatly contributed to the elevation of taste in the decorative arts, but his greatest work is the *Geschichte der Kunst des Altertums* (1764; new ed., by Julius Lessing, with biography, 1882; Eng. trans. by G. H. Lodge, Boston, 1880). Through it, and in the field of archæology, through the *Monumenti antichi inediti* (1767–68; new ed., 1821), Winckelmann became the true expounder of classic art and the founder of scientific archæology. His views of the theory of the beautiful called forth Lessing's *Laokoon* and profoundly impressed Goethe, eliciting his famous *Winckelmann und sein Jahrhundert* (1805; Eng. trans., New York, 1914). In April, 1768, he left Rome in company with the sculptor Cavaceppi to revisit Germany, but in passing the Alps he evinced a strange reluctance to leave Italy, and was with difficulty persuaded to proceed to Munich. At Vienna he was received with honor by the Empress Maria Theresa. On his way back to Rome by way of Trieste, he was murdered there in a hotel June 8, 1768, by a robber named Arcangeli. In Winckelmann's honor a marble statue was erected in the vestibule of the Berlin Museum, a monument in his birthplace, and a colossal marble bust in the Villa Albani, Rome. The standard work on Winckelmann is by Carl Justi, *Winckelmann und seine Zeitgenossen* (3 vols., Leipzig, 1898). Consult also Walter Pater, *The Renaissance: Studies in Art and Poetry* (library ed., London, 1910), originally published as *Studies in the History of the Renaissance* (ib., 1873).

WINCKEL'S (vingk'lz) **DISEASE.** See CHILDREN, DISEASES OF.

WINCKLER, Hugo (1863–1913). A German Orientalist. He was educated at the University of Berlin where, by 1904, he had risen to be professor of oriental languages and history. Besides doing much editorial work, he wrote: *Die Keilschrifttexte Sargons* (1889), *Untersuchungen zur altorientalischen Geschichte* (1889); *Geschichte Babyloniens und Assyriens* (1892, Eng. trans., 1907), *Alttestamentliche Untersuchungen* (1892); *Geschichte Israels* (1898); *Gesetze Hammurabis* (1904), *Die jüngsten Kämpfe wider der Panbabylonismus* (1907), *Die babylonische Geisteskultur* (1908).

WIND (AS. *wind*, Goth. *winds*, OHG. *wint*, Ger. *Wind*, wind; connected with Lat. *ventus*, Skt. *vāta*, wind, from *vā*, to blow). Moving air. The direction of movement, if horizontal, is expressed by stating the point of the compass from which the wind comes. The force was formerly expressed on some arbitrary scale, such as zero for calm, and four for destructive to large trees. In 1806 Admiral Beaufort introduced into the British navy a scale of zero to 12, arranged according to the amount and kind of sail to be carried by the standard ship of the royal navy. (See BEAUFORT SCALE.) Instead of using the wind velocity, which is the datum specially appropriate to meteorology, many have attempted to measure the pressure against a normal unit of surface and thus obtain a scale of wind force. But as the pressure varies with the shape of the obstacle and the density of the air, it is generally conceded that velocities should be observed and pressures must be calculated therefrom as best we can.

From a general meteorological point of view, winds are classified as steady, periodical, and variable. The steady winds are best illustrated by the trade winds at the earth's surface, and the anti-trades above them, by the easterly wind that apparently prevails high above the equatorial region, and by the westerly wind that prevails above the north temperate zone. The periodical winds are represented by the diurnal land and sea breezes and the summer and winter monsoons, which are in fact sea breezes and land breezes on a large scale. The variable winds usually occur in connection with the areas of high and low pressure, or the storms that move over the earth. They represent ascending and descending movements due to the interaction of upper and lower strata or of cold arctic and warm tropical air, when seeking to obtain more stable equilibrium. The variable winds generally endure only a few days, or at the most a week, by which time the disturbance has passed by or perhaps altogether subsided, and a change of wind takes place. Sometimes the winds appear to blow with some regularity for a few days from the north and then for a few days from the south alternately, but this alternation is not often maintained for any length of time, as it is evidently due to the regularity with which areas of high and low pressure pass over the station. These irregular or variable winds give to ordinary local weather its characteristic variability, and they have therefore always been a prominent subject of observation and discussion. In the north temperate zone the westerly wind may be considered as the normal and most frequent; all other winds soon shift to the west.

The local names that have been given to various winds must not be considered as implying that the peculiarities of the winds are local. Thus the simoom, sirocco, and solano, which are the warm southerly winds of the northern Mediterranean coast, have their parallels in very similar southerly winds in Siam, India, and the Atlantic coast of the United States. The bora of the Adriatic and the gregale of Malta have their counterparts in the blizzards of the United States and the purga of Siberia. The dry puna winds of Peru have a very close parallel in the so-called hot winds of the region from Missouri to Nebraska and Iowa. The east winds of the British Islands prevail in New England as well as from Scotland eastward into Russia, where, however, they become drier than they are in Great Britain. The mistral, or northwest wind of southern France, is essentially the same as the northwest wind that follows a storm centre passing over the lake region eastward into New York and New England.

Several laws bearing on the winds have been enunciated. Dove maintained the existence of alternate currents, polar and equatorial, existing side by side and moving as a whole eastward. He also showed empirically that there was a certain law of sequence according to which the winds followed each other day after day, and which we now know is simply due to the fact that the majority of the storms pass on one side or the other of the station. Redfield, Reid, and other meteorologists showed that the winds circulate around a storm centre, a fact which, however, was also known to Dampier and other early voyagers. Hence all large storms have the character of whirlwinds. Redfield knew, but did not lay stress upon the fact, which Meldrum brought out most forcibly, that the winds are inclined at a considerable angle to the radius vector from the storm centre, or to the isobars surrounding the storm centre. J. Allan Broun and, many years later, Clement Ley and Cleveland Abbe independently announced that the upper winds are inclined to the lower winds in a regular sequence, so that as we ascend in the atmosphere the winds are deflected more and more to the right. Ferrel showed that the inclination of the wind to the isobar depends upon the distance from the storm centre, on the latitude of the place, and on the coefficient of resistance of the earth to wind, and he gave the formula connecting these together. Espy and, many years later, Koeppen, independently, showed that the interchange of air between the upper strata and those near the ground causes the decided diurnal increase in the velocity of the wind in the early morning hours up to a maximum at the hour when the interchange is most rapid; also that there must be a corresponding diminution of the wind in the upper strata, which diminution has been established by actual observations on mountain tops and other elevated points. The general circulation of the atmosphere is not a simple system of steady upper and lower winds. It has been shown that the dynamics of the air do not allow of the existence of any steady currents maintaining the dynamic equilibrium. Therefore the system of upper and lower winds devised by Ferrel as the simplest imaginable must be replaced by systems of whirls or eddies, so that the great whirlwinds or cyclones and anticyclones that observation shows on every daily weather map must be considered as an integral and essential

part of the general circulation, and would be so even if the globe were a uniform frictionless sphere

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WIND'AGE. In smooth bore artillery, the space between the projectile and the surface of the bore, in muzzle-loading rifle guns, the difference between the diameter of the piece and that of the projectile; in these relations the term is now obsolete. To-day it means the influence of the wind in deflecting the projectile from the point at which it is aimed; it is also applied to the allowance made on the wind gauge, which is a graduated attachment on the rear sight of the piece by which allowance may be made in aiming for the effect of the wind upon the projectile, as well as for drift. Consult *Small Arms Firing Manual*, United States Army (Washington, 1913). See DRIFT OF A PROJECTILE.

WIND AND WATER, BETWEEN. See BETWEEN WIND AND WATER.

WIND'BER. A borough in Somerset Co., Pa., 8 miles south of Johnstown, on the Pennsylvania Railroad (Map: Pennsylvania, D 7). Coal mining, lumbering and the manufacture of fire brick are the leading industries. Pop., 1910, 8013.

WINDBREAK, or SHELTER BELT. Any planting on the windward side of buildings, orchards, gardens, etc., with the object of overcoming the force of the wind. Windbreaks are of great advantage in prairie regions in protecting from the cold, lessening evaporation from soils and plants, retaining snow and leaves as protection, lessening liability to mechanical injury from winds, protecting trees at time of blossoming, and so on. Some disadvantages are that they cause snow to drift to the leeward; prevent the circulation of warm winds in spring, thus retarding the melting of snow and the drying of the soil and roads; and furnish harbors for plant pests, etc. The trees are usually planted upon the north and west sides of the object it is desired to protect. The drifting of snow may be prevented about buildings by planting a second line of trees at a short distance from the main shelter belt. The snow will then be caught in the space between the two. The number of rows of trees required for a good shelter belt will depend upon the kind of trees planted and the nature of the country. Among the best species for planting are the Norway spruce, Austrian and Scottish pines, maples, and box elder. In Minnesota and similar regions it is recommended first to plant white willows, followed by green ash and white elm, and after these become established to plant hardy evergreens, mountain ash, and birches or other ornamental trees and shrubs. A mixed plantation with hardy deciduous trees to the windward is by many considered the ideal windbreak. In planting windbreaks, as well as in all other tree planting on the prairies, the trees should be far enough apart for cultivation, but sufficiently thick to furnish forest conditions at the earliest time possible A distance of 8 feet for the rows and 2 feet apart in the rows is believed to have given the most satisfactory results. In many tropical countries windbreaks have been found necessary to protect young plantings from the force of the trade winds. Temporary windbreaks of bananas, pigeon peas, etc, are provided until permanent ones of bamboos, or rapid growing trees may become established.

WIND CAVE NATIONAL PARK. See PARK, NATIONAL

WINDELBAND, vĭn'del-bänt, WILHELM (1848–1915). A German philosopher, born at Potsdam. He studied in the universities of Jena, Berlin, and Gottingen, in 1876 became a professor of philosophy at the University of Zurich, in 1877 at Freiburg, in 1882 at Strassburg, and in 1903 at Heidelberg. His work in the history of philosophy is of high value. Among his published works are: *Die Geschichte der neuern Philosophie in ihrem Zusammenhange mit der allgemeinen Kultur und den besondern Wissenschaften* (2 vols., 1878–80; 5th ed., 1911); *Praludien: Aufsätze und Reden zur Einleitung in die Philosophie* (1884; 5th ed., 1915); *Geschichte der antiken Philosophie* (3d ed., 1912; Eng trans., 3d ed, 1910); *Geschichte der Philosophie* (1892; 4th ed. as *Lehrbuch der Geschichte der Philosophie*, 1907; 6th ed., 1912; Eng. trans., 1898); *Geschichte und Naturwissenschaft* (1894; 3d ed., 1904); *Platon* (1900; 4th ed., 1905); *Ueber Willensfreiheit* (1904; 2d ed., 1905); *Neuere Philosophie in Kultur der Gegenwart* (1909), *Die Philosophie im deutsche Geistesleben des 19. Jahrhunderts* (1909; new ed., 1912); *Prinzipien der Logik* (1912).

WINDER, wīn'dĕr, WILLIAM HENRY (1775–1824). An American soldier, born in Somerset Co., Md He graduated at the University of Pennsylvania, and from 1798 till 1812 practiced law in Baltimore. In 1812 he was appointed lieutenant colonel of the Fourteenth United States Infantry, was promoted to the rank of colonel, and in November of that year led a successful raid into Canada from Black Rock, N. Y. In the following March he was commissioned a brigadier general. He was captured at the battle of Stony Creek early in June, was held a prisoner until the spring of 1814, and in May of that year was put in command of the Tenth Military District, comprising Maryland, the District of Columbia, and a part of eastern Virginia. In the following August General Ross and several thousand British troops landed and advanced upon Washington. To oppose them Winder had only a few hundred regulars, and a mob of some thousands of militia. In consequence he was totally defeated at Bladensburg (q.v.), and the capital fell into the hands of the invaders. Winder was afterward court martialed, but was acquitted of all blame.

WINDERMERE, wĭn'dĕr-mēr, or **WINANDERMERE.** The largest lake in England, situated in a rock basin between Westmoreland and Lancashire, a few miles north of Morecambe

Bay, into which it discharges (Map England, D 2) It is 11 miles long, 1 mile broad, and over 200 feet deep It contains several islets, and the shores are high and wooded, becoming somewhat bold towards the north The lake is celebrated for its quiet beauty Near its northern extremity is Rydal, the home of Wordsworth

WINDFLOWER See ANEMONE

WINDGALL (*wind + gall*, AS *geallu*, probably from Lat *galla*, gallnut) In horses a term for dilated bursæ at the posterior part of the fetlock joint Windgalls have their origin in a dropsical condition of the bursæ of the joint itself and also of the tendon which slides behind it They may be attributed to external causes such as severe labor or strains resulting from heavy pulling, fast driving or jumping or be among the sequelæ of internal disorders Consult Leonard Pearson and others, *Special Report on Diseases of the Horse* published by the United States Bureau of Animal Industry (rev ed, Washington, 1911)

WINDHAM, win'dam, WILLIAM (1750–1810) An English statesman, born in London He was educated at Eton, Glasgow University, and University College, Oxford In the Portland Ministry, formed by the coalition of Fox and Lord North (1783), Windham became the principal secretary to Lord Northington, Lord Lieutenant of Ireland, but, dissatisfied with the policy pursued, he resigned, and returned to England In 1784 he entered Parliament and held his seat till 1802 On the outbreak of the French Revolution he went with Burke into reaction, and favored the bills against seditious meetings and aliens He entered the Ministry of Pitt (1794) as Secretary of War, and began a series of reforms in the army which mark his best work Going out of office with Pitt in 1801 he opposed the Peace of Amiens, a policy which cost him his seat at Norwich In 1803 he became the head of the Grenville party, and, gradually drifting away from Pitt, united once more with Fox, and in 1806 accepted the Colonial Office in the Grenville administration Renewing his efforts for military reforms, he advocated and carried measures for pensions, higher pay, and shorter terms of service Two years later life service was reintroduced against his protest, but in 1847 Windham's principle of short enlistment was reinaugurated In the war against Napoleon Windham favored concentration and opposed the attack on Copenhagen and the disastrous Walcheren expedition In general, he believed in protecting England by developing its navy, and not by fortifying its coasts Consult Thomas Amyot, *Speeches with Memoir* (London, 1812), Mrs Henry Baring, *Windham's Diary* (ib, 1866), *Correspondence of Edmund Burke and William Windham*, edited by J P Gilson (Cambridge, 1910), *The Windham Papers* (2 vols, London, 1913)

WINDHOEK, vint'huk' Capital, since 1889 of German Southwest Africa, situated in the southern part of Damaraland on the northern slope of the Awas Mountains, at an altitude of 5331 feet (Map Africa, F 7) It is often termed Great Windhoek, and officially, since 1903, Windhuk In 1901 it was connected with Swakopmund, on the coast, by telegraph, and in 1902 by rail The railway, taking a rather indirect course, is 237 miles in length, it was extended to Tsumeb (354 miles) in 1906 The white population in 1912 numbered 593 Just to the southwest is Little Windhoek, having in 1912, 51 white inhabitants Here are five hot springs, with temperatures from 104° F to 122° F The district of Windhoek had in 1912, a population of 1312 whites, of whom 1105 were Germans, and about 23,000 natives Windhoek was captured by the forces of the Union of South Africa in 1915 See WAR IN EUROPE

WINDHOVER See KESTREL

WINDING UP OF COMPANY Under the English law, a company which is incorporated under the Companies Act cannot go out of existence except through the process of winding up under the provisions of the Companies Winding Up Act (1890) This may be done by the court upon petition of the stockholders or the creditors, in which case the court appoints a receiver or liquidator, and the proceedings are quite similar to those in bankruptcy or the shareholders themselves may wind up the company voluntarily It is estimated that 90 per cent of the companies organized under the above Act are thus wound up by voluntary resolution of their shareholders, appointing liquidators and turning over the affairs of the company to them for settlement Proceedings under this method resemble somewhat those under the insolvency acts in the United States Consult N L Lindley, *On Companies* (6th ed, 2 vols, London, 1902), Sir H B Buckley, *Law and Practice under Companies Acts* (9th ed, ib, 1909)

WIND INSTRUMENTS A generic name for all those instruments in which the tone is produced by means of a vibrating column of air With respect to the material employed in their construction wind instruments are divided into brass and woodwind The organ is a combination of all the various kinds of wind instruments See the separate articles on various instruments, also MUSICAL INSTRUMENTS, ORCHESTRA, ORGAN

WINDISCH, vin'dish, ERNST (1844–) A German Sanskrit and Celtic philologist, born at Dresden, and educated at the University of Leipzig (1863–67) In 1870–71 he catalogued the Sanskrit manuscripts in the India Office Library, London From 1872 he was professor successively at Heidelberg, Strassburg, and Leipzig, being also rector of the latter university in 1895–96 In 1871 he became associate editor, with Berthold Delbruck, of the *Syntaktische Forschungen*, and in 1880 of the *Zeitschrift der deutschen morgenlandischen Gesellschaft* His publications include *Der Heliand und seine Quellen* (1868), *Kurzgefasste irische Grammatik* (1879, Eng trans by Norman Moore, 1882), *Mâra und Buddha* (1895), *Buddha's Geburt und die Lehre von der Seelenwanderung* (1908), *Keltische Brittanien* (1913) He also edited *Zwolf Hymnen des Rigveda* (1883), the *Pali Itivuttaka* (1890), *Georg Curtius, Kleine Schriften* (1886), *Irische Texte* (4 vols, 1880–1909), with Whitley Stokes, *Catalogue of Sanskrit MSS in India Office Library* (1894), *Die altirische Heldensage Tán bó Cúalnge*, German translation (1905) His pupils and friends offered him a *Festschrift* on the occasion of his seventieth birthday, in 1914

WINDISCHGRATZ, vin'dish-grets The name of a princely Austrian family, dating from the thirteenth century Its most prominent member is ALFRED CANDIDUS FERDINAND, PRINCE WINDISCHGRATZ, who was born May 11, 1787, at Brussels, entered the Austrian army in 1804 and saw active service throughout the

Napoleonic wars. In 1833 he became a lieutenant field marshal and commander of division. From 1840 to 1848 he commanded the forces in Bohemia In June, 1848, he suppressed the insurrection in Prague with bloody severity, but his wife and son were killed during the rioting He was then placed in command of all the Austrian forces except those in Italy After the insurrection of October 6 at Vienna Windischgratz declared the city in a state of siege, and on October 23 began the attack on the capital. On October 31 he took the city by storm. With his brother-in-law, Prince Felix Schwarzenberg, he arranged the abdication of Ferdinand, and then led an army against the Hungarians. In January, 1849, he took Buda and Pest, but dissensions with the Vienna government led to his recall. In 1859 he was made Governor of Mainz, then under the control of the Diet of the Germanic Confederation. He died March 21, 1862. Under his auspices was published *Der Winterfeldzug 1848–49 in Ungarn* (Vienna, 1851).

WINDLASS (corruption of *windas, windass,* from MDutch *windacs,* Dutch *windas,* Icel. *vindāss,* windlass, winding beam, from MDutch *windan,* Icel. *vinda,* to wind + MDutch *aes,* Dutch *as,* Icel. *āss,* Goth, *ans,* beam, pole; influenced by popular etymology with obsolete Eng. *windlass,* circuitous route, subtlety). A modification of the wheel and axle used for raising weights It consists of a cylindrical drum, on which a rope or chain is wound, having its ends firmly supported in bearings, and an arrangement for applying a force with considerable leverage at one or both ends. It differs from the capstan (q.v.) chiefly from having a horizontal instead of a vertical axis. Some forms of windlass closely resemble the winch (q.v.) in construction. The advantage in power is secured by having the force applied on the wheel at considerable distance from the centre, according to the law of the wheel and axle (q.v.). See ANCHOR; CAPSTAN.

WINDLESTRAE, win'd'l-strā'. See HAIR GRASS

WINDMILL. A motor which utilizes the energy of the wind for pumping water, driving mills, or doing other work The wind acts on a set of sails or slats attached to an axis so as to form a revolving wheel. A crank or gearing transmits the power from the axis to the pump or other mechanism to be driven. Most windmills are mounted on towers at an elevation above the ground, or else placed on the tops of buildings, in order to take advantage of the unobstructed action of the wind. A comparatively few wind wheels are set on a vertical axis, but as a rule the axis is either horizontal or slightly inclined therefrom. A deviation from the horizontal is sometimes essential to permit the sails to clear the base of the tower.

The typical Dutch windmill is composed of four long sails at right angles to each other, fixed on an axis inclining about 10° to the horizontal and mounted on an inclosed tower of masonry or wood. Modifications of this type include six or more sails. The web of the sails is generally of canvas, but wood may be substituted. In the best forms of European windmills each sail is composed of arms or whips 30 feet or more in length, attached at right angles to the sail axle. Transverse bars or rods are secured to the whip at intervals throughout its length, and on these the sails are stretched. By setting the bars at varying angles with the plane of revolution of the whips a warped surface is produced. This is essential, because, if the bars were all parallel to one another, the pitch of those at the extremity of the arms would be much greater than that of those near the axle The result of this would be that the wind would tend to turn the outer end of the arms much more rapidly than the inner end, which would simply drag. The sails are generally wider at the tips than at the hub.

American windmills may be divided into two broad classes: (1) those that revolve in the same direction as the wind and resemble paddle wheels or certain types of water wheels, and (2) those revolving at right angles to the wind. The members of the second class in this one respect are similar to the Dutch and European mills already described, and may for convenience be called sail wheels. Most of the windmills in use fall in the second class. The paddle-wheel mills must have one-half of their fans guarded from the action of the wind, for otherwise they will not revolve, since the pressure on the two halves will balance. This protection may be afforded, in the case of wheels revolving on a horizontal axis, by casing in the lower half of the wheel; and for wheels on a vertical axis, by either casing in one-half or by using folding vanes that close on themselves when they come into the counter pressure In either of these subclasses, it is evident that only a portion of the total wind area of the wheel is effective. The horizontally set paddle-wheel mills are generally placed near the ground and facing the prevailing wind. They are of no use except when the wind blows their way. Sometimes the vanes are made in the form of a warped or screw surface to obviate this defect, whereupon the mill assumes somewhat of the sail-wheel type. In the vertical paddle-wheel mills the wind guard may be made in the form of a semicylindrical revolving hood, self-adjusting by means of the changing direction of the wind itself, through the action of the wind on a rudder.

The American sail-wheel windmills vary in design from four or more arms attached to a horizontal axis, with a single plain board nailed to the arm at such an angle as to catch the wind, to an elaborate series of fans in one or more annular rings, the fans being composed of narrow slats of wood, also set at an angle with the wind. The majority of the windmills now on the market, however, are of a simple form, somewhat like the old European mills, except that in the place of a few curved sails of canvas and wood there are a number of metal sails with curved surfaces, all connected to make a compact, strong wheel.

Whatever the type of mill employed, its highest efficiency can be attained only by keeping it constantly in the wind; i.e., so that its plane of revolution will be at right angles to the wind in the sail-wheel mill, and parallel with it in the paddle-wheel type. In the early European mills the wheel and tower were mounted on a pivoted post and turned by hand Later on the mills were so arranged that only the wheel, its accessories, and the dome or cap of the tower were turned. This was done either by hand or by wind power, an auxiliary windmill, with gearing, being employed in the latter case. In the American mill, also, only the upper part of the mill revolves. The turntable to

effect this movement is actuated by the direct pressure of the wind on either the wheel itself or a rudder attached to it; or else by means of a secondary wheel, which is used to turn the main wheel into the wind.

Besides devices to keep the wheel in the wind others must be employed to regulate the wheel under varying conditions of wind velocity. Such regulation is necessary to secure the maximum amount of power when the wind is low, a fairly constant speed, so far as is possible, under all conditions, a reduction of speed in high winds, and the complete stoppage of the windmill during gales. Regulation may be effected by applying a brake to check the speed, or, as is commonly the case, by diminishing the area of sail exposed to the wind. The latter may be effected by changing the angle of the groups of vanes of a sectional wheel by means of centrifugal action applied through lever rods and resisted by means of weights or springs. The greater the velocity of the wheel the more the vanes will be turned until, if the wind be high enough, they offer it no purchase whatever. A second method involves turning the wheel partially or wholly out of the wind, by revolving it about the axis of the tower. Counterweights may also be used here, as in the case of both the centrifugal governor and some of the devices used for holding the wheel in the wind. The object of the counterweights is to prevent too sudden action of the regulating devices, which might result in damage to some portion of the mechanism involved.

The chief use to which windmills are put in America is the pumping of water from wells, but they are also employed, often conjointly, for grinding grain and cutting fodder for stock, turning grindstones and other machinery for repairing and making farm tools, and numerous other purposes where a relatively small amount of irregular power is needed and where low first cost and a minimum of expense for maintenance and operation are essential. Experiments with windmills to drive dynamos to charge storage batteries have been carried on, but without marked success save in isolated instances.

The power of windmills increases a little faster than the square of the wind velocity and about 1.25 times the square of the diameter of the wind wheel. According to Murphy (see bibliography below) "a good 12-foot steel mill should furnish one horsepower in a 20-mile wind (indicated) and 1.4 horsepower in a 25-mile wind. This is the smallest amount of power that will do any considerable amount of useful work. A 16-foot mill will furnish 1 5 horsepower in a 20-mile wind (indicated) and 2 3 horsepower in a 25-mile wind.

"A 12-foot steel mill and a 50-foot steel tower as commonly made weigh about 2000 pounds. A 16-foot steel mill and a 50-foot steel tower weigh about 4250 pounds. The 16-foot outfit weighs more than twice that of the 12-foot, and its power is only 1.5 that of the latter. In addition, the 12-foot mill will govern more easily and is less likely to be injured in a storm than the 16-foot mill. In most cases, therefore, it is better to use two 12-foot mills than one 16-foot mill."

"Steel mills," he says, "with few large sails, have much more power than the wooden mills with their many small sails." Mills should be placed on towers 50 to 70 feet high, in order to get them at least 30 feet above the tallest trees and buildings. Mills should start in as light a wind as corresponds to a velocity of four or five miles per hour. For information as to velocity and other phases of the wind, see WIND.

Consult: A. R. Wolff, *The Windmill as a Prime Mover* (New York, 1885), a technical treatise; F. E. Powell, *Windmills and Wind Motors: How to Build and Run Them* (ib., 1910); E. H. Barbour, *Wells and Windmills in Nebraska*, (Washington, 1899), which contains a very interesting descriptive review of home-made windmills, and E. C. Murphy, "The Windmill: Its Efficiency and Economic Use," in United States Geological Survey, *Water Supply and Irrigation Papers*, Nos. 20, 29, 41, 42 (ib., 1899–1901); valuable data and other information are to be found in manufacturers' catalogues and in mechanical engineers' pocket books. R. M. Dyer in a paper published in *Machinery* (August, 1907) discusses Murphy's and other experiments presenting his own conclusions.

WIN'DOM, WILLIAM (1827–91). An American legislator and cabinet officer, born in Waterford, Ohio. He was educated at Mount Vernon (Ohio) Academy, was admitted to the bar in 1850, and in 1852 was elected prosecuting attorney of Knox County on the Whig ticket. In 1855 he removed to Winona, Minn., where he allied himself with the Republican party. He was a Republican member of Congress from 1859 to 1869, and was chairman of the important Committee on Indian Affairs. In July, 1870, he was appointed to the seat in the United States Senate made vacant by the death of Daniel S. Norton, and was regularly elected in 1871 and again in 1877, holding the position of chairman of the Committee on Appropriations. On March 4, 1881, he resigned his seat to enter President Garfield's cabinet as Secretary of the Treasury. He resigned his portfolio after Garfield's death, and was at once reelected to the Senate to fill his own unexpired term. From 1889 until his death he was Secretary of the Treasury in President Harrison's cabinet. He was one of the early advocates of reciprocity and of the gold standard, and was a candidate for the presidential nomination in the Republican National Conventions of 1880, 1884, and 1888.

WINDOW (Icel. *vindauga*, window, wind eye, from *vindr*, AS. *wind*, wind + *auga*, Goth. *augō*, OHG. *ouga*, Ger. *Auge*, AS. *ēage*, Eng. *eye*). An opening in the wall of a building for the admission of light and air. Windows are generally closed with glass, set in a frame called the sash. This may be of wood or of metal, and may be fixed or arranged to be opened at will. Commonly the sash is in two halves, either hinged at the sides and meeting in the middle, as in French and casement windows, or sliding up and down in grooves, with cords and counterbalancing weights, as in double-hung windows. The former are the more common on the Continent of Europe; the latter in England and the United States. The sash is, however, sometimes pivoted so as to turn horizontally or vertically. When stained glass is used, it is set in small pieces held together by grooved strips of lead, and stiffened by iron bars. Large windows are often subdivided by fixed vertical bars or mullions of wood, metal, or stone, and one or more horizontal bars called transoms. A bay window or bow window is a window or group of windows set in a frame or structure projecting

outward from the face of the wall. A narrow bow window supported on a corbel or single shaft is called an oriel. A dormer is a vertical window lighting the interior of a steep roof. When the sash is made to lie in the slope of a roof it is called a skylight; it may be fixed or hinged, or partly fixed and partly hinged. Windows constitute one of the most important elements in the architectural design of buildings, especially of their exterior, and ever since the early Middle Ages their form, size, distribution, and decoration have in large measure determined the character of the various historic styles. The systematic arrangement and distribution of windows in the design of a building is called its fenestration.

Ancient. In Egypt unglazed windows were in common use in ordinary houses, piercing the wall on the second story front and on the inner court. In temple architecture they were rare, but occur at Karnak as clerestory openings in the hypostyle hall. In military architecture they were common, and in the palaces and villas of the new Empire were elaborately treated with heavy stone jambs and sills, and lintels crowned with the characteristic cavetto cornice. The openings were protected by wooden slats and shutters. In Babylonia and Assyria there was little use made of windows, though some reliefs show clerestories lighting the larger and loftier palace halls.

In Greece windows were in use from prehistoric times, but remained quite simple rectangular openings, sometimes slightly smaller at the top: the window frame was of stone or of wood, as occasion required. In some cases the windows are oblong and double, the lintel being supported in the centre by a pier. A decorative framework was often carved in the wall masonry, as in the beautiful Erechtheion windows discovered in 1907. The windows, when not left as mere openings, were fitted with gratings of wood or metal, or with shutters (usually of wood), or with both. The Romans made even more use of windows, with greater variety of form and increased richness of decoration. In private houses those on the streets were ordinarily small and simple (e.g. house of John and Paul on the Cœlian, Rome), but windows of temples were often highly elaborate, e.g., in the temple of Vesta at Tivoli; at Palestrina, surmounted by a cornice resting on consoles; and in the little temple of the Deus Rediculus near Rome, framed with rich ornamental carving. Under the late Empire round-headed windows became common, as at Telmessos in Asia Minor. Of extraordinary beauty are the windows of the Porta dei Borsari at Verona, which with their pilasters and gables undoubtedly served as models for the masters of the Renaissance. The great halls of the thermæ were lighted by huge semicircular clerestory windows, fitted with elaborate bronze gratings. The use of glass was far commoner than is imagined, beginning even in Republican times and probably derived from Alexandria and Antioch; several examples have been found in Pompeii. Even commoner was the use of transparent stones called specularia, the choicest of which came from Spain.

Mediæval and Mohammedan. The development of the basilican church involved the general use of windows. The normal window of Early Christian and Early Byzantine buildings was a single, plain and rather wide round-arched opening, without moldings or sculpture. Only in the East, where stone was commonly used, was the old Græco-Roman richness partly perpetuated, especially in the ruined cities of central Syria, where hundreds of windows remain in religious and secular structures built during the third, fourth, fifth, and sixth centuries A.D.

As the later Middle Ages approached, the Byzantine windows took on new forms, and were slenderer, often with two lights, separated by marble colonnettes and framed with moldings. The Roman custom of filling the aperture with glass, onyx, or alabaster was continued, and many examples remain of the perforated marble slabs; usually the perforations were small and circular, quite often square, sometimes in elaborate patterns. The perforations were at times filled with colored glass, thus combining the two varieties. The churches of Grado, Parenzo, Ravenna, Rome, etc., retain examples dating from the sixth to the eleventh century. In the Mohammedan East windows were early provided with musharabiyeh lattice work, or with stucco window sashes cut out in free and exquisite floral designs, filled with stained glass, this was practiced especially in Egypt (Cairo), but perhaps also in Syria, and many beautiful examples are to be seen in the mosques of Constantinople.

Romanesque windows are ordinarily single, round-headed apertures, splayed where the wall is thick; very seldom does a two-light window with central colonnette occur. Occasionally the arched opening was framed with carving or treated, like the superb doorways, with receding arches and carved moldings, especially in southern France and southern Italy. But the highest development of the window came with the Gothic style. Its perfect system of balanced construction permitted the opening of windows as vast as the entire space between the supporting piers of a vaulted interior. Thus arose the magnificent pointed and circular windows with tracery (q.v.), dividing them into several narrow lights. They were filled with stained glass, which developed into an important branch of painting. For the first time—except for a few late Romanesque examples in France and Germany—the pieces of stained glass framed in lead were so assembled as to form immense figured compositions rivaling wall paintings. France led the way, closely followed in this art by England and Germany. Italy was least important. See STAINED GLASS.

Renaissance. The discontinuance of the Gothic system of construction after the fifteenth century put an end to the use of tracery and removed the chief distinction between the windows of churches and secular buildings. The art of stained glass declined, although a few fine examples were produced in Florence and in northern France and Belgium during the early Renaissance. In general attention was now bestowed upon the architectural adornment and framing of the square or arched openings, which at first were single or coupled arches with little decoration, but later were enriched with most elaborate carved ornament, as in the superb windows of the Certosa at Pavia. In the later periods they were flanked by colonnettes and crowned with entablatures and often with curved or triangular pediments. Clear glass was almost exclusively used.

Modern. In modern work windows are either treated simply as openings for light and air,

and therefore filled with clear glass in movable sashes, usually of wood, or made internally decorative, as in the Middle Ages, by the use of stained glass. This art has been revived and extended by wholly new developments as to color and treatment, especially in England and the United States, and applied in both secular and religious architecture. In general the form and treatment of modern windows are made to conform to the historic style which predominates in the design, but the style is often handled with great freedom of detail. Nearly all types of Gothic and Renaissance windows may be seen in modern buildings, the Gothic being chiefly confined to ecclesiastical buildings. In windows of monumental size bronze is often employed for mullions, transoms, decorative framework, and even sashes. In the colonial houses of the United States windows over the doors (fan lights) and narrow windows on either side of the door (side lights) were often made with glass set in iron or lead framework forming charming decorative patterns. The use of plate glass has made possible the glazing of large windows without intermediate sash bars, with gain in light but frequent loss of architectural effect. Shop windows measuring 10 or 15 feet square are not uncommon, each of a single sheet of glass, but they detract greatly from the solid aspect of a building and are generally destitute of architectural character. The development of fireproof construction (q.v.) has brought about the use of wire glass, which may crack but will not disintegrate even in intense heat; and of sashes either wholly of metal or of wood cased in sheet copper or sheet brass, often called kalamine windows. The heavy glazed, round windows used in ships are called port holes. See GLASS.

WINDOWPANE. A small, thin, almost translucent, variously mottled flounder (*Lophosetta maculata*) common along the northeastern coast of the United States. It is a near ally of the English turbot, but is little used as food.

WINDOW SHELL. A Ceylonese oyster (*Placuna placenta*) of the family Anomiidæ, whose valves are round, nearly flat, almost transparent, and formerly were extensively used in China and elsewhere as a substitute for window glass. In the middle of the nineteenth century their export in shiploads was an important item of commerce in Ceylon. They abound in tiny pearls, which are saved for burning into a lime to be chewed with betel nut by those who can afford the luxury. Compare JINGLE SHELL.

WINDPIPE. See TRACHEA.

WINDS, TOWER OF THE. See TOWER OF THE WINDS.

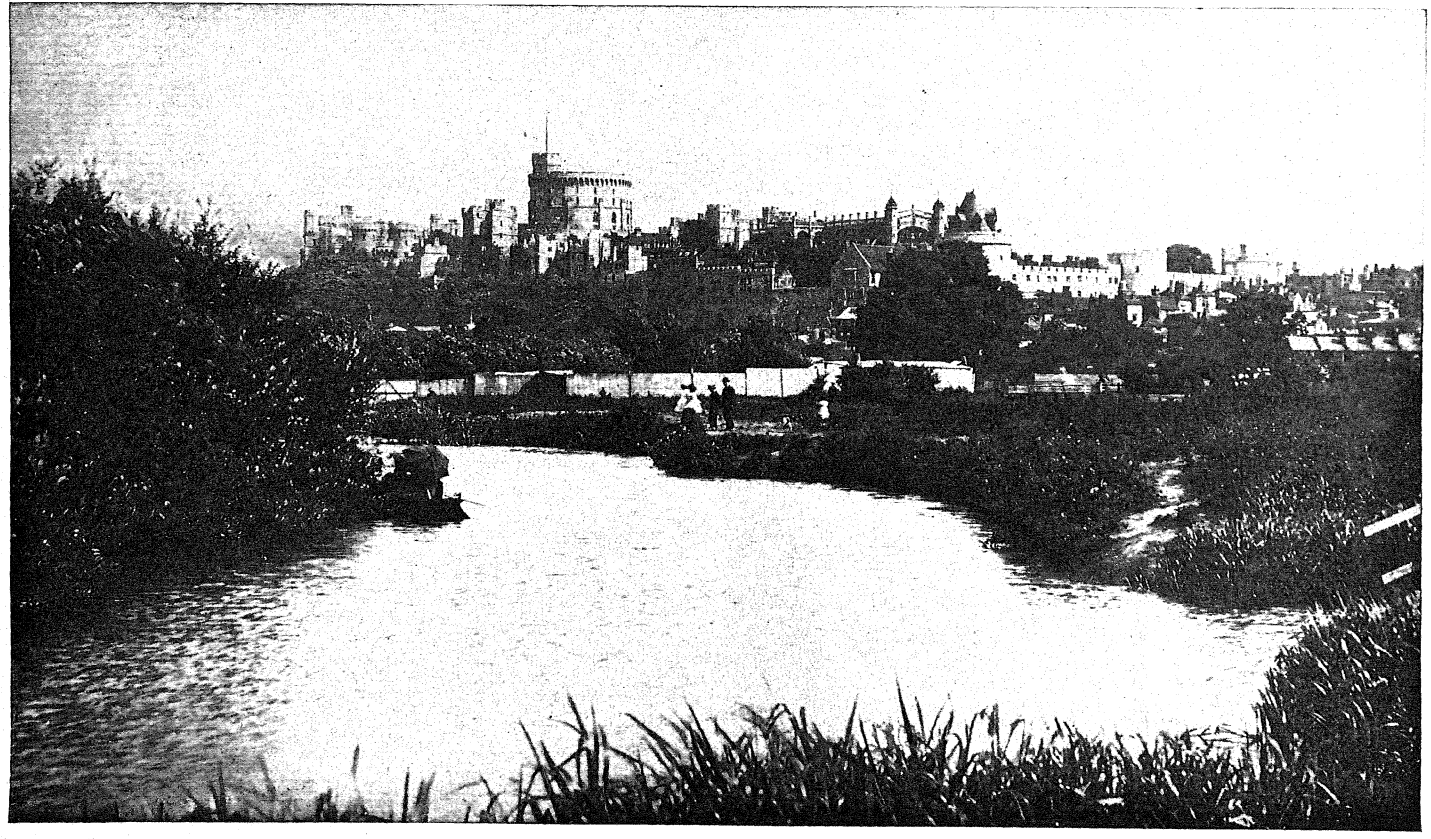
WINDSOR, wĭn'zẽr. A municipal and Parliamentary borough in Berkshire, England, on the Thames, 21 miles by rail west by south of London (Map: England, F 5). Of great antiquity, its chief interest lies in its castle and parks. It has been a favorite residence of English monarchs. (See WINDSOR CASTLE.) Bridges connect the town with Eton and Datchet opposite on the left bank of the Thames. The town hall, built by Sir Christopher Wren in 1658, contains some royal portraits. Pop., 1901, 13,958; 1911, 15,370.

WINDSOR. A port and the capital of Hants County, Nova Scotia, on the Dominion Atlantic Railway, 45 miles northwest of Halifax (Map: Nova Scotia, F 7). It is the seat of the University of King's College, chartered in 1788 by George III. There are plaster, glue, and fertilizer works, a foundry, a builders' and a furniture factory, and gypsum is shipped in large quantities from the neighboring quarries. Pop., 1901, 3398; 1911, 3452.

WINDSOR. A city in Essex County, Ontario, Canada, on the Detroit River, opposite Detroit, and on the Canadian Pacific, the Michigan Central, the Grand Trunk, the Wabash, and the Pere Marquette railways (Map: Ontario, C 9). It has car and passenger ferryboats connecting with Detroit, electric lights and street railroads, important beds of rock salt, a large fruit and tobacco industry, and thriving manufactures. Pop., 1901, 12,153; 1911, 17,829.

WINDSOR. A town in Hartford Co., Conn., 6 miles by rail north of the city of Hartford, on the Connecticut and Farmington rivers, and on the New York, New Haven, and Hartford Railroad (Map: Connecticut, E 2). Manufacturing is the leading industry, the most important products being paper, knit goods, and electric motors. Tobacco culture is extensively carried on in the vicinity. Noteworthy features are the Loomis Institute, Campbell School, and the public library. Pop., 1900, 3614, 1910, 4178. In 1633 William Holmes and a few associates from Plymouth built here a fortified trading post, and two years later permanent settlers, headed by Roger Ludlow, came from Dorchester, Mass., the settlement being called Dorchester until 1637, when the present name was adopted. In 1639 Windsor united with Hartford and Wethersfield, under the "Fundamentall Orders," to form the Colony of Connecticut. Consult Stiles, *History of Ancient Windsor* (New York, 1859).

WINDSOR CASTLE. The chief residence of the British sovereigns, at Windsor (q.v.), on the Thames. The buildings, which crown a plateau west of the town, cover 12 acres of ground in the midst of the Little or Home Park, which is about four miles in circumference. A tree-lined avenue connects with the Great Park, which has a circuit of 18 miles, and west of this is Windsor Forest, occupying an area 56 miles in circumference. The castle may be grouped in three portions: The Middle Ward, conspicuous by the dominating Round Tower or Keep, 80 feet high, built on an eminence 42 feet high; the Lower Ward on the west, containing St George's Chapel, the Albert Chapel, the houses of the military knights, cloisters, etc.: and the Upper Ward on the east, containing the royal private apartments. The Round Tower, which was built by Edward III to receive the round table of the knights of the newly founded Order of the Garter, was used as a prison until 1660. St George's Chapel, begun in 1474 by Edward IV and completed by Henry VIII, is a fine specimen of flamboyant Gothic architecture. In the vault below the chapel Henry VI, Edward IV and his Queen, Henry VIII and Jane Seymour, Charles I, George III and his Queen, George IV, the Princess Charlotte, the Duke of Kent, the Duke of York, William IV and his Queen, and other members of the royal family are buried. Adjoining St. George's Chapel is the Albert Chapel, built by Henry VII, and lavishly restored by Queen Victoria as a memorial to the Prince Consort, Albert. The state apartments in the Upper Ward, including the celebrated St. George's Hall, 200 feet long by 34 feet wide, the Waterloo Chamber or Grand Dining Room, 98 feet long by 47 feet wide, the Throne Room, and the old Ball Room, now the



WINDSOR CASTLE
FROM THE THAMES

Vandyck Room, contain valuable collections of paintings, statuary, and other priceless objects of art. Frogmore (q.v.), the mausoleum of Queen Victoria and her husband, is in the park half a mile from the castle. Windsor was a residence of the Saxon kings before the Conquest, their palace being at Old Windsor, two miles distant. William the Conqueror chose the present site and built a castle which was extended by Henry I and Henry II, but under the orders of Edward II was taken down and a new one rebuilt by William of Wykeham, Bishop of Winchester This castle was extended by successive monarchs, and under George IV it was completely renovated. Consult: W. H. Dixon, *Royal Windsor* (4 vols, London, 1879–80); W. J. Loftie, *Windsor: The Castle, Park, Town, and Neighborhood* (ib., 1886); G. F. Laking, *Furniture of Windsor Castle* (New York, 1905)

WINDSOR LOCKS. A town in Hartford Co., Conn., 12 miles north of Hartford, on the Connecticut River, and on the New York, New Haven, and Hartford Railroad (Map: Connecticut, E 2) The public library and Memorial Hall are noteworthy. There are manufactories of paper, underwear, cotton warp and yarns, trucks, rubber rolls, and machines. Pop, 1900, 3062; 1910, 3715

WINDSOR MILLS. A town in Richmond County, Quebec, Canada, on the St Francis River and on the Grand Trunk and Canadian Pacific railways, 90 miles east (direct) of Montreal (Map: Quebec, J 6). It has a Protestant academy, a convent, and manufactories of powder, paper, and cheese. Pop., 1901, 2149; 1911, 2233

WIND SUCKING. See CRIBBING.

WINDTHORST, vint'hôrst, LUDWIG (1812–91). A Prussian party leader. He was born at Kaldenhof, in Westphalia, studied jurisprudence at Göttingen and Heidelberg, became an advocate, and in 1849 was chosen a member of the Lower Chamber of Hanover. In this body he assumed the leadership of the party opposed to Prussian domination. He was made President of the Lower House, and from 1851 to 1853, and again from 1862 to 1865, was Minister of Justice. He was ultramontane in his views. When the collision between Austria and Prussia became imminent his influence was a considerable factor in bringing about the alliance of Hanover and Austria. After the North German Confederation had been formed and Hanover had been incorporated with Prussia Windthorst first led the Hanoverians in opposition, and when the Kulturkampf broke out he became the chief of the Catholic Centre party, whose policy he guided with great skill and persistence. While never completely reconciled to the Imperial Government, he succeeded, by supporting its economic policy, in gaining in return many a victory for his party and the Ultramontane cause generally Consult Menzenbach, *Ludwig Windthorst in seinem Leben und Wirken, insbesondere in seiner politischen Thatigkeit* (Treves, 1892).

WIND VANE. An instrument for showing the direction of the wind, frequently also called anemoscope (q.v.).

WINDWARD ISLANDS. The southern portion of the Lesser Antilles, between St. Lucia and Trinidad, including the former and sometimes excluding Trinidad and Tobago (Map: West Indies, G 4). The northern portion of the Lesser Antilles—Martinique to the Virgin Islands inclusive—constitutes the Leeward Islands Besides the islands already named, the principal members of the Windward group are St. Vincent, Barbados, and Grenada.

The name "Windward Islands" is also applied to a British possession consisting of the colonies of St Lucia, St. Vincent, and Grenada (see these titles). The area is 524 square miles Pop., 1901, 160,769; 1911, 157,264. The majority of the inhabitants are negroes, less than 5 per cent being whites. There are about 5000 East Indian coolies, and a few Caribs remain in St. Vincent. English is spoken, but among the peasantry of St. Lucia and Grenada a French patois persists. Imports and exports in 1913, £694,219 and £756,809 The three colonies are under the administration of one governor, resident at St. George's in Grenada

The name "Windward Islands" was formerly applied to the whole of the main chain of the Lesser Antilles, the chain of islands extending east and west along the coast of South America having been known as the Leeward Islands.

WINE. Specifically, fermented grape juice, by extension, fermented juice of other fruits or plants, the name of the fruit always preceding the term, e.g., currant wine, rhubarb wine, elderflower wine, etc.; loosely, unfermented fruit juice used as a beverage Wine manufacture antedates history. Sketches on Egyptian monuments indicate that it was practiced several years before our era; biblical records abound in references to wines and vineyards; history credits the dissemination of the vine throughout the Mediterranean region to the Phœnicians, and, to judge by the writings of Herodotus, Aristophanes, Democritus, Cato, Varro, Vergil, Columella, and Pliny, wine making in their days had reached a high degree of perfection among the Mediterranean nations Many of the ancient wines, particularly of Western Asia, Greece, and Italy, owed their popularity to spices, the addition of which, except in the Mediterranean region and in the East, has been commercially abandoned. This practice and the present commercial demand for natural wines is partly accountable for the lower rating of formerly famous wines of the countries mentioned.

Commercial Importance. Wine is one of the most important agricultural products of the world, being made in every continent, and in almost every country except those of the extreme North. The world's supply, in 1912, was estimated at 3,454,941,336 gallons, which is equivalent to about 2.1 gallons per capita. During the fiscal year ending June 30, 1912, the United States exported 958,000 gallons of domestic wine and imported 4,035,746 gallons of foreign wine. In 1914 the value of wines imported into the United States was $10,117,000 and of wines exported $4,134,000 According to the *Moniteur Vinicole* the amount manufactured in the various countries, 1914, was as on page 618.

Classification. Wines are red or white according to the method of their manufacture. The former are prepared by fermenting or partially fermenting on the husks (skins), the latter after the expression of the juice. Often both kinds are prepared from the same grape, but of course a red wine cannot be made from a white grape, nor a white wine from a dark-colored must. Red wines are fuller (have more body), more astringent, and are usually more acid than white ones. Wines are classified as: Dry when completely fermented—only about 0.1 per cent of sugar remaining; sweet or fortified when the fermentation is checked at an early stage by the

addition of grape brandy or alcohol, evaporated must or sugar also being frequently added; still when the carbon dioxide produced by fermentation is allowed to escape before bottling or barreling; sparkling or effervescent when charged with carbon dioxide formed by the fermentation of a small amount of sugar solution added to the completely fermented wine; carbonated when charged artificially with carbon dioxide under pressure; rough and astringent or smooth, according to the amount of tannin derived from skins and stems during fermentation, heavy or light according as the alcoholic content is high

COUNTRY	*Gallons*
France	1,584,542,000
Italy	1,137,136,200
Spain	427,108,500
Algeria	272,563,200
Argentina	145,293,500
Russia	126,801,600
Austria-Hungary	118,876,500
Portugal	105,668,000
Chile	105,668,000
Greece and Islands	72,646,750
United States	45,965,600
Germany	26,417,000
Turkey and Cyprus	21,133,600
Rumania	17,461,600
Switzerland	15,393,400
Brazil	11,887,650
Servia	9,246,000
Australia	7,925,100
Tunis	7,925,000
Uruguay	5,283,400
Cape of Good Hope	4,623,000
Peru	4,226,700
Bolivia	1,226,700
Bulgaria	1,056,700
Azores, Canaries, and Madeira	792,500
Canada	449,100
Mexico	224,500
Persia	66,400
Egypt	39,600
Luxemburg	26,500

or low; full when rich in body (solids). According to flavor and aroma the self-explanatory terms "mild" and "delicate" are frequently employed. The variations in these characteristics are due to differences in climate, soil, culture, methods of manufacture, and varieties of grapes.

Wines are commonly classified also according to the country where manufactured, and within each country into special types. Among these types may be mentioned the following (see also the various manufacturing countries mentioned below): Bordeaux or claret—an astringent, dry, red wine manufactured in the valley of the Gironde in France. Burgundy—a smooth, dry, red wine made in Côte d'Or in France; Champagne—the most famous sparkling wine, made in the Province of Champagne, France; Madeira—a sweet Portuguese wine from the island of Madeira; Malmsey—a light, sweet Madeira. Moselle—an acid, dry, white wine made in the valley of the Moselle in Germany; Port—a famous sweet, red wine made near Oporto, Portugal; Rhine wine—a white, dry wine of fine aroma from the Rhine valley, Germany; Sauterne—a superior dry, or slightly sweet, white wine made in the upper valley of the Gironde, in France; Sherry—a dry, fortified Spanish wine; Tokay—a rich, soft, sweet Hungarian wine.

American Wines. About the middle of the sixteenth century wine was made in Florida from wild grapes, and unsuccessful attempts were made by the early settlers of Virginia to establish wine making as a permanent industry. In 1664 a man named Richards received permission from the first English Governor of New York to sell native wines without tax, and began the extensive cultivation of grapes in that Colony. During the latter part of the seventeenth century the manufacture of wine was begun in New Jersey and Delaware, and it was attempted, but without success, by William Penn in Pennsylvania. From the beginning of the industry in the United States the best grapes have been imported from wine-producing countries, but attempts to acclimate them have been largely unsuccessful except in the States lying west of the Rocky Mountains. See GRAPE.

There are five distinct wine-producing regions in the United States: (1) The Pacific district, including the territory lying west of the Rocky Mountains, New Mexico, Arizona, and a portion of the Rio Grande Valley in Texas; (2) New York; (3) Ohio and Virginia; (4) Missouri, and (5) the Southern States from North Carolina to Texas. These divisions are of the most general nature, and each would be subdivided into many districts if its wines were carefully and comprehensively studied. For instance, the soil and climatic conditions of California yield wines of widely varying characteristics. They are made almost exclusively from the European varieties of Vinifera. The wines of California have been carefully studied by Hilgard and his associates at the State Agricultural Experiment Station, and have been described in the station's publications. In general, California wines are higher in alcohol, solids, tannin, and coloring matter than European wines made from the same grapes. Thus California Bordeaux may be made more like the product of the Gironde by dilution. The successful wines of the Pacific district may be distributed among the following types. Bordeaux, Champagne, Jura, Sauterne, Southern French, Rhine, Port, Sherry, and the cultivated varieties of the North Italian. Burgundy, which resembles French Bordeaux more closely than it does French Burgundy, has been largely made, but is being discontinued. The Hungarian type, with the exception of the Zinfandel, is also rapidly losing favor.

East of the Rocky Mountains American varieties of grapes are used almost exclusively and the relative amount of grapes used for wine making and for the table depends largely upon the price of the latter; vines are most cultivated to supply table demands. But the number of vineyards for wine production is increasing, and there are some localities, especially in New York, Virginia, and Ohio, where wine making is an important industry. Large amounts of sparkling wine of fair quality are produced in this district, chiefly from Iona, Catawba, and Delaware varieties. In Virginia and Ohio a red wine of good color and body is made from Norton's Virginia and Ives's seedling grapes; the Cynthiana, Elvira, and Goethe grapes are employed for wine in Missouri; the Southern States from North Carolina to Texas employ the Herbemont, Lenoir, Goethe, and Elvira; in the Atlantic Coast States from North Carolina to Florida the Scuppernong is largely raised, and is highly prized both as a table and wine grape. The majority of the American varieties are said to have a foxy flavor, which is believed to be due to the short time that the American species have been cultivated. The wines of the Northern States are usually drier, less alcoholic, and more acid than more southerly kinds.

Austrian Wines. Austrian wines are little known in commerce; they are usually full, strong, and astringent. No distinct type can be described, since the various parts of Austria

RED WINES

NAME	Type	Country where made	Characteristics
Adelantadillo	Bordeaux	Spain	Still
Affenthaler	Rhine	Germany	Dry and still
Aleatico	Muscatel	Italy	Still, sweet, and delicate
Alicante (Alicant)	Southern French	Spain	Still and sweet
Assmannshäuser	Rhine	Germany	Still and sparkling, sweet and dry
Asti	Burgundy	Italy	Still or sparkling and strong
Auldana	Bordeaux	Australia	Full, still, and slightly astringent
Auvergnat	Bordeaux	France	Full, still, and slightly astringent
Auxerre	Burgundy	France	Still, smooth, and slightly astringent
Avallon	Burgundy	France	Still, smooth, and slightly astringent
Barbera	North Italian	Italy	Full, sparkling, and rough
Beaujolais	Burgundy	France	Smooth, slightly astringent, and still or sparkling
Beaune	Burgundy	France	Full, smooth, still or sparkling and astringent
Beclan	Jura	France	Still, full, and astringent
Beni Carlo	Burgundy	Spain	Deep red, still, smooth, and spirituous
Bergerac	Bordeaux	France	Still and astringent
Beziers	Burgundy	France	Still and sweet
Blanquefort	Bordeaux	France	Still and pungent
Blue Portuguese	Austrian	Austria	Still, deep colored, full, and neutral
Bonarda	North Italian	Italy	Still, deep colored, acid, and astringent
Bordeaux	Bordeaux	France	Still and astringent
Bourg	Bordeaux	France	Still and slightly astringent
Bual	Madeira	Madeira	Still, sweet and soft, ruddy brown
Burgundy	Burgundy	France	Still or sparkling, full, smooth, and dry
Cabernet	Bordeaux	France	Still and soft
Carignan	Southern French	France, United States	Still, full, and neutral
César	Jura	France	Still, full, deep colored, and rough
Chambertin	Burgundy	France	Dry, still or sparkling and soft
Champagne	Champagne	France	Dry or sweet and sparkling
Charbono	Bordeaux	France	Still, full, and astringent
Château Lafitte	Bordeaux	France	Still, full, and slightly astringent
Château la Rose Perganson (Château la Rose)	Bordeaux	France	Still, fruity, and soft
Château la Tour	Bordeaux	France	Still, full, and mellow
Château Margaux	Bordeaux	France	Still and generous
Chauché Noir	Southern French	France	Still, light, and neutral
Chianti	North Italian	Italy	Still, full, and spirituous
Cinsaut	Southern French	France	Still, full, and delicate
Claret	Bordeaux	France	Still and slightly astringent
Clos Vougeot	Burgundy	France	Still, full, and soft
Commanderia	Sherry	Cyprus	Still, heavy, and rich
Constantia	Sherry	Cape of Good Hope	Still, heavy, and sweet
Cosne	Bordeaux	France	Still, dry, and slightly astringent
Côte Rôtie	Southern French	France	Purple color, still or sparkling and slightly astringent
Dolcetto	North Italian	Italy	Still, deep colored, light, and soft
Epineuil (Epinal)	Burgundy	France	Full, dry, and sparkling
Etraire de l'Adhui	Jura	France	Still, full, and astringent
Falerno	Sherry	Italy	Still and sweet
Favorita	North Italian	Italy	Light, deep colored, and mild
Floirac	Bordeaux	France	Still and slightly astringent
Florence	Bordeaux	Italy	Still, full, and slightly astringent
Gamai Teinturier	Bordeaux	France	Deep colored, still, and full
Glenpara	Bordeaux	Australia	Still and spirituous
Gomera	Madeira	Canary Islands	Still and spirituous
Graves	Bordeaux	France	Still, full, and slightly astringent
Gros Mansenc	North Italian	Italy	Still, full, acid, and astringent
Grossblauer (Kolner)	Austrian	Austria	Still, light, and mild
Hermitage	Southern French	France	Still, full, soft, and aromatic
Highercombe	Australian	Australia	Still and dry
Hochheimer (Hock)	Rhine	Germany	Still or sparkling, dry or sweet, light, and acid
Kadarkas	Hungarian	Hungary	Dry, full, and rough
Karlowitzer	Port	Hungary	Still, spirituous, and astringent
Lacrimæ Christi	Southern Italian	Italy	Full, still or sparkling, and sweet
Lagrain	North Italian	Italy	Full, still, deep colored, and astringent
Lipari	Muscatel	Lipari Islands	Still, sweet, and raisiny
Mâcon	Burgundy	France	Still, light, and soft
Madeira	Madeira	Madeira	Still, dry, soft, delicate, and nutty
Malbec	Bordeaux	United States	Still and slightly astringent
Malmsey	Madeira	Madeira, Canaries, Greece, Spain, Italy	Still, sweet, full, and soft
Malvasia (Malvaise, Malvoisie)	Madeira	All wine-producing countries	Still, sweet, full, and soft
Marsala	Madeira	Sicily	Still, dry, and astringent
Marzemino	North Italian	Italy	Still, light, low acid, and rough
Mataro	Southern French	France	Still and slightly astringent
Médoc	Bordeaux	France	Dry, still, and delicate
Merlot	Bordeaux	France	Dry, still, and delicate
Meunier	Burgundy	France	Dry, still, full, and soft
Mission		United States	Light, neutral, and low acid
Mondeuse	Bordeaux	United States	Soft and slightly astringent
Montefiascone	Muscatel	Italy	Still and spirituous
Montepulciano	Muscatel	Italy	Still, spirituous, and sharp
Mourastel	Southern French	France	Dry, still, light, and neutral
Muscatel (Muscadel, Muscadine, Muscat)	Muscatel	All wine-producing countries	Still, sometimes sparkling, sweet, raisiny, and aromatic
Musigny	Burgundy	France	Dry, still, soft, and full

RED WINES—*Continued*

NAME	Type	Country where made	Characteristics
Nebbiolo	North Italian	Italy	Full, heavy, and acid
Patras	Port	Greece	Still or sparkling, spirituous and sharp
Pinots	Burgundy	France	Dry, full, and soft
Poussard	Jura	France	Dry, full, and astringent
Pomard (Pommard)	Burgundy	France	Dry, still, full, and soft
Pomino	North Italian	Italy	Still, dry, spirituous, and acid
Pontac	Bordeaux	France	Dry, still, rich, and delicate
Port	Port	Portugal	Still, sweet, astringent, and heady
Preignac	Sauterne	France	Dry, still, and fruity
Rausan	Bordeaux	France	Dry, still, slightly astringent, strong, and aromatic
Refosco	North Italian	Italy, Austria	Dry, full, deep colored, and astringent
Rivesaltes	Muscatel	France	Dry, still, and fruity
Romanée-Conti	Burgundy	France	Dry, still or sparkling, full, and aromatic
Rousillon	Burgundy	France	Dry, still, fruity, and aromatic
Saint-Emilion	Bordeaux	France	Still and generous, dry and slightly astringent
Saint-Estèphe	Bordeaux	France	Dry, still, and delicate
Saint-Julien	Bordeaux	France	Still, fruity, and aromatic
Saint-Macaire	Southern French	France	Dry, still, and slightly astringent
Santenay	Burgundy	France	Still, full, and soft
Savigny	Burgundy	France	Dry, still, rich, aromatic, and smooth
Shiraz	Sherry	Persia	Still, sweet, rich, and aromatic
Sirah	Jura	France	Dry, full, and astringent
Syracuse	Muscatel	Sicily	Still or sparkling, raisiny, and aromatic
Tannat	Southern French	France	Dry, still, and slightly astringent
Tent	Sherry	Spain	Rich, sweet, fruity, and aromatic
Tinta Amarella	Port	Portugal	Full, heavy, and astringent
Tinta Cão (Tinta Cam)	Port	Portugal	Dark colored, full, and heady
Tinta Valdepeñas		Spain	Full, strong, and slightly bitter
Torres Vedras	Bordeaux	Portugal	Still, sweet, and thin
Trousseau	Jura	France	Dry, full, and slightly astringent
Valdepeñas	Sherry	Spain	Dry, still, full, and slightly astringent
Volnay	Burgundy	France	Dry, full, still or sparkling, firm, and delicate
Zinfandel	Hungarian	United States	Still, dry, spirituous, and astringent

WHITE WINES

NAME	Type	Country where made	Characteristics
Aliso	Sherry	United States	Still and sweet
Amontillado	Sherry	Spain	Dry, still, delicate, and nutty
Angelica	Tokay	United States	Still and sweet
Avize	Champagne	France	Dry, light, and sparkling
Ay	Champagne	France	Dry, light, and sparkling
Bacharach	Rhine	Germany	Light, still, sweet, and acid
Bakator	Hungarian	Hungary	Dry, still, full, heavy, and smooth
Bari	Muscatel	Italy	Still, sweet, and raisiny
Barsac	Bordeaux	France	Still, dry, and slightly astringent
Beaujolais	Burgundy	France	Dry, still or sparkling, and rather soft
Beaune	Burgundy	France	Dry, full, still or sparkling, and slightly astringent
Bergerac	Bordeaux	France	Still, dry, and slightly astringent
Bernkasteler Doctor	Moselle	Germany	Dry, still, acid, and musky
Blanquette	Champagne	France	Still or sparkling and also dry or sweet
Bodenheimer	Rhine	Germany	Light, dry, still, acid, and delicate
Bordeaux	Bordeaux	France	Dry, still, and astringent
Bouzy	Champagne	France	Dry, sparkling, delicate, and soft
Brauneberger	Moselle	Germany	Light, still, dry, and acid
Burger	Rhine	Germany	Light, dry, still, and slightly astringent
Burgundy	Burgundy	France	Dry, still or sparkling, and soft
Canary	Madeira	Canary Islands	Full, heavy, still, and sweet
Cape	Sherry	Cape of Good Hope	Still and spirituous
Carcavelhos	Port	Portugal	Still, sweet, and heavy
Catawba	American	United States	Still or sparkling and dry or sweet
Chablis	Burgundy	France	Dry, still or sparkling, full, and soft
Chambertin	Burgundy	France	Dry, still or sparkling, and soft
Champagne	Champagne	France	Sparkling and dry or sweet, light, and acid
Château la Tour Blanche	Sauterne	France	Still, sweet, and spirituous
Château Yquem	Sauterne	France	Still, sweet, and delicate
Chianti	North Italian	Italy	Still, full, and heavy
Clos Vougeot	Burgundy	France	Dry, still, firm, and smooth
Constantia	Sherry	Cape of Good Hope	Still, heavy, and sweet
Côte Rôtie	Southern French	France	Still or sparkling and slightly astringent
Cotnar		Rumania	Still, sweet, and heavy; greenish color
Deidesheimer	Rhine	Germany	Light, dry, still, and acid; gold color
Delaware	American	United States	Still, dry, and delicate
Epernay	Champagne	France	Dry, sweet, and sparkling or creamy
Falerno	Sherry	Italy	Still, sweet, and nutty
Farnese	Muscatel	Greece	Still, sweet, and oily
Folle Blanche	Sauterne	France	Still, dry, and mild
Forst	Rhine	Germany	Light, still, dry, and acid
Frontignan	Muscatel	France	Still, sweet, and high in alcohol
Geisenheimer	Rhine	Germany	Still and slightly astringent
Genevrières	Burgundy	France	Still, dry, and smooth
Glenpara	Bordeaux	Australia	Still, heavy, and slightly astringent
Graves	Bordeaux	France	Still and slightly astringent
Grüner Veltliner	Austrian	Austria	Still, dry, and neutral
Haut Villers	Champagne	France	Dry and sparkling; straw color

WHITE WINES—*Continued*

NAME	Type	Country where made	Characteristics
Herbemont	American	United States	Still, dry, fresh, and aromatic
Hermitage	Southern French	France	Still, full, and soft
Highercombe		Australia	Still
Hochheimer (Hock)	Rhine	Germany	Light, sparkling, and dry or sweet
Johannisberger	Rhine	Germany	Dry, still or sparkling, delicate, and soft
Jurançon		United States	Dry, still, and aromatic
Lacrimæ Christi	North Italian	Italy	Full, still or sparkling, and sweet
Liebfrauenmilch	Rhine	Germany	Dry, still, and delicate
Lipari	Muscatel	Lipari Islands	Still, sweet, and raisiny
Lunel	Muscatel	France	Still, sweet, and spirituous
Mâcon	Burgundy	France	Still, light, and soft
Madeira	Madeira	Madeira	Still, dry, soft, delicate, and nutty
Malaga	Sherry	Spain	Still, dry or sweet, with burnt flavor
Malmsey	Madeira	Madeira, Canaries, Greece, Spain, Italy	Still, full, and sweet
Malvasia (Malvaise, Malvoisie)	Madeira	All wine-producing countries	Still, soft, full, and sweet
Manzanilla	Sherry	Spain	Dry, still, aromatic, and nutty
Markobrunner	Rhine	Germany	Still, dry, and slightly astringent
Marsala	Madeira	Italy	Still, soft, and sweet
Médoc	Bordeaux	France	Dry, still, and delicate
Montilla	Sherry	Spain	Still, dry, light, and aromatic
Montrachet	Burgundy	France	Dry, still, and soft
Moselle	Moselle	Germany	Light, still or sparkling, dry or sweet, soft, delicate, and aromatic
Muscatel (Muscadel, Muscadine, Muscat)	Muscatel	All southern countries	Still or sparkling, sweet, raisiny, and aromatic
Niersteiner	Rhine	Germany	Still, light, acid, and delicate
Oloroso	Sherry	Spain	Dry, still, nutty, and aromatic
Orvieto	Muscat	Italy	Still and sweet
Patras	Port	Greece	Still or sparkling, heavy, and sharp
Pedro Jiménez (Pedro Ximénes, Peter-see-me)	Sherry	Spain	Still, dry, and nutty
Pinot Blanc	Burgundy	France	Still, dry, full, and soft
Pinot Chardonay	Burgundy	France	Still, dry, full, and soft
Pinot Gris	Rhine	Germany	Still, dry, and delicate
Pontac	Bordeaux	France	Still, rich, and slightly aromatic
Port	Port	Portugal	Heavy, still, sweet, and astringent
Preignac	Sauterne	France	Dry, still, fruity, and aromatic
Rauenthaler	Rhine	Germany	Light, still, and dry
Rhine	Rhine	Germany	Light, still or sparkling, dry, and aromatic, yellow color
Riesling	Rhine	Germany, Austria	Light, still, soft, and subacid
Romanée-Conti	Burgundy	France	Still or sparkling, full, and soft
Rudesheimer	Rhine	Germany	Light, dry, still or sparkling, delicate, and sharp
Rulander	Rhine	Germany	Still, dry, and delicate
Sack	Malaga	Canary Islands	Still, dry or sweet, and heavy
Santenot	Burgundy	France	Dry, full, still, and soft
Saumur	Champagne	France	Still or sparkling, dry, and delicate, gold color
Sauterne	Bordeaux	France	Still, also sparkling; sweet or dry, spirituous, and aromatic
Sauvignon	Bordeaux	France	Still, dry, delicate, heavy, and slightly astringent
Scharlachberger	Rhine	Germany	Light, still, delicate, aromatic, and acid
Scharzhofberger (Scharzberger)	Moselle	Germany	Light, still, dry, and aromatic
Scuppernong	American	United States	Still, sweet, aromatic, and delicate; gold color
Semillon	Sauterne	France	Full, still, and soft with low acidity
Sherry	Sherry	Spain	Still, strong, dry, nutty, and spirituous
Shiraz	Sherry	Persia	Still, sweet, and rich
Slankamenka	Hungarian	Hungary	Still, light, dry, and full
Stein (Holy Ghost Wine)	Rhine	Germany	Sparkling, full, soft, and aromatic; gold color
Steinberger	Rhine	Germany	Dry, still, subacid, light, rich, and delicate
Steinschiller	Hungarian	Hungary	Dry, still, light, and subacid
Syracuse	Southern Italian	Sicily	Still or sparkling, raisiny, and aromatic
Teneriffe	Madeira	Canary Islands	Still, dry or sweet, soft, rich, and aromatic
Tokay	Tokay	Hungary	Still, sweet, soft, full, and rich, topaz color
Tonnerre.	Burgundy	France	Sparkling, spirituous, aromatic, full, and soft
Valdepeñas.	Sherry	Spain	Full, still, and slightly astringent
Verdal	Southern French	France	Light, dry, still, and neutral
Vernaccia	Austrian	Austria, Italy	Still, dry, full, and acid
Verzenay	Champagne	France	Light, sparkling, and dry
Volnay	Burgundy	France	Still or sparkling, full, delicate, and soft
Walschriesling	Austrian	Austria, Germany, Switzerland	Dry, still, and neutral
Zeltinger	Moselle	Germany	Sparkling, sweet, soft, delicate, and aromatic
Zierfahndler	Austrian	Austria	Still, fiery, alcoholic, and somewhat sweet

produce widely different varieties. Many Austrian vineyards are fortunately located, and excellent wine is produced where the methods of manufacture are not too careless and inefficient. The grapes are usually those of the surrounding countries, especially Germany, Hungary, and Italy, and but few characteristic local varieties are known.

Australian Wines. The wines of Australia are very similar to those of California, and are popular in England. The industry is growing rapidly and is of considerable importance.

French Wines. The production of wine is one of the leading industries of France, 78 of the 86 departments producing it in large quantities. Until 1875 France easily led the world, but in the following years her vineyards were devastated by the phylloxera, which reduced the acre-

age between the years 1875 and 1887 from 5,550,000 acres to 3,722,000, and the output of wine from 1,840,000,000 gallons to 535,000,000. Since the latter date vineyards have been restored by grafting on resistant American varieties, and the industry is again flourishing. The best-known types of wine made in France are the Bordeaux, Burgundy, Champagne, and Sauterne. The wines of Saumer, of Jura, and the light wines of southern France are also worthy of mention. These in turn are divided and subdivided according to local geographical and climatic conditions and the varieties of grapes employed. The wines produced in the region of the Gironde, in and near the Province of Bordellais, are commonly called Bordeaux, a class including a large number of wines with somewhat widely varying characteristics. They are all full, astringent, acid, usually rich in coloring matter, and have a medium alcohol content, their average composition is: alcohol, 7.5 per cent; total acids, 0.60 per cent; tannin, 0.175 per cent; solids, 2.3 per cent. Among the grapes employed in the preparation of Bordeaux are the Cabernet, Verdot, Merlot, Malbeck, Teinturier, Gamai, and Charbono. Many light wines are made in this region, however, and these are usually blended with those having a higher percentage of alcohol before being placed on the market.

The wines of the Gironde naturally arrange themselves into the following classes: Médoc, Graves, Sauterne, Entre-deux-mers, Saint Emilionnais, Bourgeais, and Blayais: subdivisions which are, in a sense, geographical and vary in size from three cantons to the greater part of a department. They are also graded according to their supposed relative merits. The first classification of the Médoc wines was made in the eighteenth century, and has not been revised since 1855, when six groups were made, the first five called classified growths, and originally valued in the order of their number. This classification is rigorously retained, and it is difficult for a wine to be promoted into a higher grade even though it may make such a reputation as will demand a higher price than many in the grades above it.

Each of the Gironde districts makes wines distinctly different from those of the other districts, but this distinction is not commonly understood, and the great majority of the wines of the Gironde region are sold simply as Bordeaux.

The wines of Burgundy, which once ranked highest, are still held in high estimation by connoisseurs. Burgundy is rich in flavor, smooth, velvety, and when aged has a peculiar delicate aroma not present in the new wine. It has a medium content of alcohol, acid, and solids, is very low in tannin, and rather lacking in color. The vineyards, consisting of Pinots, Gamai Noir, and Meunier grapes, are located about half way up the hillsides (800–1000 feet high) in the Côte d'Or between Dijon and Châlons. Red and white varieties, which are made from the same grapes, are equally esteemed. Three classes or "growths" of red Burgundy and two of white are recognized. Similar to the wines of Burgundy, but inferior to them, are those of Chablis and Mâcon.

Champagne. Champagne is the name given to a famous sparkling wine of French production. It derives its name from the ancient Province of Champagne, where it was first produced. The discovery of the process of its production is attributed to Don Pérignon, a monk, about the close of the seventeenth century. However, the wine did not enjoy much popularity until the latter part of the eighteenth century. Its production has gained constantly and is to-day an industry of great importance. When champagne is poured into the glass the carbon dioxide gas escapes with a sparkle, the liberation of the gas continuing for some time if the wine is properly served. It is due to the sparkle that wines of this type owe their great popularity. The sparkle of true champagne is developed by bottle fermentation; i.e., the carbon dioxide is formed by the decomposition of sugar in the bottle. During bottle fermentation the pressure increases, and very often amounts to 5 or 6 atmospheres.

The time required for producing true champagnes and the care which is required in their preparation are the main reasons for the high price at which they are sold. To meet the demand for cheap articles the manufacturers carbonate wines artificially, i.e., force the carbon-dioxide gas into the finished wine, but the sparkle in these wines subsides sooner than in the true champagnes. Such wines, although of good quality, are not considered as champagnes in the true sense of the word.

The French government, by a decree issued by the Ministry of Agriculture, Dec. 17, 1906, delimited the territory for which the name of champagne is exclusively reserved to the Departments of La Marne and the Aisne. However, on the 9th of June, 1911, a supplementary decree to that of 1906 was issued delimiting a second zone, which includes the Aube, Haute Marne, and the Seine-et-Marne departments. No wine from other districts is permitted to be sold in France as champagne, but vintners in this district purchase the products of neighboring sections for blending, the result being that wines of this type may be purchased in Paris for very small sums.

Jura Type. The wines of the Department of Jura, made from such grapes as César, Mondeuse, Etraire de l'Adhui, Sirah, and Tinta Valdepeñas, are deep-colored and astringent, fuller, smoother, less aromatic than the Bordeaux, markedly different from the delicate, smooth Burgundies of the Côte d'Or, upon which the district borders, and also from the neutral wines of southern France. Their average composition is: alcohol, 11.50 per cent; solids, 3.00 per cent; acid, 0.55 per cent; tannin, 0.25 per cent.

Sauterne. The white wines made in the Sauterne district, in the Upper Gironde, are commonly divided into Haut and Grave Sauternes; the former, which contain about 14 per cent of alcohol, 3.5 per cent of solids, and 0.7 per cent of acid, being full, high in alcohol, smooth, somewhat aromatic, vinous, and slightly sweet, the latter, lighter, drier, and less aromatic. When fermentation has reached the desired stage, Haut Sauternes are racked into heavily sulphured casks, and consequently contain a relatively large amount of sulphurous acid, to the presence of which the persistent headaches that follow indulgence are attributed. The Grave Sauternes include many of the most highly prized of European white wines, their flavor being due to the care used in preparation rather than to soil and climate. A marked difference exists between the first growth and the second. In the preparation of the latter, only ordinary care is exercised; in that of the former, the berries are picked singly, and no possible precautions are omitted.

A number of the crus Burgeois are of great merit, and often bring a higher price than some of the second growth

A large amount of red and white, sweet and dry wine, unclassifiable into distinct types, but generally deficient in aroma, is made in southern France. The wines of the hill regions are somewhat full and smooth, and those of the plains low in alcohol, body, tannin, and acidity. The *vins de liqueur*, such as the sweet Muscats and Roussillon, are most prized. The average composition is: alcohol, 10 per cent; solids, 2.10 per cent; acid, 0.55 per cent; tannin, 0.15 per cent.

German Wines. The valleys of the Rhine and the Moselle in southern Germany, long famous for their wines, mark the northern limit of successful viticulture, but probably they suffer from unfavorable climatic conditions, especially cold and wet, more frequently than any other region. In favorable seasons the wines are of exceptionally fine flavor and delicate aroma The Rhine valley is the most important wine district of Germany; north of Coblenz little wine is made; between Coblenz and Assmannshausen that produced is inferior. From the vicinity of Assmannshausen to that of Mainz on the north bank of the river are many of the most famous wine-producing localities, and in the neighborhood of Hochheim is produced the so-called Hock, under which name English usage often includes all Rhine wine.

The valleys of the Moselle and the Saar, especially in Lorraine, produce large quantities of high-grade wine. In Württemberg much low-grade wine is made. Characteristically German wine is white, but red wines are produced in some localities. In general, German wines are low in alcohol (generally below 9 per cent) and body, with very often as much as 1 per cent of acid; those of the higher grade approach French wines in composition, the average being· alcohol, 11 per cent; solids, 2.5 per cent; acids, 0.7 per cent.

The list of varieties of grapes employed is smaller than that of France, and includes Riesling (most widely grown), Traminer, Burger, Sylvaner, Ruländer, Blaver, Burgunder (a pinot), Affenthaler, Arbst, Kleinberber, Orléans, and Elbling.

Greek Wines. Since early historical times the hillsides and valleys of Greece have been famous for their wines, which, however, are commonly so crudely and imperfectly made, and so badly fermented, that they cannot be carried through the first summer. Rather than perfect their methods, the vintners use smoke and resin as preservatives. The wines of Santorin, which are shipped mainly to Russia, are acknowledged best. Other celebrated Greek wines are the Malvoisies or the Kephissia of Attica, a red wine of Zante, and the so-called Tokays, which are largely exported from Patras. Others in good repute are Thera, Caliste, and St. Elie. The annual vintage is about 45,000,000 gallons.

Hungarian Wines. Among the most prized Hungarian wines are the Furmint or Tokay and the Kadarkas, produced from Hungarian varieties of grapes. German and Italian varieties are also grown. Among the celebrated vineyards are those of Erlau, Tokay, Bakator, Erdöd, Somlyo, and Ménes; the Hegyalja Mountain and the valleys of Samos and Bodrog in the north; and Rust, Alsó-Fehér, the Banat, and the Wojwodina in the south.

Italian Wines. Most of the wine of northern Italy, being carelessly made from neglected vineyards, is light, neutral, coarse, and of bad keeping quality, but, owing to the natural advantages of the country, well-colored wines of high alcohol and tannin content can be produced with reasonable care. Though rough and astringent when new, they are fully equal to the Bordeaux type when properly aged, and are highly prized for their pleasant flavor and for blending with the neutral wines of southern France. The wines of Asti and Montferrat are among the most famous The wines of southern Italy are rich in alcohol, but have less tannin and acid than the northern type. Those of Tuscany are highly prized, and a red wine made in Chianti finds a ready market. Among the grapes used are Refosco, Margemino, Barbera Fresa, Lagrain, Nebbiolo, and Moscatello Fino. The first two are remarkable for their adaptability, being among the most valuable wine grapes of Austria and California The wines of Sardinia and Sicily are famous, the Marsala of Sicily especially

Portuguese Wines. The soil and climate of Portugal are especially favorable to the grape, and some of the wines, which include red and white, sweet and dry, are among the world's most famous. Port, made in the mountains near Oporto, is said to have been first exported in 1678, and by 1750 to have reached a volume of 2,000,000 gallons. From 1757 to 1833 and from 1843 to 1867 it was controlled by a monopoly which raised the price, but lowered the quality to such an extent that the demand decreased. New port is ordinarily fortified with alcohol to hasten the ripening and prolong fermentation, and is made to appear aged by the addition of jeropiga, a solution of elderberries, raisins, molasses, and alcohol. Grapes were introduced into the island of Madeira early in the fifteenth century, since when Madeira vintages have been in great demand. An outbreak of oidium early in the nineteenth century reduced the output from 2,770.000 gallons in 1813 to 3780 gallons in 1855, and induced extensive immigration to the West Indies. Since the latter date production has increased, a successful remedy for oidium having been found. A light, sweet, aromatic Madeira wine called Malmsey from Napoli di Malvasia, an island in the Grecian Archipelago, the wines of which are widely known by this name, is made from fully ripe grapes partially dried on the vines and is produced in the Azores, the Canaries, Sardinia, Sicily, and Provence, as well as Madeira.

Spanish Wines. The favorable soil and climate have made viticulture the most important agricultural industry of Spain, an industry which has repeatedly received governmental encouragement. The wines are high in alcohol, color, and aroma, and have been extensively used for blending with French wines, especially of the Gironde district, the red wines of Tarragona Rioja being favorites for this purpose. Spain leads the world in the manufacture of fortified wines. The most famous, sherry, a dry wine, made in southern Spain between Port Saint-Mary (Puerto de Santa Maria) and Jerez, from which it is named, is so little fortified that it contains only 14 or 15 per cent of alcohol. The grapes, having been allowed to ripen fully and to become partially dry before picking, are sold to large wineries, and not, as in other regions, worked up in small establishments. After fortification the wine is matured (baked) in hot

rooms. Two classes of sherry deserve special mention, amontillado and manzanilla, the former, inland wines, subdivided into fino (the most delicate) and oloroso, the latter, lighter and drier wines, made on the coast. Mantilla, a wine resembling manzanilla, is made in the Province of Cordova. Other important Spanish wines are tinto, a sweet red wine from the Rota district, Valdepeñas (red), from Central Spain, and Tarragona or Spanish red, from Catalonia.

Wine Manufacture. In the successful manufacture of wine, great discretion, unremitting care, and large experience are essential. Climate, location, soil, vintage, and method of preparation profoundly influence the character and composition of wine, and it is exceedingly difficult to maintain the uniformity demanded by commerce. The manufacture of wine really begins with the growing of the grapes and ends only after the final racking of the finished product. The vine must be intensively cultivated to replace the often unpleasant natural odor of the fruit with an agreeable aroma. The grape obtained, the vintner must ascertain the variety of wine for which it is suited, and then study the method and details of fermentation which will give best results. Unless the fruit is ripe when harvested, it may need to be artificially ripened or fitted for pressing by exposure to sun or fire heat, by steaming, sweating, or freezing; unless ripe when pressed it will generally yield a small quantity of juice, which must be further manipulated to avoid the production of wine of excessive acidity; and unless free from dust it must be sprayed to prevent a taint of earth in the final product.

In many of the wine-producing sections of Europe, even in Médoc, Graves, and St. Emilion, the wine makers hesitate to adopt improved methods, because they fear that the quality of the product may be impaired. Here the cuvier or wine house is often a one-roomed, one-storied building which serves for both pressing and fermenting.

Stemming, Crushing, and Pressing. Grapes whose tannin content is low, and especially fully mature or over-ripe grapes, are often pressed without stemming. The kind and quality of wine to be made also helps to decide whether or not stemming shall be performed. For high-grade wines the berries are often picked by hand; for ordinary grades, and particularly in old-fashioned practice, they are removed by wicker-work or galvanized iron combs or screens against which the clusters are worked by hand; in modern practice, prevalent in California and somewhat used in the Gironde, steam-power stemmers are used, and some of these can stem more than 300 pounds of grapes a minute. For white wines the fruit is pressed (usually without stemming) and the juice fermented; for increasing the body and astringency it is crushed and allowed to ferment more or less before the must is removed for further fermentation; for red wines this is the usual practice, since it secures the required color from the skins in the solvent action of the alcohol formed during fermentation. According as a red or a white wine is desired the grapes in modern establishments are transferred by an endless chain from the storage rooms to a stemming machine or to an endless press. Sometimes a centrifugal machine is used for obtaining the juice from the crushed fruit. In some localities, however, the ancient method of treading the grapes with clogs or sandals or kneading with wooden pestles is still in operation, the claims being that it secures an amount of saccharine matter equal to that obtained by the recent process without crushing the stems or the unripe berries. Usually the first run, the juice that flows naturally from the crushed grapes, is treated separately from the second run, which is pressed out. The exhausted pomace may be treated with water, sugar, etc., for making inferior wines, brandy, or vinegar. In white-wine making the more perfect presses obtain from 60 to 80 per cent or even more of the juice of the fruit, depending largely upon the kind of grape, whether watery or pulpy, in red-wine making they often secure more than 85 per cent, the pulp and skins having been acted upon by fermentation prior to pressing.

Fermentation. Since wine fermentation is due to yeasts found in the air and upon the skins of the fruit, the addition of yeast to the must as in beer making is unnecessary. Action starts in from 12 to 24 hours, depending upon the temperature, and continues briskly for about a week. Selected yeasts (pure cultures), which have been carefully investigated, have been found of little value in cold climates, but in warm regions they are of assistance in controlling fermentation and improving the flavor of the finished product. It is not true, however, that they can convert cider into high-grade wine, as is popularly reported.

In making red wine the grapes may be fermented whole or after crushing according to the vintner's preference. The former practice insures a clearer, brighter wine than the latter, which yields a larger first run (*vin de goutte*) and a wine richer in body and coloring matter. In white-wine making the must becomes turbid from the growth of yeasts in it and from the flocculation of proteids and tartar. During the fermentation of red-wine must the floating mass (cap) of skins, stems, etc., brought to the surface by the gas evolved must be thoroughly mixed daily with the liquid to prevent souring and to insure uniform fermentation. To avoid this labor, perforated or loosely fitting covers are used, and in making red wine diverse inventions for excluding the air are gaining in favor.

With the appearance of requisite color in the must, the mass is pressed, an operation which, depending upon the color of the grapes and their content of tannin, may occur the day after crushing, usually before the fifth day, but sometimes not until the conclusion of fermentation. Since rapid fermentation at temperatures above 25° C produces less aromatic and less stable wines than slower action at lower temperatures—a fact which largely accounts for the superior aroma of northern wines—cool cellars have long been used and artificial methods of cooling are sometimes employed. As soon as the wine becomes clear, usually in December, it is racked into clean casks and kept at a lower temperature in the subcellar. Here a slow fermentation continues and a second racking (drawing off) is made in March or April, when cheap wines may be bottled for sale. Higher grades are kept in casks and racked annually (in some cases for eight years) until the sediment (tartar, proteids, gummy matter, etc.) ceases to form, the casks being kept full to the bung by additions of wine every week during the first few months and fortnightly thereafter.

The fine bouquet so much desired is produced

by the gradual oxidation of the alcohols and the combination of the resultant products with acids, hence the necessity of keeping the wine in wood, through the pores of which the air enters. No bouquet is formed in air-tight vessels. Racking every alternate month permits the absorption of oxygen, thus hastening the formation of bouquet. But it exposes the wine to possible infection of so-called diseases which may impart stale, sour, or bitter flavors and thus ruin the product. To obviate this, scrupulous cleanliness is imperative As an additional precaution, however, antiseptics and other means are used as preventives. Of these practices, burning sulphur in the casks is most general; filtering through unglazed porcelain, fining with gelatin and tannin are used in specific occasional cases; and pasteurizing has gained in favor since being demonstrated useful.

Sparkling Wines. Effervescent wines are prepared by adding a small quantity of sugar sirup and occasionally yeast-forming material to bottled (sometimes barreled) white or red still wines, after which they are kept closely corked to retain the carbon dioxide evolved by the ensuing fermentation. Champagne, which is the most noted of these wines, demands the highest degree of skill and care The grapes are gathered with scissors, the defective berries are cut off, the fruit removed to the press room with as little bruising as feasible and pressed quickly to avoid the extraction of an excess of tannin and coloring matter. After vigorous fermentation subsides the wine is racked into barrels, blended for the desired flavor, and removed to the cold cellar, where it is again racked in December. In March or April it is removed to the fermenting room and sugar added. As soon as fermentation starts more sugar, as a sirup, is added and the wine decanted usually into tightly corked strong bottles, which are placed neck downward in an inclined position. When ripe the bottle is given a gentle rotary movement, the cork drawn, the sediment which collects in the neck dextrously removed, a small quantity of sweetened and flavored liquor added, and the bottle quickly corked. Barrels are sometimes used to cheapen the price. Champagne is never entirely dry, a trace of sugar being necessary to prevent a raw, unpleasant taste.

Sweet or Fortified Wines. To produce sweet wines, which may be red or white, still or sparkling, grapes of high sugar content are used, and before the sugar has all been acted upon fermentation is stopped by the addition of wine brandy, evaporated must being also often added to meet certain demands. The mixture is then ripened in warm rooms in partially filled casks. It must contain more than 18 per cent alcohol to prevent fermentation of the sugar, of which ingredient as much as 8 per cent may be found in the finished product.

Blending. Since the composition, flavor, etc., of wine obtained from any variety of grape varies with seasons and various other factors, and since commerce demands uniformity, the mixing of somewhat dissimilar wines is widely practiced. By this means excess or deficiency of acids, body, astringency, etc., are corrected. In the operation the known composition of the elementary wines is of assistance, but much more depends upon the manipulator. In no other branch of wine-making are skill, experience, and judgment more requisite.

Composition and Adulteration. The constituents of grape must vary considerably in percentage with season, variety, state of maturity, etc The principal ones are water, sugar, and cream of tartar (bitartrate of potassium)

In cold climates, especially in unfavorable years, the sugars present (about equal parts grape and fruit sugar, and in few instances cane sugar) may be less than 12 per cent; in very warm localities, 30 per cent or even more; the usual range is from 15 to 25 per cent. Since they continue to form until the grapes are fully ripe, some is sacrificed when immature grapes are used, and since the mature fruit loses moisture rapidly, the relative proportion of sugars to water increases after maturity—a phenomenon utilized in making certain wines, notably Malmsey. In the preparation of dry wines, musts containing more than 25 per cent of sugar are commonly diluted thus to prevent the formation of a sweet wine by the non-conversion of the sugar into alcohol. Fermentation does not yield more than about 14 per cent of alcohol by volume and is slow and uncertain above 12.5 per cent. It converts the sugars largely into alcohol and carbon dioxide, theoretically thus:

Glucose or levulose	= Alcohol +	Carbon dioxide
$C_6H_{12}O_6$	$= 2C_2H_6O +$	$2CO_2$

the alcohol being 51.11 per cent of the sugar fermented. In practice, however, only about 48 5 per cent of alcohol is formed, the deficiency being represented mainly by glycerin (from 6 to 14 parts by weight to 100 of alcohol), higher alcohols, succinic and acetic acids and ethereal salts, upon the nature and quantity of which last the flavor of wine largely depends. Since the development of sugar is largely dependent upon temperature, the wines of northern climates are uniformly poorer in alcohol than those of the south The alcohol content of unfortified wines known to be pure varies from 2½ to 15 per cent by volume; that of glycerol, from 0.2 to 1.4 grams per 100 cubic centimeters. A relatively high ratio of glycerol to alcohol is thought to indicate a superior wine, and in Europe a content of 7 to 14 parts glycerol to alcohol is desired, but, since many wines contain less than 7, the tendency is to lower the minimum to 6. Judging from the few complete analyses, American wines conform to the same standards.

The acidity of must may range from 0.5 to 1.5 per cent and is largely due to tartaric acid and its acid salts, cream of tartar and calcium and magnesium bitartrate As grapes mature their relative acidity diminishes with an increase of sugar; as the young wine matures its absolute acidity decreases because of the deposition of cream of tartar, which is insoluble in alcohol. The acid of the young wine, which is rarely less than 0.4 gram, nor more than 1.5 grams per 100 cubic centimeters (calculated as tartaric acid) is diminished considerably during fermentation and storage, owing to precipitation of cream of tartar and the breaking up of malic acid into lactic acid and carbon dioxide. A small increase of acidity takes place during fermentation and storing through formation of succinic acid and volatile acids; however, these combined increases are practically negligible as compared with the very decided decrease caused through the first-mentioned sources. The acid content of a wine is usually in inverse ratio to the content of alcohol; thus dry, northern wines are less alcoholic but more

acid and aromatic than southern ones. While volatile acids are always formed during fermentation, excess indicates carelessness in management. In northern wines they are limited to 0.12 and 0.16 gram per 100 cubic centimeters respectively, in white and red wines.

Coloring matter is found in the skins, which, like the stems and seed coats, contain tannin. Hence, the closer the crushing, and, in red-wine making, the longer the immersion of these parts in the must, the higher the percentage of tannin in the expressed juice. Tannin is present only to a small extent in the first run, and, like coloring matter, is deficient in the juice of stemmed grapes quickly pressed.

Albuminoids, of which from 0 25 to 0 9 per cent is found in must, are somewhat decreased by fermentation. Their deficiency precludes complete fermentation; their excess is thought to interfere with the preservation of the wine, but their offices are not fully understood. Varying somewhat with the varieties, the sugar-free solids of white wine range from 1.6 to 2 5 grams per 100 cubic centimeters, those of red wine, 1.8 to 3.7, pure German reds reaching the minimum and Californian rarely less than 2 4 grams. Wines with an ash content of less than 0.14 gram per 100 cubic centimeters are suspicious, as are also those containing a high sodium chloride or potassium sulphate percentage and a minimum ash. The ratio of ash to solids is usually about 1 to 10, and the percentage of ash depends largely upon the composition of the wine in other respects; for instance, a plastered wine will necessarily contain a high ash, and a new wine more than an old. The separation of cream of tartar diminishes the ash content and the neutralization of excessive acidity increases it.

The Municipal Laboratory of Paris considers red and white wines to be fortified when their alcohol content exceeds 4.5 to 6.5 times, respectively, the weight of their solids. It also considers wine to be diluted with water when the percentage of alcohol by volume (natural alcohol in the case of fortified wines), plus the weight of total acids in grams (expressed as sulphuric acid—H_2SO_4), is less than 12.5 per liter.

The figure obtained by deducting the sum of the glycerol, ash, and fixed acids from the sugar-free solids is usually between 0 3 and 0.6 gram per 100 cubic centimeters, a figure of great importance in wines of low solid content, since it helps to determine whether addition has been made to increase the percentage of solids to the minimum limit. A high undetermined solid content should accompany a high percentage of alcohol and a low acid content.

The composition outlined above is possible only with wines made from grapes adapted to their climate and soil and grown in a favorable year. When the must of a particular vintage is not normal, as often happens, additions of sugar (chaptalizing), of acid, or water (gallizing) are permitted in many countries to make it normal; but such treatment is liable to abuse. When added so as to increase the output the practice is fraudulent.

A cheap winelike beverage (piquette) is made for home consumption by fermenting the pomace or marc of the grape with a sugar solution or of the liquids obtained by extracting pomace with sugar solution. Cheap wines are often made from raisins and other dried fruits, sugar, and glucose. The addition of preservatives to wine is not permissible The use of sulphur for bleaching a dark-colored white wine or to check improper fermentation is fraudulent, though sulphur is widely used for cleansing the casks prior to their use in fermenting Foreign coloring matters in red wine should not be employed; the skins should supply sufficient color. Misrepresentation as to variety of wine and place of production is the most common fraud practiced with supposed medium and high-grade wines.

Dietetic and Medicinal Value of Wines. Wines may be roughly divided according to their therapeutic and dietetic uses into the heavy sweet wines such as port, sherry, and Madeira, the lighter clarets, Burgundies, and acid white wines, Rhine and Moselle wines; and the sparkling wines or champagnes. Heavy wines are often used in disease instead of whisky or brandy when an alcoholic stimulant is needed. Port is a serviceable temporary tonic in cases of debility and exhaustion, especially in old people. It may be spiced, or mulled, and diluted. It is reputed to be unsuitable for dyspeptics, and those subject to gout, rheumatism, biliousness, or to the formation of gall stones or gravel.

The clarets or Bordeaux and the Burgundies and certain red Hungarian wines, which have a wider range of usefulness, if sound and well made, are among the most wholesome wines, and are serviceable tonics for invalids or convalescents. They contain little or no sugar and are of approved value in convalescence. The lighter varieties are best for daily consumption by brain-workers or those leading a sedentary life. Burgundy, being a much fuller wine than claret, is considered useful as a tonic and blood maker. All of these wines are best taken somewhat diluted with water.

Champagnes or sparkling wines are good for invalids and others with extremely irritable stomachs. Champagne will often remain in the stomach when that organ will retain nothing else. It is absorbed with great rapidity and acts promptly by invigorating the nervous system. It may often be substituted with advantage for spirits when an alcoholic stimulant is indicated. Sparkling wines impede the digestion less than still ones. The heavy wines retard digestion perceptibly.

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WINE, IN MEDICINE. When used as a vehicle for medicinal substances wines closely resemble tinctures. In these preparations the official

white wine (*vinum album*), containing from 7 per cent to 12 per cent of alcohol is used, reenforced, however, by the addition of more alcohol. Besides *vinum album* and *vinum rubrum*, the United States *Pharmacopœia* recognizes eight medicated wines, viz., those of antimony, coca, ergot, colchicum seed, ipecac, opium, and two of iron. Only one of these, that of coca, is made of red wine. Their medicinal uses are the same as those of the drug which they hold in solution. See ALCOHOL.

WINE'BRENNER, JOHN (1797–1860). An American clergyman, founder of the Winebrennerians or Church of God. He was born in Glade Valley, Frederick Co., Maryland, was ordained as a minister of the German Reformed Church in 1820, and took charge of four small congregations at and near Harrisburg, Pennsylvania. In 1827, being out of harmony with this church, he withdrew, but continued to preach. In 1830, with several other preachers, he founded a new organization. (See CHURCH OF GOD.) For several years he edited the *Church Advocate*, and published a *Pronouncing Testament and Gazetteer* (1836); *Brief View of the Church of God* (1840); *Regeneration* (1844); *Practical and Doctrinal Sermons* (1860).

WINE'BRENNE'RIANS. See CHURCH OF GOD.

WINE'LAND. See VINLAND.

WINE PALM. See GOMUTI; JUPATI PALM.

WINER, vē'nĕr, GEORG BENEDIKT (1789–1858). A German biblical scholar. He was born in Leipzig, studied at the university there, and was made professor in 1819. In 1823 he was appointed to a chair at Erlangen, but returned to Leipzig in 1832. He devoted himself particularly to the philological side of Bible study, and is best known for his *Grammatik des neutestamentischen Sprachidoms* (1822; 8th ed., 1894; Eng. trans., Andover, 1825, Edinburgh, 1859, 1877). Besides this he published *Darstellung des Lehrbegriffs der verschiedenen christlichen Kirchenparteien* (1824; 4th ed., Eng. trans., Edinburgh, 1873); a Chaldee grammar (1824; Eng. trans., Andover, 1845) and reading book (1825); *Biblisches Realwörterbuch* (1820); *Handbuch der theologischen Litteratur* (3d ed., 1838–40; supplementary volume, 1842). He edited the *Neues kritisches Journal der theologischen Litteratur* (1824–30) and the *Zeitschrift fur wissenschaftliche Theologie* (1826–32).

WINES, ENOCH COBB (1806–79). An American Congregational minister and penologist. He was born at Hanover, N. J., and graduated at Middlebury College in 1827. After teaching for some years he studied theology and began to preach in 1849. He was pastor at Cornwall, Vermont, and East Hampton, Long Island, became professor of languages in Washington College, Pennsylvania, in 1853, and president of St. Louis University in 1859. In 1862 he became secretary of the New York Prison Association, and of the National Prison Association in 1870. He was member of a commission appointed by the State of New York to investigate the relation of free labor and prison labor. In 1871–72 he organized in London the first international congress on prison discipline, and was an active member of many later meetings for similar purposes both in the United States and Europe. Of his published works mention may be made of *Two Years and a Half in the Navy* (1832); *Hints on Popular Education* (1838); *Commentaries on the Laws of the Ancient Hebrews* (1852); *The Prisons and Reformatories of the United States and Canada* (1867); *State of Prisons and Child-Saving Institutions* (1880).

WINES, FREDERICK HOWARD (1838–1912). An American sociologist, statistician, and penologist, born in Philadelphia, Pa. He graduated at Washington College (Pa.), in 1857; was chaplain in the United States army from 1862 to 1864; and after graduating at Princeton Theological Seminary in 1856 became pastor of the First Presbyterian Church of Springfield, Ill. From 1869 to 1893 and from 1897 to 1899 he was secretary of the Illinois State Board of Commissioners of Public Charities. Besides giving much time to the work of the National Conference of Charities and Correction, of which he was president in 1883, the International Prison Congress, and the National Prison Association, of which he was president in 1904, he lectured on these subjects at various universities. He served as assistant director of the census in 1899–1902. Besides the volumes on crime and pauperism of the tenth and eleventh censuses, his works include: *Punishment and Reformation* (1895; rev. ed., 1910), *The Liquor Problem in its Legislative Aspects* (1897; 2d ed., 1898). His father was Enoch Cobb Wines.

WINE STAIN. See NÆVUS.

WIN'FIELD. A city and the county seat of Cowley Co., Kan., 38 miles southeast of Wichita, on the Walnut River, and on the Atchison, Topeka, and Santa Fe, the St. Louis and San Francisco, and the Missouri Pacific railroads (Map: Kansas, F 8). It is the seat of the State Imbecile Asylum, of the Southwest Kansas College (Methodist Episcopal), opened in 1886, and St. John's Lutheran College, opened in 1893. Other features are the public library, high school, and courthouse. Winfield is the commercial centre of a region engaged in farming and stock raising, and containing a supply of natural gas. There are flouring mills, grain elevators, machine shops, and two large produce-packing establishments. Winfield has adopted the commission form of government. Pop., 1900, 5554; 1910, 6700.

WINFRID. See BONIFACE, SAINT.

WING. See BIRD.

WIN'GATE, GEORGE WOOD (1840–). An American lawyer and organizer of rifle practice. He was born in New York City. During the Civil War he served in a New York regiment, and subsequently he supervised the construction of elevated railways in Brooklyn. In 1867 Wingate drew up rules for systematic rifle practice by Company A, 22d regiment, New York National Guard, of which he was then captain. The publication of these rules (the first of the kind to be formulated in the United States) led to the organization (in 1871) of the National Rifle Association of America, of which he was first secretary and later president for 25 years. Besides special articles on military subjects he published: *Manual for Rifle Practice* (1872; 7th ed., 1880); *The Great Cholera Riots* (1880); *Through the Yellowstone Park on Horseback* (1886); *History of the 22d Regiment, N. G. N. Y.* (1896). See TARGET AND TARGET PRACTICE, *Civilian Rifle Practice*.

WINGATE, SIR (FRANCIS) REGINALD (1861–). A British soldier, born at Broadfield, Renfrewshire. Educated at the Royal Military Academy, Woolwich, he was appointed a lieutenant in the Royal Artillery in 1880. He

served in India and at Aden (1881–83), participated in the Nile Expedition (1884–85) under Sir Evelyn Wood, and then returned to England. Rejoining the Egyptian army in 1886, he took part in the battle of Toski (1889) and in the capture of Tokar (1891). After 1889 he was largely employed in the intelligence service, of which he became director in 1892, participated in the Sudanese campaigns of 1896–98, and commanded the operations which resulted in the death of the Khalifa, near Gedid, in 1899. He succeeded Kitchener as governor general of the Sudan in the latter year, and was promoted to major general (1903), lieutenant general (1908), and general (1913). Wingate was created K. C. M. G. in 1898, K. C. B. in 1899, and G. C. B. in 1914. He published *Mahdism and the Egyptian Sudan* (1891).

WINGED LION. See LION OF SAINT MARK.

WINGED PEA. See TREFOIL, BIRD'S FOOT.

WING'FIELD, EDWARD MARIA (c.1560–c.1613). An English merchant and colonist in America, born at Stoneley, Huntingdonshire. He served in the English army both in Ireland and in the Low Countries. Becoming interested in schemes for American colonization, he was one of those to whom the patent of Virginia was granted April 6, 1606. He was the only one of the patentees who sailed to America with the first colonists, and was named in the sealed instructions a member of the council, of which he was elected the first president. He quarreled with the other members of the council, and with Capt. John Smith in particular, his Catholicism threw suspicion upon his loyalty, and he was soon deposed both from the council and governorship in September, 1607. In 1608 he returned to England and was living on his family estates as late as 1613. He wrote *A Discourse of Virginia*, a journal of the colony from the first setting out to his departure from it, the manuscript of which is in Lambeth Library. It was edited and published by Charles Deane in 1860.

WINGHAM. A town in Huron Co., Ontario, Canada, on Maitland River, and on the Grand Trunk and Canadian Pacific railways, 129 miles west by north of Toronto (Map: Ontario, D 6). It possesses a business college, public library, hospital, and park, and has a variety of manufactures. Pop., 1901, 2392; 1911, 2238.

WINGLESS VICTORY. See NIKE APTEROS.

WING-SHELL. The name of various mollusk shells having a shape or expansions regarded as winglike, e.g., the great stromb (q.v.), or certain broad species of *Unio;* more especially the name of the irregular bivalves of the tropical family Aviculidæ, which includes the pearl oysters (q.v.) and other species of interest, existing and fossil. The family characteristic, typically displayed in the genus *Avicula* (see Plate of ABALONE, ETC.), is the straight hinge margin, produced on each side into winglike ears. This is carried to its extreme in the hammer oyster (see HAMMER SHELL). The outer surface of the shell is foliaceous, and the inner always highly macreous, yielding valuable mother of pearl.

WING'SPEED. See HOP TREE.

WINIFRED, wĭn'ĭ-frĕd, SAINT. A Welsh maiden of noble family, who lived in the seventh century. According to the legend Prince Caradoc cut off her head because she would not accept his addresses. Her head, so the legend says, rolled down the hill and into St Bueno's Church, where immediately a spring appeared. The head was replaced by St. Bueno, after which she lived 15 years. This spring, called Holywell, is one of the most famous in England. The flow of water has never ceased. The spring was leased in 1876 to the corporation of Holywell by the Duke of Westminster for 1000 years at a sovereign a year. See HOLYWELL.

WINKELMANN, vĭn'kel-män, EDUARD (1838–96). A German historian, born in Danzig and educated at Berlin and Göttingen. In 1859 he became a coeditor of the *Monumenta.* He was appointed head master of the knight and chapter school at Reval in 1860, and in 1865 professor at the University of Dorpat. He was called to the chair of history at Bern in 1869, and in 1873 to Heidelberg. He published *Geschichte Kaiser Friedrichs II. und seiner Reiche 1212–1235* (1863–65); *Forschungen zur deutschen Geschichte* (1872); *Bibliotheca Livoniæ Historica* (1870 and 1878); *Philipp von Schwaben und Otto IV. von Braunschweig* (1873–78); *Geschichte der Angelsachsen* (1883); *Urkundenbuch der Universität Heidelberg* (1886); *Kaiser Friedrich II.* (1889–97).

WINKELMANN, HERMANN (1849–1912). A German dramatic tenor, born in Brunswick. He adopted the profession of a singer after he had reached manhood. He made his début at Sondershausen, and then went to Darmstadt and Hamburg. He became identified with the Wagnerian drama in 1882, when he took the part of Parsifal at Bayreuth, with such success that he was engaged for the Imperial Opera at Vienna. Here he sang in Wagner's operas, with Madame Friedrich-Materna and Herr Scaria. The famous trio made a tour of the United States in 1884.

WINKELRIED, vĭn'kel-rēt, ARNOLD or ERNI. A Swiss peasant, who, according to tradition, is said to have brought about the victory of the Swiss over Duke Leopold of Austria at Sempach (q.v.) on July 9, 1386. The tradition relates that Winkelried broke the phalanx of the Austrians by gathering several spears of the enemy and pressing them into his breast, thus opening a way for his companions. A monument was erected in his honor on the battlefield in 1886. There has been considerable dispute as to whether Winkelried is a legendary character or not. There is no contemporary notice of him, but there are many modern works championing or assailing the legend. The evidence against is very well summarized by Moritz von Sturler in the *Anzeiger fur Schweizerische Geschichte* (1881). Karl Dändliker in his *Geschichte der Schweiz,* vol. i (3d ed., Zurich, 1893), supports the story.

WINKING. See NICTITATION.

WINKLE. A name, shortened from periwinkle, applied among oystermen of the Northeastern coast of the United States to certain large mollusks destructive to oysters. See CONCH; OYSTER; PERIWINKLE.

WINNEBAGO, wĭn'ē-bā'gō. An important tribe of Siouan stock (q.v.) formerly residing in central Wisconsin, chiefly about the lake which bears their name, but now in part located on the Omaha reservation in northeastern Nebraska, while the majority continue scattered among the whites in their old country. They call themselves *Hochanka,* Winnebago being their Algonquian name, originally applied to the lake. They are first mentioned in 1640, and more than

a century afterward were prominent allies of the French against the English. Subsequently, in the Revolutionary War and down to the close of the War of 1812, they fought against the Americans, first under Little Turtle and afterward under Tecumseh By treaties between 1825 and 1837 they sold all their lands east of the Mississippi and removed to Iowa. After several other removals, each disastrous in its effect upon the Indians, they were finally located in 1866 on the present reservation in Nebraska, although in various ways the major portion contrived to find their way back to their old homes, where they long remained forgotten and free from government supervision. In their original condition the Winnebago partook rather of the characteristics of the Algonquian tribes of the lakes than of the cognate tribes west of the Mississippi Their alliances also were with the lake tribes as against those of the west. They lived in wigwams of wagon-top shape, covered with rush mats, which the women were very expert in weaving and dyeing. They practiced a limited agriculture, but, aside from hunting and fishing, depended chiefly upon wild rice. They also understood the art of making sugar from the juice of the maple. Those still in Wisconsin continue to follow their former habits of life to a great extent. The Winnebago in 1822—before the great smallpox epidemic of 1836, which carried off almost one-fourth of them—were estimated at 5800. In 1910 they numbered 1820, of whom 1007 were on the reservation, the rest in Wisconsin. Consult: Paul Radin, *Influence of the Whites on Winnebago Culture*, published by the Wisconsin State Historical Society (Madison, 1914); and id., *Social Organization of the Winnebago Indians*, published by the Canadian Geological Survey (Ottawa, 1915).

WINNEBAGO LAKE (Algonquian, dirty or cloudy water). A large lake in the eastern part of Wisconsin (Map: Wisconsin, E 4, 5). It is 30 miles long, from 3 to 11 miles wide, and discharges northeastward into Green Bay through the Fox River (q.v.). It is navigated by steamers, and there are a number of towns on its banks, the largest being Oshkosh and Fond du Lac.

WINNEPESAUKEE (wĭn'ē-pē-są'kē) **LAKE.** A lake in the east-central part of New Hampshire (Map: New Hampshire, G 6). It has an extreme length of about 20 miles and a width of from 1 to 8 miles, but is very irregular in outline, and studded with about 270 islands. The water is clear and deep, and the picturesque scenery attracts large numbers of visitors. The lake discharges through a small stream into the Merrimac River.

WINNET'KA. A village in Cook Co., Ill., 16 miles north-northwest of Chicago, on the Chicago and Northwestern Railroad (Map: Illinois, J 1). It is a residential suburb of Chicago, having many fine homes, the North Shore Health Resort, the Henry D. Lloyd Public Library, and the Community House. Pop., 1900, 1833; 1910, 3168.

WINNFIELD. A city and the parish seat of Winn Parish, La., 46 miles by rail north of Alexandria, on the Chicago, Rock Island, and Pacific, the Tremont and Gulf, the Louisiana Railway and Navigation Company, and the Louisiana and Arkansas railroads (Map: Louisiana, D 3). There are saw and lumber mills, a creosoting plant, brick works, an ice factory, and a shoe and harness factory. Pop., 1910, 2925.

WINNINISH, wĭn'ĭ-nĭsh (Canadian French *ouananiche*, from the North American Indian name). A variety of the common salmon (*Salmo salar*, variety *ouananiche*), of the Saguenay River, Quebec, and neighboring waters.

WIN'NIPEG. A lake in the Province of Manitoba, Canada (Map: Manitoba, F, G 1, 2). It is 275 miles long and from 40 to 60 miles broad, has an area of 9000 square miles, and lies 710 feet above sea level. Its greatest depth is 70 feet. It is connected by navigable channels with lakes Winnipegoos and Manitoba, which lie to the west and extend almost parallel with it. Of its tributaries the largest is the Saskatchewan (q.v.). The Winnipeg River, 300 miles long, and flowing in a northwesterly direction, connects the Lake of the Woods and Rainy Lake with Lake Winnipeg. The Red River and its great branch, the Assiniboine, discharge their waters at the southern extremity of Lake Winnipeg Nelson River, issuing at the north end of Lake Winnipeg, is its outlet, and connects it with Hudson Bay. A few Icelandic colonies to the southwest and some scattered posts of the Hudson's Bay Company are the only settlements on its banks.

WINNIPEG. The capital of the Province of Manitoba, Canada, situated at the confluence of the Red and Assiniboine rivers, the two principal streams of the province, and on the Canadian Pacific, Grand Trunk Pacific, Canadian Northern, and Great Northern railways, 1424 miles west of Montreal (Map: Manitoba, G 4). The area of the city in 1911 was 12,750 acres. Through the Red River there is access to Lake Winnipeg. The city is regularly laid out, except the old part contiguous to Fort Garry. Main Street, the chief business street, is the broadest thoroughfare in Canada. Other leading business streets are Portage Avenue and Princess Street, along which stretches the wholesale section. The principal residential portion of the city is south of Portage Avenue, but there are many handsome residences in Fort Rouge, the part of Winnipeg south of the Assiniboine. The city is the headquarters of the provincial government, and has the residence of the Lieutenant-Governor, the Parliament House, and the public departments of the province. The city hall is noteworthy, and is situated within a park, with a soldiers' monument. Other prominent buildings are the Courthouse, Union Bank, Merchants Bank, Post Office, Ideal Building, General Hospital, Women's Home, Children's Home, Masonic Temple, Royal Alexandra Hotel, Canadian Pacific and Union railway stations, Fort Garry Hotel, Hudson's Bay Company's and T. Eaton Company's stores, Young Men's Christian Association building, and the deaf and dumb institute. The principal parks are Assiniboine Park, River Park, containing a zoölogical garden, and Elm Park, a spoon-shaped peninsula formed by a loop of the Red River. There are several smaller parks. The University of Manitoba, situated here, includes Manitoba College (Presbyterian), St. John's College (Anglican), St. Boniface College (Roman Catholic), Wesley College (Methodist), and Manitoba Medical College. The provincial agricultural college is situated here. There is a fine system of public schools, housed in attractive buildings. The city has large machine and engine shops and car works belonging to the Canadian Pacific, Grand

Trunk Pacific, and the Canadian Northern railroads, lumber mills, abattoirs, meat-curing establishments, foundries and rolling mills, flour mills, tent, box, boiler, carriage, and other factories. In 1914 the value of the manufactured output was estimated at over $50,000,000. Electric power for manufacturing and lighting is obtained from Winnipeg River, 52 miles distant.

Winnipeg is the banking, financial, and wholesale centre for western Canada. The city is the centre of the Canadian grain trade. It owns its water works. It is governed by a mayor, four controllers, and 12 aldermen. As Fort Garry, Winnipeg was originally an old post of the Hudson's Bay Company, and was associated with the earliest days of trapping and fur trading. The fort was situated about 400 yards from the mouth of the Assiniboine, and in 1835 was replaced by a larger structure, now dismantled, which was the centre of the colony of Assiniboia. Only the gateway has been preserved. The fort figures prominently in the history of that colony and of Manitoba, and is noted as the seat of Louis Riel's short-lived government, 1869–70. Pop., 1871, 241; 1881, 7985; 1891, 25,639; 1901, 42,340; 1911, 136,035.

WINNIPEGOOS, wĭn'ĭ-pē-gōōs, or **WINNIPEGOOSIS,** wĭn'ĭ-pē-gōō'sĭs. A lake in Manitoba lying 20 to 60 miles west of Lake Winnipeg (Map: Manitoba, D 1, 2). It is about 130 miles long and 20 miles broad, but shallow and navigable only for vessels drawing 10 feet or under. It discharges through the Waterhen River southeastward into Lake Manitoba.

WINNIPISEOGEE, wĭn'ĭ-pĭ-sā'gē. See WINNEPESAUKEE.

WINONA, wĭ-nō'nȧ. A city and the county seat of Winona Co., Minn., 103 miles southeast of St. Paul, on the Mississippi River, here spanned by several bridges, and on the Chicago, Milwaukee, and St. Paul, the Chicago and Northwestern, the Chicago, Burlington, and Quincy, the Chicago Great Western, and the Green Bay and Western railroad (Map: Minnesota, F 6). It has a State normal school, College of St. Teresa, for girls, St. Mary's College, for boys, and a public library. Other features include the Winona General Hospital, Elks Home, Masonic Temple, courthouse, the Margaret Simpson Home, Levee and Bluffside parks, Y. M. C. A., Y. W. C. A., and the United States government building. Winona is favored with excellent transportation facilities and is especially known as the centre of extensive grain and lumber interests. It is prominent industrially, its various manufacturing establishments in 1914 having $12,013,000 invested capital and a production valued at $14,304,000. There are several large saw mills, railway shops, breweries, packing plants, an enormous flour mill, a malting plant, and manufactories of flax fibre, carriages and wagons, boots and shoes, farm implements, candy, patent medicines, machine shop products, etc. Pop., 1900, 19,714; 1910, 18,583; 1920, 19,143.

WINONA. A city and the county seat of Montgomery Co., Miss., 89 miles northeast of Jackson, on the Illinois Central and the Southern railroads (Map: Mississippi, F 4). Winona has important cotton-shipping interests, and there are cotton and lumber mills. Pop., 1900, 2455; 1910, 2512.

WINOOSKI, wĭ-nōōs'kē. A village in the town of Colchester, Vt. See COLCHESTER.

WINOOSKI (or ONION) RIVER. A river of northern Vermont. It is formed at Marshfield, in the east-central part of the State, by several branches, and flows in a general southwesterly direction to Montpelier, whence its course is northwestward to Lake Champlain, which it enters near Burlington (Map: Vermont, C 3). It is about 60 miles long and its drainage area is about 995 square miles.

WINS'FORD. A salt-mining town in Cheshire, England, 5½ miles south of Norwich. Pop., 1901, 10,382; 1911, 10,771.

WINSHIP, ALBERT EDWARD (1845–). An American educational journalist, born at West Bridgewater, Mass. After a teaching experience of several years, he became a student at Andover Theological Seminary in 1875 and was pastor of Prospect Hill Church, Somerville, from 1876 to 1883. In 1886 he became editor of the *Journal of Education*, Boston, which grew to be one of the leading popular educational magazines of the country. An active member of numerous educational associations, from 1903 to 1909 he was also a member of the Massachusetts State Board of Education. He published *Life of Horace Mann* (1896), *Great American Educators* (1900), and other works. For his son, see WINSHIP, GEORGE PARKER.

WIN'SHIP, GEORGE PARKER (1871–). An American librarian and author, son of Albert Edward Winship. He was born at Bridgewater, Mass., and graduated in 1893 at Harvard, where he was an assistant in history in 1893–95. Subsequently he was librarian of the John Carter Brown Library at Providence, R. I., until 1915, when he took charge of the collection of rare books made by Harry E. Widener and housed in the new Widener Memorial Library at Harvard. He contributed to the NEW INTERNATIONAL ENCYCLOPÆDIA, edited a number of historical works, and published *The Coronado Expedition* (1896); *John Cabot* (1898); *Geoffrey Chaucer* (1900); *Cabot Bibliography* (1900); *William Caxton* (1909); *Printing in South America* (1912); *The John Carter Brown Library* (1914).

WINS'LOW. A town in Kennebec Co., Me., on the Kennebec and Sebasticook rivers, and on the Maine Central Railroad. Interesting features are the public library, the high school, and the Block House, built in 1754, and now in good state of preservation. There are large paper mills and a power plant. Winslow was incorporated in 1771. Pop., 1900, 2277; 1910, 2709.

WINS'LOW, EDWARD (1595–1655). An Anglo-American Colonial governor, born at Droitwich, Worcestershire, England. In 1620, with his wife and brother, he joined the *Mayflower* at Southampton and was one of the party that landed at Plymouth, Mass. His wife died in March, 1621, and his marriage two months later, with Mrs. Susannah White, was the first in New England. Susannah was the mother of Peregrine White, the first English child born in New England. The same year Winslow won the friendship of Massasoit, the Indian chief, with whom he negotiated a treaty. In 1623–24 he visited England as agent of the Plymouth Colony. He was elected Governor in 1633. While on a visit to England in 1635, he went before the council and prevented any attempt to destroy the self-government of the Plymouth Colony. The same year he was imprisoned for 17 weeks by Laud on the charge of giving instruction in the church and of celebrating marriages, while only a layman. He was Governor again in 1636

and 1644 and in 1643 he represented Plymouth on the Board of Commissioners of the New England Confederacy. He again visited England in 1646, and in 1649 went to England and stayed there. He was one of the founders of the Society for Propagating the Gospel in New England In 1655 he was appointed by Cromwell one of three commissioners to accompany an expedition against the Spaniards in the West Indies, but he died on the voyage between Hispaniola and Jamaica. He wrote several works, the chief of which, *Good Newes from New England* (1624), *Hypocrisie Unmasked* (1646), and *The Glorious Progress of the Gospell Amongst the Indians* (1649), have been republished by the Massachusetts Historical Society.

WINSLOW, Forbes (Benignus) (1810–74). An English alienist, of New England stock, born in London. He studied medicine in New York, at the Royal College of Surgeons, London, and at Aberdeen. He was superintendent of private asylums in London, was parliamentary reporter for the *Times*, and for many years served as an expert in court proceedings. He founded in 1848 the *Quarterly Journal of Psychological Medicine and Mental Pathology*, and conducted it till 1865. He also founded *The Medical Critic* (1861–63). He wrote many important books in his special field.

His son, L(ittleton) Forbes Winslow (1844–1913), was also a psychiatrist. He edited the *Psychological Journal* for eight years, founded the British Hospital for Mental Disorders (London), served as expert in notable cases, and published many articles and books. Consult his *Recollections of Forty Years* (London, 1910).

WINSLOW, vĭns'lō, Jacques Bénigne (Jakob Benignus) (1669–1760). A Danish naturalist, born at Odense. He studied in Holland and Paris, and in 1743 was made a professor of anatomy in the Jardin du Roi in Paris. He wrote a large number of works, of which the most important is *Exposition anatomique de la structure du corps humain* (5 vols, 1732; afterward translated into several languages), which remained a standard book for nearly a century. An opening in the gastrosplenic omentum is called after him the "foramen of Winslow."

WINSLOW, John (1702–74). An American soldier of the Colonial period. He was born at Marshfield, Mass., and was descended from the early Plymouth Colony Governor of his name. He led a company of his own raising in the luckless attack on Cartagena, and commanded the force which in 1754 was sent out to occupy the country about the Kennebec. In the following year he had charge of the seizure of the Acadians, but disliked the work exceedingly, and wrote of it, "The affair is more grievous to me than any service I was ever employed in." In 1756 he was given command of the New England troops; in the same year was placed in command of Fort William Henry on Lake George; and led a second expedition to the Kennebec in 1758–59. Afterward he was made presiding judge of Common Pleas for Plymouth County, and was a member of the Legislature and of the Council. The *Letter and Order Books of Winslow* are in the library of the Massachusetts Historical Society and form a valuable historical source upon the period of the French and Indian War.

WINSLOW, John Ancrum (1811–73). An American naval officer, born at Wilmington, N. C. He entered the United States navy as a midshipman in 1827; served on the *Cumberland* and in command of the prize *Morris* in the Mexican War; and in September, 1855, was commissioned commander. During the first year of the Civil War he was attached to the Mississippi flotilla under Foote, and in July, 1862, he was commissioned captain and received command of the *Kearsarge*. In that vessel he proceeded to the coast of Europe in search of Confederate cruisers. After blockading the *Florida* at Brest, and then the *Rappahannock* at Calais, he received word while at Flushing that the famous *Alabama*, under Captain Semmes (q.v.), was in the port of Cherbourg, France. He at once proceeded to that place, and upon his arrival Semmes, who was confident of a victory that would benefit the Confederate cause in Europe, challenged him to a combat. The meeting took place on June 19, 1864; and after a comparatively short engagement, in which Winslow managed his vessel with consummate ability, the *Alabama* was forced to surrender and soon afterward sank. For this brilliant service Winslow received the thanks of Congress and was promoted to the rank of commodore. He commanded the Gulf squadron in 1866–67; was made a rear admiral in March, 1870; and commanded the Pacific squadron in 1870–72. Consult Ellicott, *The Life of John Ancrum Winslow* (New York, 1902).

WINSLOW, Josiah (1628–80). A Governor of Plymouth Colony, born in Marshfield, Mass., was a member of the General Court in 1643, was Assistant Governor of Plymouth from 1657 until 1673, and was Governor from 1673 until his death, being the first Governor in any of the New England Colonies who was born in America. From 1658 until 1672 he was one of the commissioners of the United Colonies of New England, and in 1675, soon after the outbreak of King Philip's War, was chosen commander in chief of the intercolonial forces.

WINSLOW, Miron (1789–1864). An American Congregational missionary. He was born at Williston, Vt., graduated at Middlebury College, 1815, and at Andover Theological Seminary, 1818 In 1819 he went to Ceylon, as a missionary of the American Board, and served there and (from 1836) in southern India for 44 years. He prepared a Tamil and English dictionary, completed in 1862. It was based in part on manuscript material of the Rev. Joseph Knight, of the London Missionary Society, and the Rev. Samuel Hutchings, of the American mission, and was the most complete dictionary of a modern Indian language published at that time.

WINSLOW, William Copley (1840–1925). An American archæologist, born in Boston, the son of Hubbard Winslow. He graduated at Hamilton College in 1862, and, after doing newspaper work in New York, at the General Theological Seminary (1865). Afterward he was minister of various Protestant Episcopal churches near Boston. He founded the American branch of the Egyptian Exploration Fund in 1883 and served as vice president, honorary secretary, and official representative for America until 1903. His publications include: *Israel in Egypt* (1883); *A Greek City in Egypt* (1887); *The Store City of Pithom* (1885); *Tombs at Beni Hassan; Egypt at Home; Pilgrim Fathers in Holland* (1891).

WINSOR, wĭn'zẽr, Justin (1831–97). An American librarian, born in Boston, Mass. He was educated at Harvard College and continued

his studies in Paris and Heidelberg. From 1868 to 1877 he was superintendent of the Boston Public Library, and from 1877 till his death librarian of Harvard University. Winsor served as president of the American Historical Association in 1886 and of the American Library Association in 1897. His historical work was chiefly of a bibliographical and cartographical kind. The first book was a *History of the Town of Duxbury* (1849). This was followed by several valuable bibliographies, as that of the literature of the battle of Bunker Hill (1876), of the original quartos and folios of Shakespeare (1876), of the earlier editions of Shakespeare's poems (1879), etc. His more original work included: *The Readers' Handbook of the American Revolution* (1880), the iconoclastic *Christopher Columbus* (1892), *Cartier to Frontenac: Geographical Discovery in the Interior of North America in its Historical Relations, 1534–1700* (1894); and the *Exploration of the Mississippi Basin* (1895). Winsor was also editor of a *Memorial History of Boston* (1880–81) and a *Narrative and Critical History of America* (1884–89)—a scholarly performance and his most useful work, no small part of its value being due to his own bibliographical and cartographical contributions.

WIN'STED. One of the county seats of Litchfield Co., Conn., 35 miles by rail northwest of Hartford, on the Mad and Still rivers, and on the New York, New Haven, and Hartford and the Central New England railroads (Map: Connecticut, C 2). It has the William L. Gilbert Home for Poor Children, the Litchfield County Hospital of Winchester, and the Memorial and Gilbert School libraries. Highland Lake and the Mad River furnish excellent water power, which is utilized by several manufacturing establishments. The most important products are clocks, pins, hosiery, coffin trimmings, brass goods, spool silk, edge tools, leather, hardware, machinery, underwear, and pocket cutlery. It adopted the commission form of government in 1915. Pop., 1900, 6804; 1910, 7754.

WIN'STON, JOHN ANTHONY (1812–71). An American administrator. He was born in Madison Co., Ala., and was educated at La Grange College and the University of Nashville. In 1840, and again in 1842, he was elected to the Lower House of the Legislature; from 1843 till 1852 was a member of the State Senate, and was several years its presiding officer. In 1853 he was elected Governor by the Democrats and in 1855 was reelected. During his administrations he strongly opposed efforts made by the Legislature to extend State aid to railroads, and by vetoing 33 measures of this kind gained for himself the name of the "veto Governor." On the question of public schools, however, he and the Legislature were in better accord, and the session of 1853–54 marked the beginning of the public-school system of the State. When the Civil War came he was made colonel of an Alabama regiment, and fought at Yorktown and at Seven Pines, but was shortly afterward forced to resign because of bad health. By the Legislature chosen under the authorization of President Johnson he was elected United States Senator, but was not permitted to take his seat.

WIN'STON-SA'LEM. A city and the county seat of Forsyth Co., N. C., 110 miles west of Raleigh; on the Southern, the Norfolk and Western, and the Winston-Salem Southbound railroads (Map: North Carolina, B 1). In 1913 the adjacent municipalities Salem and Winston were consolidated to form the present city. Situated in a region famed for the production of tobacco, Winston-Salem is one of the leading cities of the United States in the manufacturing of tobacco products. Other important products include cotton goods, flour, fertilizers, furniture, carriages and wagons, knit and woolen goods, lumber products, tobacco boxes, etc. These represented, in 1914, an invested capital of $25,703,000, the products being valued at $37,288,000. Noteworthy features of the city are the Salem Academy and College (female) opened in 1802, Orphans' Home (Methodist), Slater Industrial College (colored), Carnegie library, Salem Museum, and the Federal building. Under the revised charter of 1899 the government is vested in a mayor, chosen biennially, and a unicameral council. The water works are owned and operated by the municipality. Pop., 1900, 10,008; 1910, 17,167; 1915 (U. S. est.), 23,566; 1920, 48,395.

WINTCHEVSKY, wĭn-chĕf'skĭ, MORRIS (1856–). The pen name of the Yiddish poet L. Benedict. Born in the Government of Kovno, Russia, he received an orthodox Jewish education supplemented by intensive secular study. His first poems appeared in 1873 in the periodical *Ha-Magid*. In 1877 he founded a Socialistic monthly, *Assefat Chachamim*. Expelled from Prussia in 1879 because of his radicalism, he transferred his Socialist propaganda to London, where he founded a number of short-lived Yiddish periodicals. From 1906 to 1914 he edited *Die Zukunft*, a Yiddish Socialist monthly of New York. Despite the dominant propagandist note in his poetry, it is among the best in Yiddish, while his epigrams, satirical sketches, and philosophical reflections (ascribed to "The Insane Philosopher") are unique in that language. In English appeared a volume called *Stories of the Struggle* (1908).

WINTER, vĭn'tẽr, FRANZ (1861–). A German classical scholar, born at Brunswick. He studied at the universities of Zurich, Munich, and Bonn. In 1886–89 he traveled, for purposes of study, in Greece, Asia Minor, and Italy, and then for some years held positions in the Royal Museum in Berlin. From 1897 he was professor of archæology successively at Berlin, Innsbruck, Graz, Strassburg, and, after 1913, Bonn. His publications include *Die jungere attische Vasen* (1885); *Griechische Portratkunst* (1894); *Kunstgeschichte in Bildern* (1900, rev. ed., 1912); *Die Typen der figurlichen Terrakotten* (2 vols., 1903); *Der Hildesheimer Silberschatz* (1901), with E. Pernice, *Die Alexandermosaik* (1909); *Der Alexandersarkophag* (1912); "Griechische Kunst," in vol. ii of Gercke-Norden, *Einleitung in die Altertumswissenschaft* (2d ed., 1912).

WIN'TER, SIR JAMES SPEARMAN (1845–1911). A Newfoundland statesman, born in Lamaline, Placentia Bay. He was admitted to the bar in 1867. He served as a Conservative member in the Newfoundland House of Assembly in 1874–89, in 1893, and in 1897–1900, and during that period was Speaker (1877–78), Solicitor-General (1882–85), and Attorney-General (1885–89). He was the Newfoundland agent at the Washington Fisheries Conference (1887–88), was a delegate at London in 1890 and 1898 in connection with the French West Shore fisheries question (see FISHING LAWS; NEWFOUNDLAND, *History*); and in 1898 was a mem-

ber of the Joint High Anglo-American Commission which met at Quebec and again in Washington in an unsuccessful attempt to settle outstanding questions between the United States and the British Empire From 1893 to 1896 he was judge of the Supreme Court, and from 1897 to 1900 was Premier.

WINTER, JOHN STRANGE. See STANNARD, HENRIETTA ELIZA VAUGHAN.

WINTER, vĭn'tĕr, PETER VON (1754–1825). A German dramatic composer, born at Mannheim. He studied with Abbé Vogler, was appointed musical director at the Court Theatre of Mannheim in 1776, and two years later went with the court to Munich. He became court kapellmeister in 1788 and held the position until his death. He wrote a number of operas, oratorios, sacred cantatas, masses, several secular cantatas, and quantities of church music. His most celebrated opera, *Das unterbrochene Opferfest*, was produced at Vienna in 1796, and given in Italy as *Il sacrifizio interrotto*.

WIN'TER, WILLIAM (1836–1917). An American dramatic critic and author, born in Gloucester, Mass. He graduated from Harvard Law School in 1857, but turned promptly to literature as a career. In 1859 he removed to New York City, where he became literary critic of the *Saturday Press*, then (1861–65) of the New York *Albion*, and for more than 40 years (1865–1909) was dramatic critic of the New York *Tribune*. He became widely known for his critical notices, for biographies of actors and many volumes of reminiscence, for his verse, and for sketches of English scenery and historic localities. In 1916 a notable testimonial was tendered him by his many friends of the stage. His writings include. *Henry Irving* (1885); *The Stage Life of Mary Anderson* (1886); *Shakespeare's England* (1888); *Gray Days and Gold* (1889); *Old Shrines and Ivy* (1892); *Shadows of the Stage* (1892, 1893, and 1894); *The Life and Art of Edwin Booth* (1893); *The Life and Art of Joseph Jefferson* (1894); *Brown Heath and Blue Bells* (1896); *Ada Rehan* (1898); *Other Days of the Stage* (1908); *Old Friends* (1909); *Poems* (1909), definitive author's edition; *Life and Art of Richard Mansfield* (1910); *The Wallet of Time* (1913); a life of Tyrone Power (1913); *Shakespeare on the Stage* (2 series, 1911–15); *Vagrant Memories* (1915). He also edited, notably: the works of George Arnold (1866–67), John Brougham (1881), Fitz-James O'Brien (1881), and *The Shakespearean and Miscellaneous Plays of Edwin Booth* (1899). Consult the monograph on Winter, biographical and bibliographical, published in New York in 1916.

WIN'TERBERRY. A popular name for two species of Ilex, of the family Aquifoliaceæ. The common winterberry (*Ilex verticillata*), or black alder, grows from 6 to 12 feet high, on moist, preferably rich ground, bearing in November great quantities of brilliant crimson or scarlet-crimson berries, which are often gathered and used as vase ornaments or wreaths. If carefully dried they retain much of their brightness for several months. The smooth winterberry (*Ilex lævigata*) grows in wet grounds from Maine to the mountains of North Carolina. See INKBERRY; HOLLY.

WINTER CHERRY. See PHYSALIS.

WIN'TERGREEN (so called because the plant remains green throughout the winter). The popular name of plants of the genera *Pyrola* and *Chimaphila*, of the family Ericaceæ. About 30 species of *Pyrola* are known. They are native herbs or half shrubby plants in woods throughout the Northern Hemisphere. Several species, natives of America, are perennial herbs with flowers of some beauty Two species of *Chimaphila*, half shrubby plants, with beautiful evergreen leaves, natives of North America, *Chimaphila umbellata*, known also as Prince's pine and pipsissewa, and *Chimaphila maculata*, spotted wintergreen, have been used to some extent medicinally. *Gaultheria procumbens*, a perennial half shrubby plant with bright red berries and spicy aromatic evergreen leaves, is known as wintergreen in parts of the United States (See GAULTHERIA) *Polygala paucifolia* is called flowering wintergreen.

WINTERGREEN, OIL OF. An essential oil yielded by the flowers of the *Gaultheria procumbens*, abundant in New Jersey, and consisting chiefly of methyl salicylate, $CH_3C_7H_5O_3$, mixed with a small quantity of a hydrocarbon, termed *gaultherilene*, which is isomeric with oil of turpentine, and which, being more volatile than the salicylate of methyl, is easily separated from it. This oil is not only yielded by the distillation of other plants (especially the bark of the sweet birch, *Betula lenta*), but may be artificially prepared by distilling a mixture of salicylic acid, wood alcohol, and strong sulphuric acid. Oil of wintergreen is a colorless or yellow oil, of a powerful, agreeable, and persistent odor; and hence it is largely used in perfumery. Both the natural and the artificial oil are used in medicine for the same purposes as salicylic acid. The artificial oil, however, is likely to contain harmful impurities. See SALICYLIC ACID.

WINTERHALTER, vĭn'tĕr-häl'tĕr, FRANZ XAVER (1806–73). A German portrait and historical painter. He was born at Menzenschwand, in the Black Forest, studied with Stieler in Munich, and first attracted attention by a portrait of Grand Duke Leopold of Baden (Karlsruhe Gallery). In 1834 he settled in Paris and became the most fashionable portrait painter of the age of the crinoline. His best known portraits are those of King Louis Philippe of France and of his Queen, of the royal family of England, the Empress Eugenie among her court ladies, William I of Prussia and his Queen, Emperor Maximilian of Mexico, Mme. Rimski-Korsakov (Louvre), and others. His works are elegant and idealized representations, rather poor in quality and lacking in color, but well drawn and arranged. Among his historical paintings are "Florinda" (Metropolitan Museum, New York) and "Susannah and the Elders" (Seattle Museum).

WINTER KING, THE. The popular title of Frederick V, Elector Palatine, who was King of Bohemia for a little more than a year, 1619–1620.

WINTER PALACE. A great building on the Neva in St. Petersburg, now used only for ceremonial purposes. It was the residence of the Empress Anne, and was built by her on the site of a house presented to Peter II The palace was partially destroyed by fire in 1837, but was at once restored. Its dimensions are: length 455 feet, breadth 350 feet, and height 80 feet. The interior contains a great number of suites and richly ornamented halls with important paintings. The brilliant court balls are held in the Nicholas Hall and are the most

imposing royal functions of Europe. In the Romanov Portrait Gallery are preserved the likenesses of sovereigns since Michael Feodorovitch. The treasury contains the costly collection from the Russian crown jewels.

WINTER'S BARK. An aromatic bark, resembling cinnamon and similarly used. It derives its name from Captain Winter, who first brought it from the Strait of Magellan in 1579. It is the product of *Drimys winteri* of the family Magnoliaceæ, a native of some of the mountainous parts of South America and abundant in the lower grounds of Cape Horn. The bark of other species has similar properties. In Australia the fruit of *Drimys aromatica* is used as a substitute for allspice.

WIN'TERSET. A city and the county seat of Madison Co., Iowa, 42 miles by rail southwest of Des Moines, on the Chicago, Rock Island, and Pacific Railroad (Map: Iowa, C 3). There are valuable limestone deposits in the vicinity. The courthouse and the public library are among the chief features of the city. Pop., 1900, 3039; 1910, 2818.

WINTER'S TALE, A. A comedy by Shakespeare, produced, according to Forman's diary, in 1611, printed in the 1623 Folio, and probably one of Shakespeare's latest plays.

WINTERTHUR, vĭn'tĕr-tōōr. A town of the Canton of Zurich, Switzerland, in the Töss valley, on the Eulach, 16 miles by rail northeast of Zürich (Map: Switzerland, C 1). There are several handsome churches, a fine town hall in the Greek style from plans by Semper, a gallery of Swiss paintings, and a museum of antiquities and natural history. Winterthur is a rich manufacturing and commercial town. There are vine-growing, cambric-weaving, and cotton-printing industries, and the manufacture of machinery. Pop., 1910, 25,066, mostly German-speaking Protestants.

WINTER WHEAT. See FLOUR; WHEAT.

WINTHER, vĭn'tĕr, CHRISTIAN (1796–1876). A Danish poet, born in Fensmark, and educated at the University of Copenhagen. His first collection of poems (1828), a success, was followed by *Nogle digte* (1835), and by *Sang og sagn* (1841); *Lyriske digte* (1849); *Nye digtninger* (1852); and *Hjortens flugt* (1855), a romantic lyric which was his masterpiece. He also wrote several novels.

WINTHROP, wĭn'throp. A town, including several villages, in Suffolk Co., Mass., five miles northeast of Boston, on Massachusetts Bay, and on the Boston, Revere Beach and Lynn Railroad (Map: Massachusetts, F 3). It is the place of residence of many business men of Boston. The chief features include the Dean Winthrop house, dating from 1649, the Frost Public Library with a collection of pictures and interesting historical relics, Forts Banks and Heath, Ingall's Park, and the Winthrop Shore Reservation. Winthrop formed successively a part of Boston, Chelsea, and North Chelsea until 1852, when it was separately incorporated. Pop., 1900, 6058; 1910, 10,132; 1915 (State census), 12,758; 1920, 15,455.

WINTHROP, BEEKMAN (1874–). An American public official, born at Orange, N. J. He graduated at Harvard in 1897, and at Harvard Law School in 1900, having been admitted to the New York bar in the preceding year. From 1900 to 1904 he was in the Philippine Islands, as private secretary to William H. Taft, then Governor, as assistant and acting executive secretary, and as judge of the Court of First Instance. He served as Governor of Porto Rico in 1904–07, as Assistant Secretary of the Treasury in 1907–09, and as Assistant Secretary of the Navy in 1909–13. Thereafter he was engaged in banking.

WINTHROP, FITZ JOHN (1638–1707). A Colonial Governor of Connecticut, the son of John Winthrop (1606–76). He was born in Ipswich, Mass., studied for a time at Harvard, went to England and served in the Parliamentary army until the Restoration, and returned to New England in 1663. He was a member of Governor Andros's council in 1686, and in 1690 commanded, as major general, the Connecticut and New York troops, together with the Iroquois who were to attack Montreal, but who never reached Canada. He was Governor of Connecticut from 1698 until his death.

WINTHROP, JOHN (1588–1649). An English colonist in America, first Governor of the Colony of Massachusetts Bay. He was born at Edwardston, Suffolk, England, and his early life was spent at Groton Manor, in Suffolk. He studied for two years (1602–04) at Trinity College, Cambridge. In 1626 he was appointed attorney in the Court of Wards and Liveries, presided over by Sir Robert Naunton. The drift of affairs in Parliament, the impending crisis in the political world, and his own sympathy with the Congregationalist movement, led him to take an interest in American emigration. The London proprietors of the Massachusetts Company, who had determined to transfer the seat of government to the New World, on Oct. 30, 1629, elected John Winthrop Governor. On June 22, 1630, with a fleet of 11 ships, Winthrop arrived at Salem. Soon afterward he removed to Charlestown, whence in the September following he and his fellow colonists again removed—this time to the site of Boston, which place they founded. In 1634 he was chosen Deputy Governor under Thomas Dudley (q.v.). Dudley was followed by John Haynes (1635) and Haynes by Sir Harry Vane (1636). During the latter's Governorship Winthrop as Deputy Governor led the opposition to the liberal policy adopted by Vane towards Anne Hutchinson (q.v.) and her followers. He had separated from the Church of England on leaving England, and was at this time thoroughly identified with the Puritan movement. He opposed strenuously the new Antinomianism and on the issue thus raised was chosen Governor over Vane in 1637. He retained the Governorship until 1640, was again Governor in 1642–44 and again from 1646 until his death. In 1643 the New England Confederation was formed under his auspices, and he became its first president. Winthrop's *Journal* was first published in a single volume (Hartford, 1790). This was republished with newly discovered manuscripts under the title *History of New England, 1630–49* (Boston, 1825–26), with notes by James Savage. Many of his papers have been published by the Massachusetts Historical Society. Consult also R. C. Winthrop's valuable *Life and Letters of John Winthrop* (2 vols., Boston, 1864–67); J. H. Twichell, *John Winthrop* (New York, 1891), in "Makers of America Series"; Andrew Macphail, *Essays in Puritanism* (Boston, 1905). For his wife, MARGARET TYNDAL WINTHROP (1591–1647), consult Alice Morse Earle, *Margaret Winthrop* (New York, 1895).

WINTHROP, JOHN (1606–76). A Colonial Governor of Connecticut. He was the son of

John Winthrop, the first Governor of Massachusetts Bay, and was born at Groton Manor, Suffolk, England. He was educated at Bury St. Edmunds Grammar School, at Trinity College, Dublin, and at the Inner Temple (1624). In 1627 he took part in the Duke of Buckingham's unsuccessful expedition to the Isle of Ré, near La Rochelle. He joined his father in New England in 1631, and two years later participated in the founding of the town of Ipswich. He was for some time titular Governor of a small settlement at Saybrook on the Connecticut River. In 1646 he laid out a plantation on the Thames River at what is now New London, where, after 1650, he made his home. He was elected a magistrate in 1651 and Governor in 1657. Then, after serving as Deputy Governor in 1658, he was again chosen Governor in 1660, holding office from that time continuously until his death. In 1662 he carried to England a loyal address from the Connecticut colonial government to Charles II, and was successful in securing from the King a very favorable charter. He was also influential in bringing about the union of the Connecticut and New Haven Colonies In 1675 he was one of the commissioners of the United Colonies of New England. Consult T. F. Waters, *A Sketch of the Life of John Winthrop, the Younger* (Cambridge, 1899).

WINTHROP, JOHN (1714–79). An American physicist, born in Boston, Mass. He graduated in 1732 at Harvard, where, from 1738 until his death, he was professor of mathematics and natural philosophy. He was one of the foremost men of science in America in the eighteenth century, and his influence on the early advancement of science in New England in particular was very great. Both Benjamin Franklin and Benjamin Thompson (Count Rumford) probably owed to him much of their early interest in scientific research. In 1740 and 1761 he observed the transits of Mercury, in the latter year proceeding to Newfoundland in a ship provided by the Province of Massachusetts—probably the first scientific expedition sent out by an American State. His application of computations to earthquake phenomena after the famous earthquake of November, 1755, has formed the basis of the claim made for him as the actual founder of the science of seismology. In addition to his scientific work he was actively interested in public affairs, was a judge of probate in Middlesex County for several years, was a member of the Governor's council in 1773–74, and subsequently gave the weight of his influence to the patriotic cause in the Revolution. He published: *Lecture on Earthquakes* (1755); *Answer to Mr. Prince's Letter on Earthquakes* (1756); *Account of Some Fiery Meteors* (1755); and *Two Lectures on the Parallax* (1769).

WINTHROP, ROBERT CHARLES (1809–94). An American political leader and legislator, Speaker of the House of Representatives. He was born in Boston, graduated at Harvard in 1828, studied law in the office of Daniel Webster, and in 1831 was admitted to the bar. He was a Whig member of the Lower House of the Massachusetts Legislature from 1834 until 1840, serving during the last three years as Speaker. From 1840 almost continuously until 1850 he was a Representative in Congress. In the Thirtieth Congress (1847–49) he was Speaker of the House. He was appointed to the seat in the United States Senate left vacant by Daniel Webster's resignation in 1850, but was defeated in the regular election, held in the following year, by Charles Sumner. His legislative career was marked by strong conservatism throughout. He was an opponent of slavery, of the Mexican War, and of the Fugitive Slave Law, but followed Webster in his desire for compromise and in his support of the Fillmore Administration. On the break-up of the Whig party he refused to ally himself with the Republican party, and supported Fillmore in 1856, Bell in 1860, and McClellan in 1864. During the latter part of his life he devoted himself to the organization and development of the Peabody Education Fund. His services are also memorable as president of the Massachusetts Historical Society for 30 years. He published *Addresses and Speeches* (vol. i, 1852, vol. ii, 1886) and *Life and Letters of John Winthrop* (2 vols., 1864, 1867). Consult C. F. Adams, Jr., *Theodore Lyman and Robert Charles Winthrop, Jr.* (Boston, 1906).

WINTHROP, THEODORE (1828–61). An American novelist and soldier, a descendant of the second John Winthrop, born at New Haven, Conn. He graduated at Yale in 1848 and then spent some time in Europe. Returning, he was in steamship service at Panama and visited California and Oregon. In 1853 he accompanied Lieutenant Strain's canal surveying expedition to the Isthmus of Panama. He afterward practiced law and took part in the Frémont campaign, but later devoted himself mainly to writing novels. Just as *Cecil Dreeme* was to be published, the Civil War came on, and Winthrop at once went to Washington with the Seventh New York Regiment. He was soon made military secretary to General Butler, with the rank of major. He was killed at the battle of Big Bethel, while rallying his men. Shortly before his death he wrote for the *Atlantic Monthly* two articles descriptive of his marches. His novels and other books, which were rapidly published and sold, include: *Cecil Dreeme*, with memoir by G W Curtis (1861); *John Brent* (1862); *Edwin Brothertoft* (1862); *The Canoe and the Saddle* (1862); *Life in the Open Air, etc.* (1863); *Life and Poems* (edited by his sister, 1884); *Mr. Waddy's Return* (1904). Winthrop's novels are full of narrative talent, and indicate that their author might ultimately have taken an important position in American letters. They helped to bring the Far West into American literature.

WINTHROP NORMAL AND INDUSTRIAL COLLEGE. An institution for normal and industrial education, founded at Rockhill, S. C., in 1886, and supported by State appropriations. It includes a college and a training school. In the former in 1916 were enrolled 960, and in the latter 396 students. The teachers and officials numbered 100. A summer school is held each year. The value of the college grounds and buildings is about $900,000. The library contains about 18,000 volumes. The president in 1916 was D. B. Johnson, A.B., LL.B.

WINTON. A borough in Lackawanna Co., Pa., eight miles from Scranton, on the Delaware and Hudson, the Delaware, Lackawanna, and Western, and the New York, Ontario, and Western railroads. Coal mining is the chief industry Pop., 1900, 3425; 1910, 5280.

WINTUN, wĭn-tōōn' (People). A group of tribes of Copehan linguistic stock, formerly occupying the country of the upper Sacramento and Trinity rivers, northern California. Although of inferior type, their disposition enabled

them to maintain themselves in the face of civilization to better advantage than the more warlike tribes. Timid, gentle, and extremely sensual, they were also industrious, and were expert in diving for clams and spearing salmon. Their houses were conical lodges of bark over a frame of poles. Their weapons were the bow and the sling. Each harvest season of fish, nuts, or blossoms was the occasion of a tribal gathering and dance, many of the songs being sweet and melodious until repeated to monotony. They had also the scalp dance, the war dance, the gift dance, and the puberty dance for young girls. Polygamy was common. The dead were wrapped into bundles and buried with all their ornaments and smaller property, and the name never thereafter mentioned. In the case of a woman a quantity of acorns was sometimes poured upon the corpse in the grave. Like the other California tribes, they excelled in basketry. The surviving tribes are the Nomelaki, Patwin, and Wintun. They totaled 710 in 1910.

WIRE (AS wir, wire, connected with OHG. *wiara*, fine-drawn gold, Lat. *viriæ*, armlets, Lith. *vėlà*, wire, and ultimately with Skt. *vā*, weave). An extremely elongated, slender bar of metal produced by drawing a short thick bar through a succession of holes of regularly decreasing sizes until its diameter has been materially reduced and its length greatly increased. Wire is generally round, but flat wire, oval wire, and wire of other shapes are also made. The manufacture of wire has been traced by good authorities as far back as the period of early Egypt, and until the fourteenth century wire was manufactured by hammering out strips of metal. In the early history of the article, gold, silver, and bronze were practically the only metals used. It seems to be fairly well substantiated that the present method of producing wire by drawing was practiced in Germany during the fourteenth century. In 1865 machine-drawn wire was first produced in England.

Process of Manufacture. Wire is almost universally manufactured by drawing, and the facility with which any metal can be drawn into wire depends upon its ductility. Most metals have this property; but some, like antimony and bismuth, are so brittle that they can be drawn out only with difficulty, and wire made from such metals is useless from want of tenacity. All metals largely used for making wire, such as steel, brass, and copper, are drawn by essentially the same process. Steel billets first are rolled into round rods. The rods are cleaned of scale either by mechanical rubbing or more commonly by being immersed in an acid bath, and then deacidized by a bath of lime water. Each bar is then drawn into wire by pulling it through the holes of a draw plate. This is an oblong plate of hard steel pierced with conical holes, gradually diminishing in diameter and having the smaller ends of these tapering holes carefully prepared to the required size. Sometimes cubical-shaped dies, each with a single trumpet-shaped hole, are used. The workman begins by making a point on the rod, so as to permit it to pass through the hole and be grasped by a pair of pincers attached to a chain. This chain is pulled along by suitable mechanism until the length of wire which has been drawn through the hole is sufficient to pass around a revolving drum, which is then set in motion and draws the rod slowly through the draw plate, winding it upon itself as it revolves. From this drum the wire is passed through a smaller hole and wound on another drum, and so the process is repeated until the wire has been reduced to the proper size. Fine wire may require from 20 to 30 drawings. The drum revolves slowly with a thick wire and the speed is increased as the size diminishes. After being passed a few times through the draw plate the metal becomes brittle and has to have its ductility restored by annealing. (See ANNEALING.) From the annealing furnace the wire passes to the acid bath to remove the scale and then to the lime water to remove the acid. It is then ready to be further reduced by the draw plate until annealing is again required. Generally a lubricant, wax, grease, soap, or other similar material, is employed during the drawing, especially for fine wires. For some very accurate purposes, such as chronometer springs and for gold and silver lace, the wire is drawn through holes perforated in rubies and other hard gems.

Uses. The uses of various kinds of wire are practically innumerable, and involve numerous kinds of wire manufactured from various materials. The metals used are silver, platinum, copper, bronze, brass, iron, and steel, and from them are drawn wires varying in size from ¼ inch to $\frac{1}{7000}$ inch, and possessing a tensile strength of from 20 tons to 150 tons per square inch of sectional area. The manufacture of wire netting, gauze, and cloth is among the many ingenious and serviceable applications of wire. Many thousand tons of plain fencing wire, strands, and barbed wire are annually manufactured. Carding wire is a product of no less magnitude and importance.

Beautiful types of wire are to be found in the eyepieces of telescopes in the form of hair or spider lines for assisting in the observation of moving stars, planets, or bodies and their relative bearings and for measuring angles or determining evolutions and gradients. A platinum wire as fine as 0.00003 inch in diameter has been obtained, of which 1060 yards weighed 0.75 grain, or 1¼ grains per mile. This result was, however, obtained by covering the wire with silver, which, after being drawn down with the platinum to as fine a degree as possible, was dissolved off by a solution of nitric acid. Platinum and other wires are also used in galvanic cauteries, écraseurs, magnetic machines, probes, and other surgical instruments and appliances. Steel wire of high breaking strains has been employed for deep-sea soundings (see SOUND, SOUNDING), and also used in the construction of aëroplanes. One of the most important uses of wire in engineering is for making wire rope (q.v.). Wire netting is also made by machines which take the wire from bobbins and deliver the netting complete in rolls ready for shipping. Consult Smith, *Wire: Its Manufacture and Uses* (New York, 1891).

WIRE GAUGES. Wire is made in a number of sizes or diameters. To designate these sizes use is made of a series of numerals each of which indicates a certain diameter in fractions of an inch where English measure is used and in millimeters where metric measure is employed. Such a series of numerically designated sizes is called a wire gauge. In England the legal gauge is the Imperial wire gauge, which was established by law in 1884. Previous to this time a number of wire gauges had been employed in England, the best known of which are the Stubbs wire gauge and the Birmingham wire

gauge. France and Germany have standard wire gauges based upon the millimeter. In the United States there are a number of different wire gauges, but they are nearly all precisely similar to the Roebling and Washburn-Moen standard. A United States standard gauge for sheet and plate iron and steel was adopted in 1893, in which the ultimate purpose was to have the number of the wire size the same as its diameter in thousandths of an inch. The following table shows the two American wire gauges most used and the equivalents in the English legal standard:

Number of wire gauge U.S.A	Roebling's and Washburn-Moen's gauge	Brown and Sharpe's gauge U.S.A.	Equivalents in the English legal standard. S. W. G.
	Inch	*Inch*	*Inch*
000000	.46	. .	.464
00000	.43	. .	.432
0000	.393	.46	.4
000	.362	.40964	.372
00	.331	.3648	.348
0	.307	.32495	.324
1	.283	2893	.3
2	263	.25763	.276
3	.244	.22942	.252
4	.225	.20431	.232
5	.207	.18194	.212
6	192	.16202	.192
7	177	14428	.176
8	.162	.12849	.16
9	.148	.11443	.144
10	135	.10189	.128
11	.12	09074	.116
12	.105	.08081	.104
13	092	.07196	.092
14	.08	.06408	.08
15	.072	.05706	.072
16	.063	.05082	.064
17	.054	.04525	.056
18	.047	.0403	.048
19	041	.03589	.04
20	035	.03196	.036
21	032	.02846	.032
22	.028	.02534	.028
23	.025	.02257	.024
24	023	.0201	.022
25	02	.0179	.02
26	.018	.01594	.018
27	.017	.01419	.0164
28	.016	.01264	.0148
29	.015	01125	.0136
30	.014	.01002	.0124
31	.0135	.00893	.0116
32	.013	.00795	.0108
33	.011	00708	.01
34	.01	.0063	.0092
35	.0095	.00561	.0084
36	.009	.005	.0076

For further comparison tables consult United States Bureau of Standards, *Circular No. 31*, and the engineering pocket books.

WIRE GLASS. See GLASS.

WI'REKER, NIGEL. See NIGEL.

WIRELESS TELEGRAPHY AND TELEPHONY. The art of telegraphing or telephoning by electricity without the aid of interconnecting wires. The principal methods are based on:

1. Conduction or dispersion of electric currents through moist earth or water; (2) electromagnetic induction between metallic circuits; (3) electrostatic induction between metallic plates or conductors; (4) electromagnetic waves, now known as radiotelegraphy and radiotelephony. The first three methods never progressed beyond the experimental stage and are of historical interest only. The fourth method has become of great practical importance and is widely used throughout the world. Radiotelephony did not progress in its practical development as rapidly as radiotelegraphy, but great strides have been made towards the practical development of this method of communication.

Conduction or Dispersion Method. Probably the first successful attempt at electric telegraphy between stations not connected by wires, was that of Samuel F. B. Morse in 1842, when on December 16 signals were transmitted a distance of 80 feet across a canal in the city of Washington. Morse's apparatus consisted of wires, stretched along the banks of the canal, terminating in copper plates which were placed in the water as indicated in the diagram.

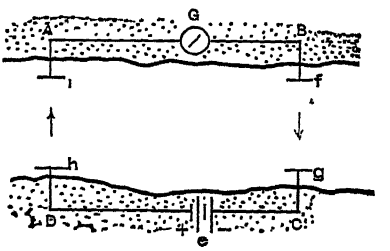


FIG. 1. MORSE'S EARLY EXPERIMENT.

With this arrangement the current flows from the positive pole of battery *e* to the submerged copper plate *h*, thence across the canal through the water to the plate *i*, completing the circuit through the wire *AB* and galvanometer *G* to plate *f*, and from there returning through the water to the plate *g* and the battery *e*.

Prior to Morse's work, Sömmerring of Munich in 1811 demonstrated that an electrical connection could be established between a transmitting and receiving instrument with only water as a connecting medium, and Steinheil in 1838 quite accidentally discovered that the ground could act as the return circuit in ordinary wire telegraphy. Other names connected with conduction or dispersion telegraphy are those of Lindsay, Trowbridge, Vail, Bell and Preece.

Electromagnetic Induction Method. Wireless telegraphy by electromagnetic induction is based on the fact that when a current flows through a coil, as, e.g., coil *A* in Fig. 2, a magnetic field will be established. This field taking the form of curved lines of force will extend to a considerable distance, and will thread through the receiving coil *B*, inducing currents therein in accordance with the laws of magnetic induction. However, since the magnetic energy decreases as the square of the distance, the current in *B* will be less than in *A*. In this method the distance to which signals may be transmitted depends upon several factors, including the number of turns of wire on the coils *A* and *B*, the size of the coils and their distance apart.

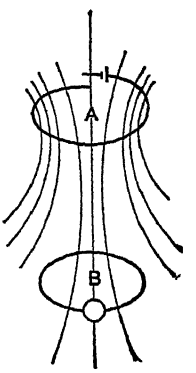


FIG. 2. INDUCTION METHOD.

Electrostatic Induction Method. In 1882 Professor Dolbear of Tufts College, Massachusetts, was awarded a United States patent on a system of wireless telegraphy which operated upon the principle of electrostatic induction.

Dolbear's transmitter (*A*, Fig. 3) consisted of an elevated condenser or capacity area 6, connected in series with the secondary 5 of the induction coil *a*, and the earthed plate 7; the primary winding 1 of the coil is connected in

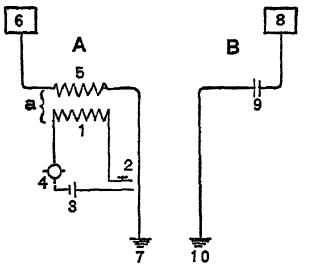


FIG. 3. ELECTROSTATIC METHOD.

series with a telegraph key 2 and a battery 3, 4 being an interrupter; the receiver (*B*, Fig. 3) comprises an electrostatic telephone receiver 9, made of two thin diaphragms of metal and placed very closely together; the two diaphragms are connected to the capacity area 8, and earth plate 10. When the key 2 is closed a difference of potential is established between 6 and 7, causing a charge to appear on 6 and an equal and opposite charge to spread over the earth. Part of this latter goes to the left-hand plate of the condenser 9, the other plate taking an equal and opposite charge by induction; this action is also increased by the inductive action of plate 6 and plate 8. The charge on condenser 9 is indicated by a relative motion of its plates.

In 1891 Thomas A. Edison took out a United States patent on an electrostatic inductive method of communicating with a moving railroad train.

ELECTROMAGNETIC-WAVE METHOD—RADIOTELEGRAPHY AND TELEPHONY

The fundamental principles upon which modern systems of radiotelegraphy and telephony are based were discovered by Oerstedt of Denmark, Faraday of England, and Henry of America. In 1820 Oerstedt discovered that an electric current flowing through a wire builds up a magnetic field surrounding the wire. In 1831 Faraday and Henry independently discovered the converse of the above, viz., an electric current in a conductor was obtained therein as a result of a "change" in the magnetic field surrounding the conductor. Eleven years later, in 1842, Henry made the further discovery that under certain conditions the discharge of a Leyden jar through a coil of wire, representing an inductance and a resistance, occurred in an oscillatory fashion: i.e., the current flowing in the coil did not persist in one direction but oscillated back and forth, rapidly changing its direction.

Sir William Thomson, later Lord Kelvin, in 1853 discussed mathematically the subject of the discharge of a Leyden jar through a resistance and an inductance, and concluded that under certain conditions depending upon the relative values of the capacity *C*, inductance *L*, and resistance, the discharge would take place in an oscillatory manner. It was shown by Thomson that the oscillatory current flowing in the coil is not constant in intensity, but its amplitude decreases from a maximum value to zero in geometric progression, as shown in Fig 4. This decrease in amplitude is due, among other things, to the dissipation of energy in the form of heat, and radiation of electric

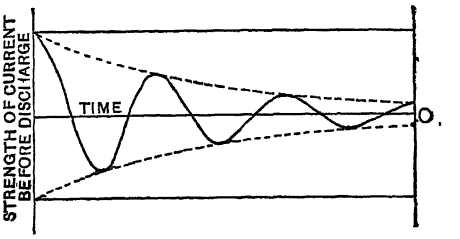


FIG. 4. CURVE OF OSCILLATORY CURRENT.

waves. The frequency of oscillation is determined by the electrical dimensions of the circuit, and when the resistance is negligible is determined by the formula $N = \frac{1}{2\pi\sqrt{LC}}$.

This action finds its analogue in mechanics in the vibration of a weight attached to an elastic spring. The capacity, inductance, and resistance of the electric circuit are respectively analogous in action to the elasticity of the spring, inertia of the weight, and friction, including that inherent to the system and of the surrounding medium. If the weight be given a displacement the resulting vibrations will gradually decrease in amplitude and finally cease, because of the dissipation of energy in overcoming the internal friction of the spring and of the medium in which the movement of the weight takes place.

Experiments in 1905 showed that if the circuit contains a spark gap whose resistance is high in comparison to the resistance of the circuit, the current amplitudes will not decrease in geometric progression, but according to a linear law, as shown in Fig. 5, and will

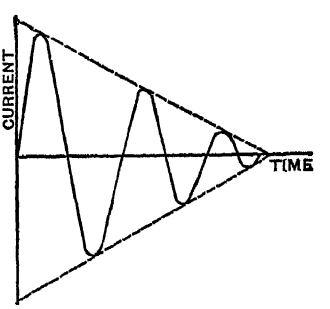
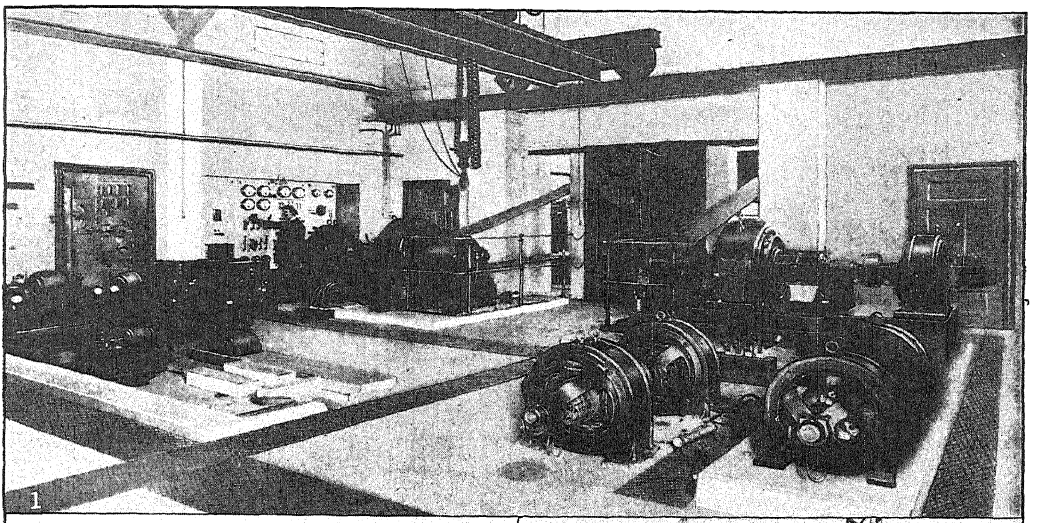
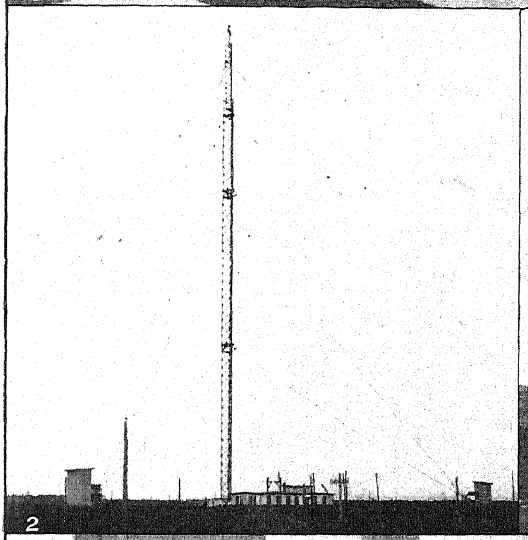


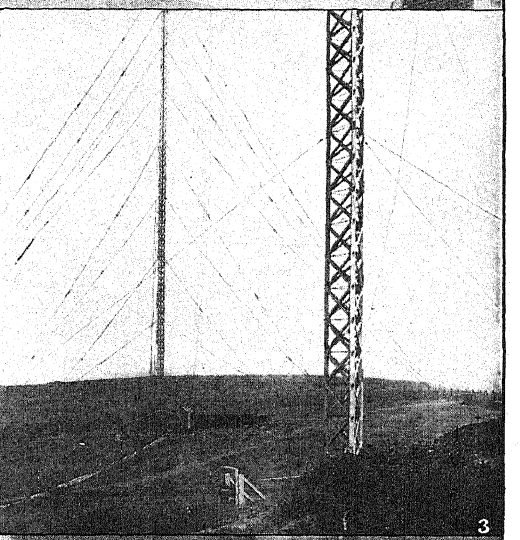
FIG. 5. RELATION OF CURRENT AMPLITUDE TO TIME.

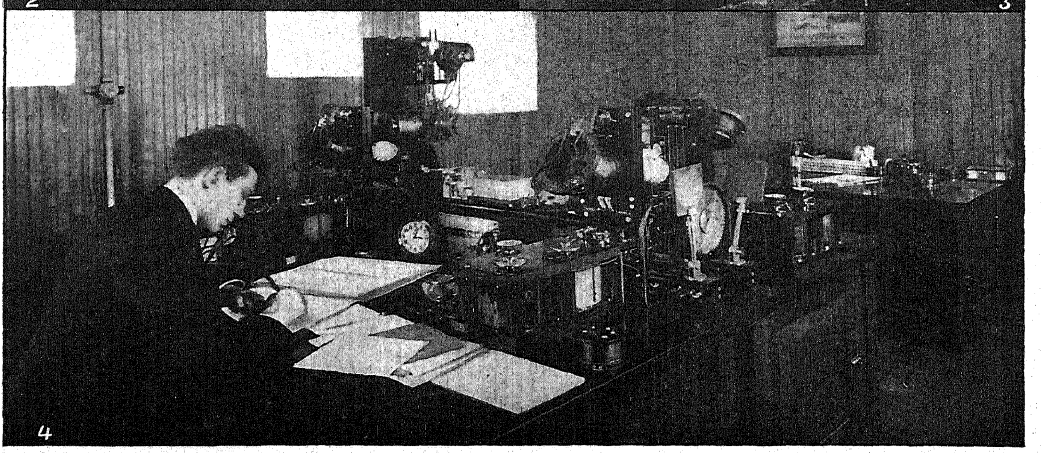
reach zero, theoretically as well as practically, in a certain time.

Starting with the discoveries of Oersted and Faraday, James Clerk Maxwell in England was able to show in 1865 that electromagnetic effects must take time to travel through space, and from the data at his disposal he proved that their velocity must be that of light. From this it followed that light waves are electromagnetic waves in the ether and that all electromagnetic waves in the ether travel with the speed of light —186,000 miles a second. He also showed that while light waves could be seen because of their very high frequency (400 to 700 million a second) there might be other electromagnetic waves of lower frequency which the eye could not see. What was wanted, then, was an artificial eye which would render these waves of





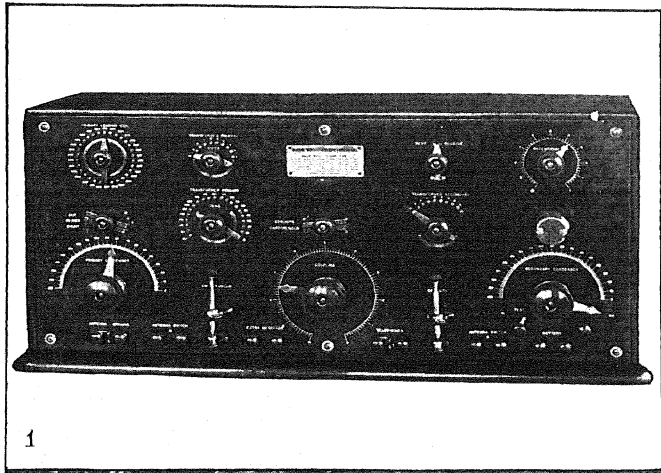


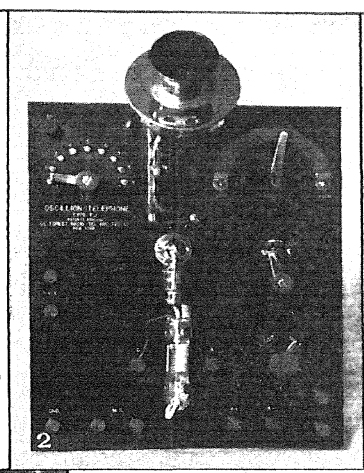


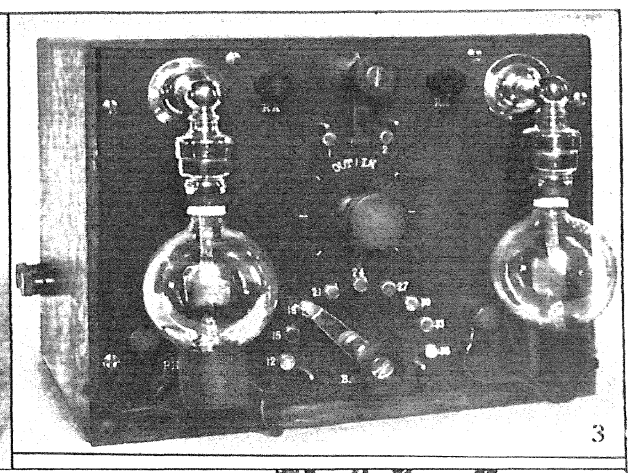
TYPICAL WIRELESS STATIONS

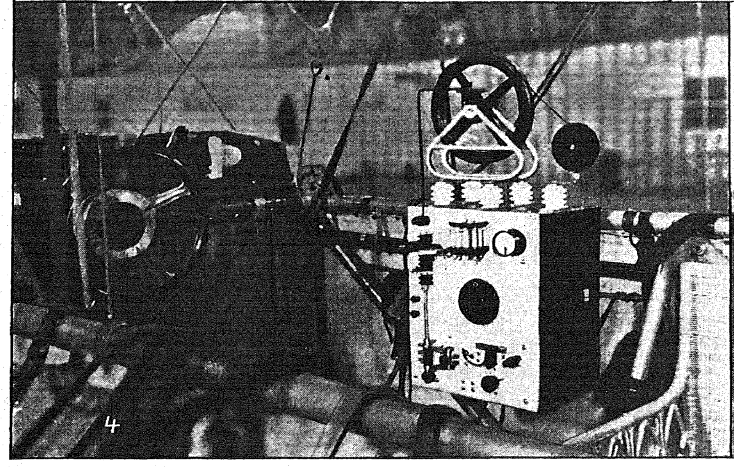
1. Power Plant of Wireless Station at Eilvese, Hanover, Germany. This station works with Tuckerton, N. J., U. S. A
2. Mast and Antennæ of Wireless Station at Sayville, Long Island, U. S. A., where messages are received from Nauen, Germany.
3. Masts and Antennæ of Wireless Station of Federal Telegraph Co., at San Francisco, California. This station works with Honolulu.
4. Receiving Room at Sayville. A typical receiving station.

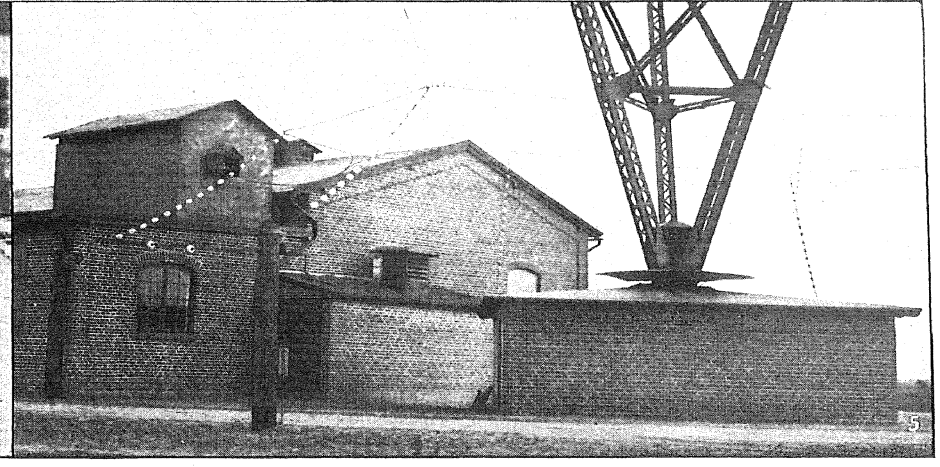
WIRELESS TELEGRAPHY











1. MARCONI SHIP SET OF INSTRUMENTS.
2. DE FOREST OSCILLION, WIRELESS TELEPHONE.
3. DE FOREST AUDION.
4. WIRELESS INSTALLATION FOR PARSEVAL AIRSHIP.
5. BASE OF TOWER AT EILVESE, SHOWING CONSTRUCTION AND INSULATION.

lower frequency visible With such an instrument it would be possible to verify Maxwell's prediction that the invisible electromagnetic waves could be reflected and refracted like visible light waves.

It remained for Heinrich Hertz of Bonn, Germany, following the suggestion of von Helmholtz, to invent such an instrument and prove the existence of invisible electromagnetic waves in the ether that traveled with the speed of light

Hertz's apparatus for the production of electric waves, termed by him an "oscillator" (Fig. 6), consisted of a pair of metallic plates or spheres (1) attached to rods (2) placed in the same line, their contiguous ends equipped with knobs (3) separated by a distance of a fraction of a centimeter These knobs were connected

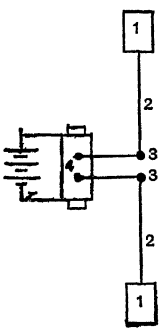


FIG. 6. HERTZ'S OSCILLATOR.

to the secondary of an induction coil (4). If a difference of potential be created between the knobs by completing the primary of the coil through a battery, an electrostatic field, consisting of lines of electric force stretching between the two halves of the oscillator, will be established; if the secondary potential difference be further increased the air between the knobs will break down and a spark will pass. The whole oscillator then becomes conductive, the electric field will change over into a magnetic field and oscillatory currents of extremely high frequency will exist in the oscillator. The action is identical in every respect to the discharge of a Leyden jar, with the exception that with each passage of the spark the lines of electric force are snapped off, so to speak, and the electric and magnetic fields are propagated outwards,

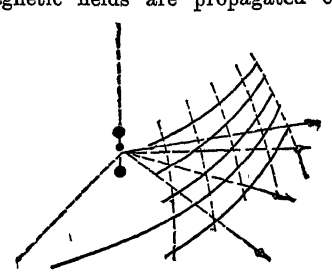


FIG. 7. PROPAGATION OF ELECTRIC AND MAGNETIC FIELDS.

each at right angles to the other, in a direction at right angles to both as indicated in the diagram. (See Fig. 7.) The movement of the two fields constitutes a flow of energy.

Hertz's wave detector or resonator was especially crude, consisting merely of a circlet of wire severed at a given point so that an air gap formed a microscopic portion of it Hertz found that when the resonator was placed in certain positions in the immediate neighborhood of the oscillator, with the latter in operation, minute sparks passed across the microscopic gap, thus indicating that energy was being conveyed across the space between the oscillator and resonator. This was the real beginning of radiotelegraphy whose development may be said to date from this time.

With this primitive apparatus Hertz not only created the invisible electromagnetic waves about which Maxwell had mathematically reasoned, but measured their length, reflected them, and refracted them and thus verified Maxwell's conclusions. Hence the waves are often called "Hertzian waves"; they are the waves used in radio telegraphy and telephony.

When we speak of waves in the ether, we have in mind waves which in some respects resemble the waves of the sea. The distance from crest to crest is called the "wave length"; the number of waves that are generated in a second is the "frequency" and coincides with the frequency of vibration of the wave-producing body or force. The waves of visible light are so short that in order to be seen they must number from 30,000 to 60,000 to the inch; the Hertzian waves used in radio communication may vary in length from a few inches to twenty miles

To generate Hertzian waves for radio communication something must vibrate from 10,000 to several million times a second. No artificial device can oscillate so rapidly, but electricity can. As we have already seen, Henry showed that an electric spark oscillates back and forth. We know now that every flash of lightning is such an oscillatory discharge As it vibrates back and forth perhaps at the rate of a million times a second or more it shakes the ether into Hertzian waves, just as a rocking rowboat shakes water into waves. Hertz's electric spark by which he set up electromagnetic waves in his laboratory was but a miniature lightning flash.

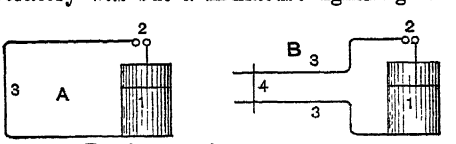


FIG. 8. LODGE'S SYNTONIC JARS.

Sir Oliver Lodge in England, in 1888, had studied the discharge of a Leyden jar and its effects on an adjacent circuit. The apparatus employed by Lodge is shown in Fig. 8. Leyden jar *A* 1, charged to a high potential, is connected in series with spark gap 2 through the circuit 3. Leyden jar *B* 1 is connected through a spark gap 2, and a closed circuit 3, 3, the inductance of which is made variable by slider 4. When sparks pass across gap 2, of *A*, it was observed by Lodge that sparks could be obtained at gap 2 of *B*, only for a certain position of the slider 4. The two circuits were then synchronized, or in resonance, having the same period of electrical oscillation.

In 1893 Nikola Tesla proposed a system for the wireless transmission of energy and telegraphic signals, consisting of the use of an elevated capacity and a ground connection at each station. Alternating currents were employed for transmission, the novel feature being that the receiving apparatus was adjusted so as to be in resonance with the transmitted waves.

Tesla's apparatus was never developed beyond the experimental stage.

It is a curious circumstance that up to this time no one had thought of practically applying Hertzian waves to telegraphing through space. Sir William Crookes was the first to suggest the possibility in an article published in the *Fortnightly Review* in 1892.

In 1896 Guglielmo Marconi, an Italian, took out a British patent on a system of radiotelegraphy, i.e., a definite system of sending signals, based on the radiation and reception of grounded or guided electromagnetic waves. Marconi employed as a transmitter a Hertzian oscillator, improving it, however, by elevating one plate to a considerable height above the earth and connecting the other plate to the earth as in Tesla's arrangement. By making and breaking the circuit in the primary of the induction coil corresponding to a prearranged code of signals—usually the ordinary Morse code—the electromagnetic waves were sent out into space. For receiving a "coherer" was substituted in the circuit in place of the spark gap, and around this

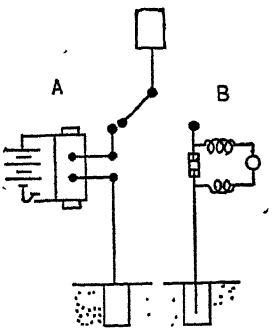


FIG. 9. MARCONI ORIGINAL ARRANGEMENT.

was shunted the proper decohering and signal-indicating devices. The coherer, which was invented by Professor Branly of Paris in 1890, consists essentially of a glass tube fitted with metallic plugs between which is a small quantity of metallic filings in a more or less loose condition, presenting normally a high electrical resistance. If an electric impulse be passed through the filings they are rendered conductive,

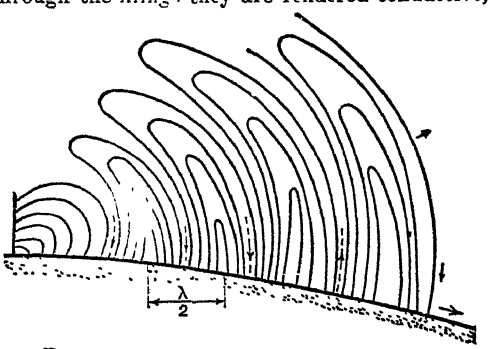


FIG 10. PROPAGATION OF ELECTRIC WAVES.

but they can be restored to their high resistance by tapping the glass tube.

The action of Marconi's transmitter is exactly that of the Hertzian oscillator with the exception that the electric waves given off are grounded or guided, traveling over the earth's surface as indicated in Fig. 10. These waves impinging upon the elevated capacity of the receiver induce currents therein which flow through the coherer to the ground, and the passage of such currents decreases the resistance of the coherer, permitting the flow of sufficient current from the local battery to operate the decohering and signal-recording instruments and to indicate the corresponding signals from the transmitting station.

The simple grounded antenna of Fig. 11 as originally used by Marconi is incapable of storing up any large amounts of energy. The

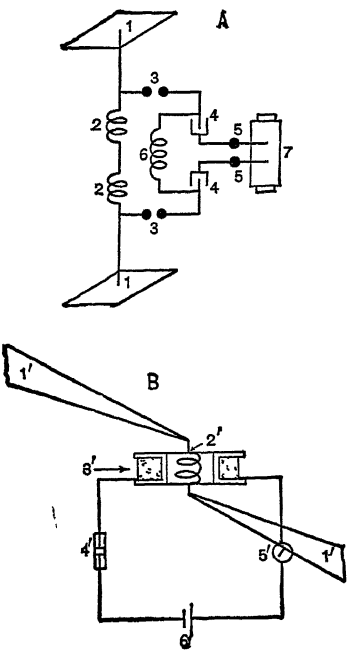


FIG. 11. LODGE'S SYNTONIC METHOD.

emitted waves are highly damped, and as a result set up forced oscillations over a wide range of frequencies in the receiving antennæ. When used as a receiver a similar condition prevails, viz., the antenna will respond equally well to a number of different frequencies, thus prohibiting selective reception This disadvantage was recognized early by a number of scientists interested in the development of radiotelegraphy, among whom may be prominently mentioned Lodge, Marconi, and Braun in Europe, and Stone in the United States.

Their researches resulted in what is now called "tuning." A vibrating tuning fork when held near a piano will cause that string to sound which has the same period of vibration. A similar electrical principle is applied in tuning a radio receiving station to the period of electrical vibration of the transmitting station; the electrical pitch of the one is made to agree with the electrical pitch of the other. The methods of thus tuning one station to another are described below.

Syntonic Radiotelegraphy. The first system of radiotelegraphy based on the principle of electrical resonance was invented by Sir Oliver Lodge of England. The transmitter and receiver are illustrated diagrammatically in Fig. 11. Referring to the diagram, *A* and *B* represent the sending and receiving circuits respectively, 1, 1 and 1′, 1′ are capacity areas made of sheet

metal connected together through inductance coils 2 and 2'. The function of these coils, according to Lodge, is to prolong the electric oscillations occurring in the radiator, so as to establish a definite frequency or pitch, and thereby render syntony in a receiver possible Shunted about coils 2, 2 is the circuit made up of the spark gaps 3, 3, condensers 4, 4, inductance 6, and gap 5. The latter is connected to the secondary of an induction coil 7. Inductively coupled to the receiving antenna inductance 2' is a secondary coil 3' which contains in its circuit a coherer 4', telegraphic instrument 5', and battery 6'. The reason for placing the coherer in the secondary rather than in the antenna circuit was that with the former arrangement the electric vibrations of the antenna circuit were not interfered with.

Slaby-Arco Tuned System. Dr. Adolph Slaby and Count George Arco of Germany improved slightly upon Marconi's apparatus by connecting to the base of the elevated wire a horizontal wire of the same length, grounding the free end. The transmitter and receiver are shown in Fig. 12. By this arrangement

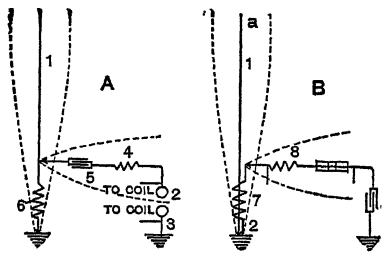


FIG. 12. DIAGRAM OF SLABY-ARCO SYSTEM

both the spark gap and the detector are placed at the crest of the voltage wave, as shown by the dotted lines in the figure. In the receiver *B* this will cause an increase in the strength of the received signals.

Braun System. Prof. Ferdinand Braun of Strassburg in 1898 patented a system of radiotelegraphy utilizing coupled circuits. Braun's apparatus is illustrated diagrammatically in Figs. 13 and 14. The transmitter, Fig. 13, is

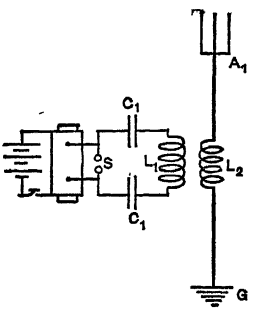


FIG. 13. BRAUN SYSTEM, TRANSMITTER.

composed essentially of two circuits, a closed circuit L_1, C_1, S, coupled inductively to an open or radiating circuit, A_1, L_2, G. The condensers C_1, when charged to a sufficient potential by the coil, will discharge through the coil L_1 and gap S, transferring its energy to the antenna circuit through the agency of the magnetic field common to the coils L_1 and L_2. The receiver was also of the coupled type containing directly in the closed circuit a detector D, of which by this time types other and more sensitive than the coherer had been developed, many of which used a telephone receiver in connection with them.

In 1898 Marconi in England also patented the usage of coupled circuits for receiving, and in 1900 extended the improvement to the transmitter, pointing out that the antenna and

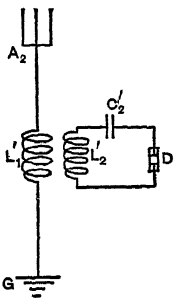


FIG. 14 BRAUN SYSTEM, RECEIVER.

closed circuits of both transmitter and receiver should all have the same electrical time periods. The companies controlling the patents of Slaby, Arco, and Braun in 1903 were combined and amalgamated into a single company, called the Telefunken Company, which soon became one of the largest manufacturing and operating enterprises in Germany. The year 1903 also witnessed the transmission across the Atlantic Ocean, a distance of 2300 miles, of a message from President Roosevelt to King Edward VII of England.

Nearly all of the systems of radiotelegraphy in operation in 1903 were based upon the prin-

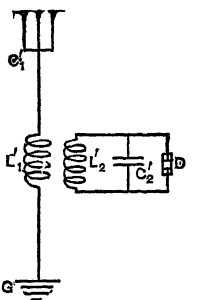


FIG. 15. RECEIVING CIRCUIT.

ciples laid down by Lodge, Marconi, Braun, and Stone, and were essentially connected as indicated in Figs. 13 and 15. Their operation is summed up as follows: The induction coil, or transformer, when actuated by the key charges the condensers C_1 (Fig. 13) to a voltage determined by the length of the spark gap S; this voltage being attained, the condenser will discharge through the coil L_1 and the gap, and establish powerful oscillatory currents of very high frequency in the circuit S L_1 C_1; the frequency is determined by the product $L_1 \times C_1$. The antenna circuit consisting of the inductance L_2 and the distributed capacity C_2 of the elevated wires, when adjusted to be in resonance with L_1 C_1, will withdraw energy from the closed circuit and radiate it into space as grounded electromagnetic waves. These waves impinging upon the receiving antenna C'_1 (Fig. 15) will set up in the circuit C'_1 L'_1 very feeble oscillatory currents, which in turn induce correspond-

ing currents in L'_2 C'_2, provided that the two circuits of the receiver are in resonance with each other and with the transmitter. Shunted about the circuit L'_2 C'_2 is some form of signal-indicating device D. This type of apparatus, because of the reaction between the two circuits of the transmitter, suffered the disadvantage that unless special precautions were taken two waves of different lengths were emitted simultaneously.

In 1906 Max Wien of Danzig, Germany, discovered that if the damping of the primary circuit of the transmitter (SL_1 C_1, Fig. 13) be made very great by the rapid extinguishing of the spark, very feebly damped waves of only one frequency, containing a much larger percentage of energy, would be radiated by the antenna. This mode of electric excitation corresponds to the sounding of a gong by striking it with a padded hammer. Both the primary electric circuit and the padded hammer have very high damping, and are in action only a very small fraction of the time, while the secondary circuit and the gong vibrate persistently. Wien's discoveries in 1916 formed the basis of practically all transmitters operating upon the spark principle.

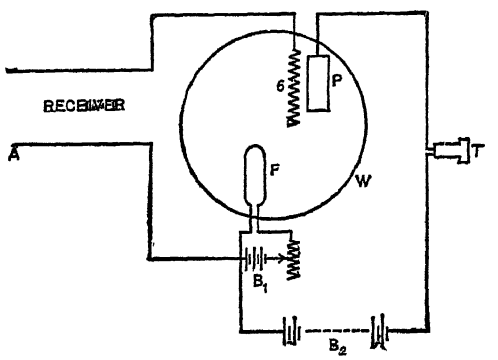


FIG. 16. DE FOREST'S AUDION.

In order to give to the transmitted signal a musical note a transformer excited by a high-frequency (500 cycle) alternating current was substituted in place of an induction coil.

The Invention of the Vacuum Tube. While experimenting with his incandescent lamp Edison discovered in 1883 what has ever since been called the "Edison effect," now applied on a wonderful scale in radio communication. He found that if he mounted a piece of metal in his lamp (without permitting it to touch the filament), and electrified it positively a current streamed over to the positive cold plate. We know now that electrons then flowed over. Edison found that only negative electricity thus streamed from the hot filament to the cold metal; there was no streaming in the opposite direction. It is now known that every hot body emits electrons and that electrons are infinitesimal particles of negative electricity; because they are negative they naturally flow toward a cold positively charged piece of metal. By reversing the current in the plate so that it becomes negative the negative electrons emitted from the hot filament are naturally repelled, just as two south poles or two north poles of magnets repel each other.

In 1904 Professor J. A. Fleming, Marconi's chief engineer, applied the Edison effect practically in wireless telegraphy. The oscillations that constitute a spark come in groups or trains, each group or train corresponding to a spark. There may be from 50 to 500 sparks a second Hence, there are from fifty to one hundred radiated wave groups each of which may in turn contain 20 to 100 oscillations or waves Between two successive alternations of electricity or waves may be an interval of only a half millionth or millionth of a second. The human ear can hear not more than 30,000 vibrations per second. Hence it was impossible to receive the telegraph signals by ear with the aid of the telephone.

It occurred to Fleming that the Edison effect might be applied in making the telegraph signals telephonically audible. He had in the modified lamp of Edison, with its metal plate forming part of a local circuit, what is called a "rectifier" in electrical engineering An alternating current is one that flows first in one direction through a conductor and then in the other; it oscillates. If one half the alternations or oscillations are suppressed, we have a series of gushes in one direction. When this occurs the alternating current is said to be "rectified." Fleming's work in wireless telegraphy had familiarized him with the fact that the Branly-Marconi coherer owed its effectiveness to just such a rectifying action. Accordingly, he applied the Edison lamp, modified to include a plate in an electrical circuit of its own, to receive the waves. The result was exactly that which he had in mind. The oscillations set up in the receiving circuit by the oncoming trains of waves were charged into short gushes all flowing in the same direction through the circuit. Since the rate at which the gushes were thus received corresponded to the spark frequency of a few hundred per second the diaphragm of a telephone receiver could be made to vibrate and emit a musical note. Hence, the dots and dashes of the Morse code were received by the telephone as longer or shorter musical notes

This rectification of the oscillations was due to the fact that the plate in the lamp was now positively, now negatively charged. In his early "oscillation valves," as Fleming called his lamps or tubes, the filament was rendered incandescent by passing through it the current of a storage battery, and a wire connected with the negative pole of this battery was joined to one terminal of the telephone receiver. Another wire was connected with the plate in the lamp bulb, and the telephone receiver was thus joined in series with the vacuous space between the filament and the plate. By connecting this combination across the terminals of the condenser of the receiving circuit, the listener at the telephone heard the sound of the spark at the distant sending station.

In 1906 General Dunwoody of the United States Army discovered that certain crystals also have the property of rectifying alternating currents. Like the Fleming valve they allow current to flow more easily in one direction than in the other. One of the simplest of such crystals is carborundum. Others are hessite, anatase, molybdenite, iron sulphide, galena, graphite and such combinations as zincite and chalcopyrite. These crystals are widely used in the construction of the crystal detectors used for the reception of broadcasted concerts and lectures.

After Fleming invented his oscillation valve

Lee De Forest, of New York, introduced in 1906 an improvement which marks one of the great advances in radio engineering De Forest mounted between the filament and the plate a grid of wires connected with a battery He found that the slightest change in the current to the grid powerfully affected the electron flow from the glowing filament to the cold plate A marvelously sensitive method of control was thus invented. The grid is like the trigger of a gun or the throttle of a locomotive. A slight movement of the finger will pull the trigger and discharge a ton of explosive; a slight pull of the throttle will set a long freight train in motion. De Forest invented a device which will not only detect the exceedingly feeble currents that oscillate back and forth in a receiving antenna, but also cause the telephone receiver to respond more markedly than is possible with the Fleming valve. De Forest called his invention an "audion," although the terms "vacuum tube," "electron tube," "triode valve" and "thermionic valve" are also much used as designations. "Vacuum tube" is the more commonly accepted term.

The arrangement adopted by De Forest is shown in Fig. 16. The audion or vacuum tube W, contains a wire grid G, a metallic plate P and a filament F, which is heated to incandescence by the battery B The plate P is connected in series with the telephone receivers T and battery B_2 to the negative side of the filament. The incandescent filament gives off electrons or negative electricity, forming in effect an electric valve or rectifier, which is made use of both in detecting and amplifying radio signals. The audion is also manufactured in large types which are used for generating high-frequency alternating current (see AUDION and PLIOTRON) both for measuring purposes and for radio and wire telephony.

A highly important property of the vacuum tube is the fact that the feeble effect detected by one tube can be amplified by a second and a third tube. Thus, it is possible to magnify the effect detected by the first tube thousands and even millions of times, so that a whole room can be flooded with radio messages without the aid of receivers clamped to the ears.

Vacuum-tube amplification may be of two kinds—"audio frequency," and "radio frequency." Often both are to be found in the same receiving set.

Audio-frequency amplifiers are inserted between the detector and the telephone receivers. It is their purpose to amplify currents having a frequency corresponding with that of sound vibrations—16 to 20,000 per second.

Radio-frequency amplifiers are inserted between the detector and the tuner, so that they amplify the current before it is detected. The frequencies dealt with are those of the waves themselves—far above those of audible vibrations. Hence the name "radio-frequency amplification." By using several stages of radio-frequency amplification and two or three stages of audio-frequency amplification it is possible to obtain signals so strong that the telephone receivers may be dispensed with and a loud-speaker horn used to flood a whole room with speech or song received from some distant station. Amplification makes it possible to use indoor loops for reception instead of more cumbrous outdoor antennæ.

The vacuum tube of De Forest may be used as a generator of alternating current, as well as a receiver; in other words, as a source of Hertzian waves. If some kind of coupling, as by inductance coils or condensers, is made between the grid and the plate circuit, so that some of the energy originating in the plate battery is transferred to the grid in such a way that any oscillation in the grid circuit is helped on and maintained by the more powerful oscillations produced thereby in the plate circuit, the tube can be made to operate as a generator. The time is at hand when this method will supersede all others for the generation of waves

Heterodyne Effect—For radio-frequency amplification at short waves "heterodyne" or "beat" reception, discovered by Fessenden, is often practised. If a tuning fork vibrating at 256 times a second is mounted near another vibrating at 260 times a second the ear will hear an alternate swelling and dying away four times a second. These alternations are called "beats." In radio reception a similar principle can be applied. We have but to generate at the receiving station waves of a slightly different frequency from those sent out by the distant transmitting station. If the one frequency is 50,000 cycles a second and the other 51,000 cycles a second, rectification by a vacuum tube or a crystal detector will produce an audible note having a frequency of 1000 in the telephone receiver. The difference in the two frequencies is usually about 100,000 cycles in radio. A beat current of this resultant frequency can be amplified with a radio-frequency amplifier, the output of which in turn can be handled in the usual approved radio way The method is fully discussed by E. H. Armstrong in the Proceedings of the Institute of Radio Engineers, vol. 9, p. 3, 1921.

The Armstrong Regenerative and Super-Regenerative Circuits. Between 1912 and 1914 Edwin H. Armstrong, while still a student in Columbia University, New York, began a close study of the vacuum tube the outcome of which was his "regenerative" circuit. By feeding back to the grid circuit some of the plate oscillations, amplified grid oscillations are produced. These amplified grid oscillations in turn produce larger variations in the plate current, thus still further reinforcing the oscillations of the system. The ultimate result is an effect in the telephone receiver much more powerful than would otherwise be obtained. If a machine gun could take some of the bullets that it has discharged and fire them over again, we would have something akin to this process of regeneration.

Although the audibility of weak signals thus received is about one hundred times greater than it would be otherwise, regeneration has its limitations. In the process of feeding back energy to the grid a point is reached when the vacuum tube begins to oscillate, which oscillation is manifest in a characteristic whistling and howling. In 1922 Armstrong announced his discovery of "super-regeneration," a method of making it possible to pass the critical point and to obtain still more powerful amplification. With a single tube in a super-regenerative circuit it is possible to obtain an amplification of one hundred thousand times.

Despite the apparently instantaneous rapidity with which electrical effects follow electrical causes it takes time for a current to act, and upon this fact depends the success of super-regeneration. It takes time for the regenerative

current to pile up to a maximum—the point where self-generation or whistling begins. In the super-regenerative circuit this piling up of current is permitted to take place until the critical point is reached. The current is then reduced so that oscillation or self-generation ceases. Regeneration is then permitted to occur alternately above and below the critical value at which the tube begins to oscillate. During the interval of building up energy the current accumulates to a far greater amount than with ordinary generation, and during the interval of subsidence of energy the current is practically nonexistent. The alternations occur with such frequency that they do not interfere with the reception of the much slower signal.

With super-regeneration amplifying effects are obtained comparable with those made possible by good radio-frequency amplifiers. So sensitive is a super-regenerative set that the outdoor antenna can be dispensed with, with the result that the more selective indoor loop may be advantageously used.

UNDAMPED WAVES AND RADIOTELEPHONY

The sparks used by Marconi and others in the early days of radio communication generated waves that rapidly die away. Such waves are called "damped waves." A plucked violin string sends forth a damped sound wave; we know that it is damped because the note dies almost as soon as it is born. A continuous wave, on the other hand, is one that lasts. Thus, a violin bow drawn across a string produces a note that lasts as long as the bow is in action; the result is a continuous sound wave. Radio telephoning became commercially practicable when a method of generating continuous Hertzian waves was discovered, and radiotelegraphy was vastly improved.

Radiotelephony differs but little in principle from wire telephony. In the telephone wire waves of electricity flow, and these waves are molded and modulated into a voice-pattern. Thus the words "hello," "boat," "horse" each change the form of the wave in a characteristic way. The receiver diaphragm is made to vibrate by these waves, and the particular way in which they have been molded or modulated determines what the diaphragm shall speak. In a sense, the modulated waves correspond with the grooves in a gramophone record. To telephone through space by radio we mold or modulate not continuous waves in a wire, but waves rippling through the ether. When the radio transmission of speech was attempted, where the question was not merely interrupting the train of waves to give the dot and dash signals of the Morse code at a rate of not more than two or three breaks per second, but so to modulate them as to correspond with the vibrations of the human voice which may average from 500 to 20,000 per second, it was found that, to obtain any satisfactory results at all, not only should the transmitted waves be undamped, but they should be of considerably higher frequency than the highest tones used in speech. In the transmission of sound the intensity or amplitude of the waves sent out must be altered at the transmitting station corresponding to the modulations of the voice through the agency of a carbon transmitter, but the frequency of vibration remains constant. These modulations correspondingly affect the circuit of the receiving telephone and reproduce the original sound.

The Poulsen Arc. We have seen that if radio waves are to be set up in the ether something must vibrate or rock back and forth with a rapidity of 10,000 to several million times a second. Because an electric spark dies away as suddenly as it is created it is unsuitable for telephoning If the spark could be made to pass steadily between the spark-gap it would cease to be a spark and become an arc Unfortunately, the street arc does not lend itself to the purpose of the radio engineer because the oscillations of current that produce its dazzling light occur only a few hundred times a second at most, and many thousands, even millions, are required.

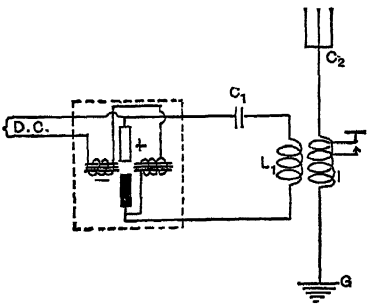


FIG. 17 POULSEN METHOD.

In 1903 V. Poulsen of Denmark devised a method for producing high-frequency undamped oscillations, suitable for use either in radio telegraphy or telephony. Poulsen's method consisted in establishing a direct-current arc in an atmosphere of hydrogen, the arc taking place in a strong transverse magnetic field between copper and carbon electrodes. Shunted about the arc is a circuit containing a capacity C_1 and inductance L_1 of appropriate values to give the frequency desired (see Fig. 17), and it is in this circuit that the high-frequency currents exist. For telegraphing, a key is arranged for short circuiting a number of turns of the inductance L_2, by which means signals are made; for telephoning, a special type of microphonic transmitter is inserted directly in the antenna circuit. The Poulsen system was controlled and operated in the United States by the Federal Telegraph Co., which company, however, does not couple the arc to the antenna but places it in series with the antenna and the ground, as shown in Fig. 18. The United States navy in 1916 used this type of transmitter very extensively.

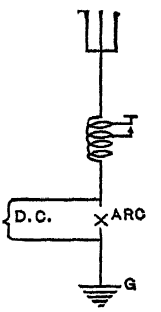


FIG. 18. POULSEN METHOD, AMERICAN MODIFICATION.

Although arcs are widely used and alternators are to be found in a few powerful stations, it is certain that continuous waves will, in the near future, be generated entirely by vacuum tubes.

With the discovery of methods of generating continuous waves radiotelephony became possible. Credit must be given to Reginald Fessenden who was probably the first to transmit human speech through the ether by modulating continuous waves.

Multitone Transmitter. In order to take advantage of the best features of arc operation and at the same time to eliminate the more undesirable ones, the multitone transmitter was devised. A diagram of connections is shown in Fig. 19. In the diagram 1 is a direct-current generator connected through choke coils 2, 2 to a specially designed spark gap 3, shunted about which is the so-called tone circuit I, tuned to audible frequencies, and the radio-frequency

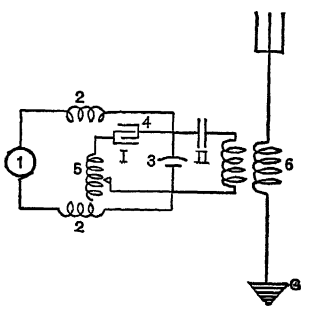


FIG. 19. MULTITONE TRANSMITTER.

circuit II. The latter contains a transmitting key, and is coupled to the antenna 6. Circuit I is comparatively undamped and the values of the capacity 4 and inductance 5 are so adjusted as to give audible frequencies Circuit II, on the other hand, is tuned to radio frequencies. The effect of circuit I is to superimpose upon the direct current flowing across the gap an alternating current of frequency determined by capacity 4 and inductance 5, and by adjusting the latter the tone-transmitted signal may be varied.

High-Frequency Alternators. Several methods for producing high-frequency currents directly by rotating machinery have been devised. Principal among these are: (1) Alexanderson alternator, which is of the inductor type, running at a speed of 20,000 revolutions per minute, and giving frequencies up to 200,000 cycles per second. This machine is an outgrowth of the early work of Tesla and Fessenden along the same line. It is supplied in powers as high as 75 kilowatts. (2) Goldschmidt alternator, which is of the reflector type, running at a speed of approximately 4000 revolutions per minute and giving a fundamental frequency of about 10,000 cycles a second.

The operation of this alternator is based primarily on the principle, disclosed by Ferrari, that a magnetic field which is varying in sign and magnitude but stationary in space (i.e., an alternating field) may be resolved into two component fields, each of half amplitude but revolving in opposite directions with the same frequency at the exciting current. In Fig. 20 the stator S is excited by a battery B or direct-current generator. Revolving in this magnetic field is the rotor R, which has induced in it an alternating current of a frequency N, which is dependent upon the speed and number of poles. The rotor circuit $RC_3D_2C_4$ is tuned to the frequency N and forms a path of low impedance. The same result would be accomplished if the rotor remained stationary and the stator revolved. As explained above, the alternating magnetic field of the rotor may be resolved into two fields, one revolving with frequency $2N$ with respect to the stator and the other in synchronism with the stator. The field of frequency $2N$ will induce electromotive forces of the same frequency in the stator, to which frequency the circuit SC_1 D_1 C_2 is tuned. In an exactly similar manner the magnetic field set up by the currents in this circuit reacts upon the rotor producing in the circuit RC_3C_5 currents of frequency $3N$ This field is in turn reflected back to the stator, generating in the circuit, SC_1 antenna ground, currents of frequency $4N$. In this manner, starting with a fundamental frequency of between 10,000 and 15,000 cycles, radio frequencies as high as 60,000 cycles a second have been produced. Alternators of 150 kilowatts capacity have been constructed. The radio station at Tuckertown, N. J., which during the European War was in

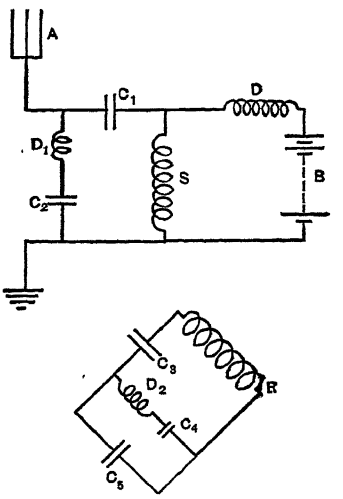


FIG. 20. DIAGRAM OF HIGH-FREQUENCY ALTERNATOR.

constant communication with Eilvese, Germany, was of the Goldschmidt type.

Static Frequency Changers. Though it has been a comparatively simple matter to construct alternators giving frequencies directly up to 15,000 cycles a second, special designs have to be resorted to when this limit is exceeded. To overcome this difficulty, methods have been devised, principally by Epstein in Germany, Vallauri in Italy, and Joly in France, for increasing such audio frequencies by static transformers. The operation of these transformers depends in general on the currents in two-branch circuits, in one of which the hysteretic lag of the iron core is greater than in the other. Two of the principal methods are described below.

Method of Epstein.—In this method two iron core transformers are employed with primaries wound in opposition. Auxiliary coils are supplied on each core, also wound oppositely and connected in series to a source of direct current, the strength of which is so adjusted as to work

the [illegible] of the magnetization curve [illegible] and c the amount of this magnetization represented by the dotted lines. If [illegible] alternating current is supplied to

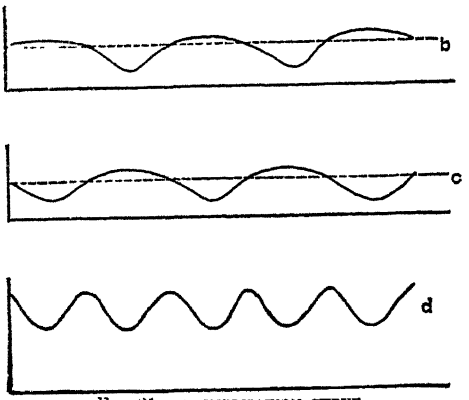


FIG. 21. MAGNETIZATION CURVE.

the primaries, connected either in series or in parallel, it is evident that there is only a slight increase in the flux density, when the alternating and direct-current magnetization is in the same direction, but there will result a considerable decrease in the flux density when they are in opposite directions. The full lines in Fig. 21, *b* and *c*, represent the resulting induction. Because of the fact that the direct current and primary coils of the two transformers are so wound that during the positive half cycle they assist each other on one transformer and oppose each other on the other, the induction of the second transformer, represented by Fig. 21, *c*, lags 180° behind that of the first, Fig. 21, *b*. The resulting induction is given in Fig. 21, *d*, and is of double frequency. If the secondaries of the transformers are wound in the same direction and form part of a tuned circuit adjusted to the proper frequency there will be induced therein a voltage of twice the primary frequency.

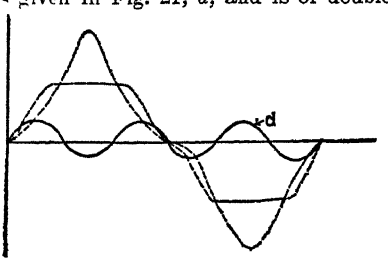


FIG. 22. INDUCTION CURVES OF JOLY SYSTEM.

Method of Joly.—A method for tripling the frequency depending upon the use of two iron core transformers, has been worked out by Joly. The primaries are, as in the preceding method, connected in series and wound in opposition; the number of turns is so adjusted that at the maximum current point of each half cycle one transformer is operating well below saturation, while the other operates practically saturated. The induction curve for the first transformer will be peaked, and for the second will be flat topped. If the secondaries are connected in series through a condenser of appropriate value, there will be set up in the circuit currents of triple the primary frequency, as is seen from curve *d*, Fig. 22, which is the difference of the two induction curves of the separate transformer. The method employing static frequency transformers has been developed to a state of practical efficiency by Arco and apparatus of high power was installed in the United States at Sayville, L. I., with which communication was maintained with Nauen, Germany.

Audion and Pliotron. The "audion" (previously described), originally invented by De Forest, has been developed and improved to such an extent by the General Electric and American Telephone and Telegraph companies, that in addition to serving as a detector it can be made to generate high-frequency currents of considerable amplitude. By making use of the wonderful amplifying powers of the audion it has been possible to radiate several kilowatts of high-frequency energy, and it was in this manner that in 1915 telephonic communication was established between the powerful United States Navy Station at Arlington, Va. (outside of Washington, D. C.), and Paris and Honolulu. Since that time, on various occasions, orders and messages have been transmitted from Arlington directly to vessels of the United States Navy lying 100 or so miles off the Atlantic coast. This method of radiotelephony may be used in conjunction with the land wire lines. Speech via wire from New York to Arlington is automatically transferred and sent out by radiotelephony.

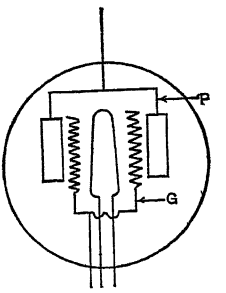


FIG. 23. PLIOTRON.

By pushing the vacuum of the bulbs to a point hitherto unobtainable, and by thoroughly removing the gas from the electrodes and the glass itself, Dr. Irving Langmuir has been able to obtain high-frequency oscillations by means of the pure electron discharge. Langmuir apparatus called the "pliotron" is shown in Fig. 23. The pliotron can be used either to control or to generate relatively large amounts of high-frequency energy. Because of its characteristics a number of pliotrons may be operated in parallel, thus still further increasing the amount of energy available. As applied to radiotelephony, the pliotron may be used either as a source of energy or as a means of control of a high-frequency alternator. A single pliotron of the 5-inch bulb type can control 2 kilowatts of energy in an antenna by currents obtained from an ordinary telephone transmitter.

Line-Radio. By linking radio with the wire telephone it is possible for communities cut off from the cities to keep in touch with the outer world. The American Telegraph and Telephone Company, for example, has made it possible for any one in the United States to communicate with a subscriber on Santa Catalina Island, off the coast of California, although the island is not connected by wire with the mainland. A business man in New York or

Chicago has only to inform the operator of his central station to whom he desires to speak on Santa Catalina Island His voice is first translated into modulated current over the ordinary land wire system to the coast and is there sent out in modulated Hertzian waves It has been technically possible ever since the historic feat of talking to Honolulu to speak in this manner from any part of the United States to London or Paris.

The vacuum tube or audion has also made it possible to multiply the conversational capacity of the ordinary wire telephone line By using waves of different frequencies a dozen different telephone conversations can be carried on without interference on a single circuit.

Because the vacuum tube can act as an amplifier of feeble electric effects, it has been extensively used as a telephone relay. Thus telephone conversations between New York and San Francisco have ceased to be extraordinary. Vacuum tubes inserted at suitable points along the line amplify the dying effect and pass it on.

Ernest Ruhmer of Berlin and Major General George O. Squier both discovered independently that continuous waves of radio frequency can be guided by wires between the transmitting and receiving stations instead of being radiated into space, and when so guided can be used for either telegraphy or telephony. This is called "line-radio," "wire-radio," "carrier-wave telephony," and "wired wireless." The radio frequency or "carrier" frequency may vary through a wide range, but is usually between 15,000 and 500,000 cycles per second, in other words so far above audible frequency that an ordinary telephone line may be used without interfering with its regular conversational use. Hence the carrier-wave may carry one conversation, the telephone line that guides the wave, another. The utility of both telegraph and telephone lines is thus enormously increased. If the carrier-wave frequencies are far enough apart as many as six conversations can be carried on at the same time over a single circuit. The carrier frequency or guided radio conversations are just as secret as those for which the wire is directly responsible. Line-radio has already been applied in this country between Harrisburg and Chicago.

Waves radiated by any radio station are thus guided by telegraph, telephone, and electric-light wires—even house-bell wires. Hence it becomes possible to use all these wires as receiving antennæ. The result is that with the aid of a suitable condenser, to dam back the heavy alternating current, it is feasible to tap any electric-light wire for messages.

Directed Radiotelegraphy. Electromagnetic waves given off by an ordinary transmitter will as a rule be propagated in all directions with equal intensity. It early was recognized that greater efficiency in transmission would be secured if the radiated energy were confined to a single direction and not diffused generally in all directions. With regard to the receiver, it is quite evident that any apparatus which is capable of determining the direction from which signals are received would prove of inestimable value. Among the scientists who have attacked this problem are Braun, Stone, Bellini and Tosi, Marconi, and Meissner.

The method of Bellini and Tosi has been developed to a certain extent by the Marconi companies, a few vessels having been equipped with apparatus; good results have been reported. Apparatus known as the "Telefunken Compass" has been developed by the Telefunken Company, by means of which a receiving station is enabled to ascertain from what direction signals are coming. A number of directive transmitting antennæ are arranged radially about a station, which is also equipped with a single nondirective antenna. By means of an automatic contractor, first the nondirective antenna, and then in succession each of the directive antennæ are excited at given intervals. The operator at the distant receiving station starts a specially designed stop watch, which is in effect a compass, when he hears the beginning signal and stops it when the signals are of maximum intensity. The pointer of the watch which runs in synchronism with the automatic contractor will then indicate the direction of the transmitting station relative to the points of the compass. Methods have been developed in the Radio Laboratory of the United States Bureau of Standards whereby with comparatively simple apparatus the direction of transmitting stations may be determined with great accuracy

The principles of directed telegraphy are applied in what is known as the "radio compass." The receiving antenna takes the form of a loop of coiled wire mounted so that it can be swung through all the points of the compass. When this loop is slowly rotated the incoming signals become audible with greater or less intensity as the plane of the loop presents itself at different angles to the direction from which the radio waves emanate. When the loop is in direct line with the incoming waves the signals are heard at their loudest, but when it is rotated so that it lies at right angles to the advancing waves no signal is heard. The reading is taken just before reaching zero intensity, and at this point it is very sharply defined. This minimum reading is noted and the compass pointer set accordingly. By taking readings from two stations it is possible for a ship in a fog to locate her position. The radio compass proved of great service during the World War in locating the positions of enemy submarines and aircraft that happened to be sending out radio messages.

We have seen that it became necessary for Hertz to show by reflecting them that the electromagnetic waves which he had discovered were indeed the waves about which Clerk Maxwell had mathematically reasoned. This he did by the radio equivalent of optical mirrors. In 1922 Marconi, in a paper read before a joint meeting of the American Institute of Electrical Engineers and the Institute of Radio Engineers, announced that he had succeeded in obtaining remarkable results by such reflectors. Waves as short as one meter were directed in given paths, and only in the direction in which the beam was sent could the voice or telegraph signal be heard. Since the days when wireless was first installed on ships there has been a tendency to use longer and longer waves. Marconi's system of directional wireless by the aid of what may be termed "radio searchlights" promises to make the use of shorter waves more common. With one of his directed beams of radio waves Marconi was able to conduct spoken communication between London and Birmingham, a distance of one hundred miles.

Marconi has experimentally applied this principle to radio beacons, which are intended to assist navigation off dangerous coasts. Fog cannot be penetrated by the rays of a lighthouse, and even sirens may not be relied upon because

of the peculiar effect of fog on the transmission of sound. Radio, however, penetrates any fog. Hence Marconi has devised a radio beacon, provided with a device for projecting a revolving beam of radio waves. The beams may be flashes produced in accordance with a system, just as in a lighthouse. Either telegraph signals or the human voice may be transmitted to warn the ship of its danger.

Radio beacons of a different type, designed by the United States Bureau of Standards, have been installed in the harbors of New York and San Francisco. These are modifications of the loop antenna of radio compass, already described. Accurate determinations of his position can be made by the navigator by taking his radio bearings from the radio beacons.

Ship Wireless. Wireless telegraphy drove home its practical utility with dramatic effect in its early days by enabling ships in distress to summon help. Thus the *Republic* after collision with the *Florida* in 1909 succeeded in calling assistance with the result that all her passengers and crew were taken off before she sank. On April 15, 1913, the *Titanic* struck an iceberg and sank, but a prompt wireless call summoned help and the lives of more than seven hundred of her passengers were saved. Literally thousands of passengers thus owe their lives to wireless.

It is altogether probable that in the very near future most passenger vessels will be equipped with radiophones, so that those on board may speak to those at home. During one of his voyages to France, President Wilson thus talked from the *George Washington* at sea. Promising experiments have been made on the steamship *America* with duplex radiotelephony—that is, wireless telephony which enables one to speak and hear at the same time. Ultimately it will be possible to talk from a ship not only to a given radio station on land, but to any telephone subscriber in the United States in accordance with the method described in this article under *Audion and Pliotron*.

Piloting Vessels by Electrically Energized Cables. So far back as 1893 the idea of using electric signals transmitted through a submarine cable to guide ships past dangerous points or into a harbor was conceived. But it was not until the vacuum-tube was perfected that the guided cable system became practical. Professor R. B. Owens of McGill University patented the system in 1901–1903. It was later improved when the vacuum-tube was brought out.

A leader cable system comprises a submarine cable laid in any waters where it is desired to facilitate navigation. Through this cable a powerful alternating current is sent which is interrupted by a key into the well-known dots and dashes of the Morse code. On board the ship is a radio receiving apparatus, in the telephones of which the Morse signals are heard as sharply pitched musical notes. The electric waves sent out by the cable, similar to those radiated from an antenna, fall upon loops of the type described under the heading *Directed Radiotelegraphy*. By means of these coils, operated as previously described, it is possible for a ship to follow the exact line of the cable. The system has been experimentally used with success both in England and in the United States.

Broadcasting by Radiophone. Up to 1920 radio was a means of communication that had won for itself a place that could not be filled by wire telegraphy and telephony. About two hundred thousand amateurs built their own apparatus, organized themselves into clubs, and amused themselves by sending and receiving radio messages. Their activities were made possible by the rather liberal regulations of the United States government. But there was no widespread interest in radio communication. With the advent of continuous wave telephony a few amateurs took it upon themselves to radiate phonograph and automatic piano music and to enliven the ether with calls to their radio mates. The United States Department of Agriculture in 1921 had also inaugurated a system of informing farmers by radiotelegraphy of market and weather conditions. There was no systematic attempt at entertaining and instructing the public as a whole.

In 1921 it occurred to the Westinghouse Electric and Manufacturing Company that if music and news were broadcasted in accordance with a regular published programme a wide public interest in radiotelephony might be aroused. The first timid experiment met with an overwhelming success. At once receiving apparatus was bought by thousands who had no technical knowledge of radio principles, but who found enjoyment in listening to the music and the speeches wafted on the ether from a station fifty, even a hundred miles distant. The effect upon the industry was magical. By the middle of 1922 over one million radio receiving sets had been sold and over one hundred broadcasting stations had been established by manufacturers, newspapers, department stores and universities.

Because of the government regulations these numerous stations were all compelled to transmit music, sermons and lectures on a wave-length of 360 meters. The result was considerable interference. Hence, a commission was appointed by Herbert Hoover, Secretary of Commerce, to study the situation and to make suitable recommendations for the allocation of wave-lengths for specific purposes and to reduce this interference, as well as the interference of radio telegraph stations.

With the establishment of broadcasting on a systematic basis, radio entered the home. It became something more than a means of communication—a means of bringing opera, symphonic music, drama, the lectures of university professors into lonely farmhouses and into city homes. Such was the demand for broadcasting facilities that the American Telegraph and Telephone Company built a station which any one who had a message to convey could hire by the hour—a station which was linked by wire with other stations so that the lecturer had only to use the ordinary wire telephone in order to broadcast his remarks from half a dozen cities between New York and San Francisco. Indeed, by thus linking radio with the wire system it became possible to pick up broadcasting material wherever it might be available; it was not necessary for the pianist or the singer to proceed to the station but simply to sit in his home in order to entertain millions.

This astonishing extension of radiotelephony brought with it new engineering and manufacturing problems. Since the public as a whole was technically uninformed it became necessary to design apparatus which would be as easy to manipulate as a phonograph. Hence, receiving sets were produced, which embodied crystal detectors and vacuum tubes, with and without the Armstrong regenerative circuit and which

made it possible for any one to "tune in" and select the particular station to which he desired to listen, provided it was within range. For the most part, these sets have ranges of fifteen to fifty miles, but the more elaborate sets are quite capable of hearing stations as distant as five hundred and even a thousand miles

Broadcasting has made radio a sociological force of vast possibilities Opera can become the common possession of the entire population. Lectures by famous university authorities, delivered in the class room, can be heard simultaneously in every educational institution equipped with the proper apparatus, so that the number of students reached may be hundreds of thousands. San Francisco becomes a radio neighbor of New York; half the nation listens as if it were in a huge auditorium. The speeches of political candidates have been addressed not to a few thousand but to tens of thousands at once. The debates of legislators can be followed as readily as if the distant listener were seated in the gallery of the council hall, provided that the proper apparatus is installed.

Remote Control by Radio. It is evident that if waves sent out into the ether can cause a telephone or telegraph instrument at a receiver to respond the result is a mechanical effect produced by radiated energy. Even before wireless telegraphy had taken its place as a valuable means of communication Eranly had shown that it was possible to control the energy received by a station and to make it light and quench an electric lamp, ring an electric bell, or discharge a cannon. Tesla, in 1896, even constructed a miniature submarine boat which was perfectly controlled by electric waves. Although the remote control of apparatus by means of wireless waves has as yet found but few practical applications many engineers have devoted to it an immense amount of research. Armstrong and Orling, Hirth, John Hays Hammond, Meissner, and others have all produced ingenious devices for controlling crewless vehicles and boats, chiefly for military and naval purposes. It is obvious that the crewless-controlled submarine or torpedo-carrying airplane has possibilities as dreadful as any of the death-dealing gases and "tanks" developed during the Great War. Remote control was applied by the United States Navy when it sent the crewless, obsolete battleship *Iowa* to sea, under her own steam, controlled, however, by radio from land, and had her bombarded by airplanes in order to determine the effect of dropped high-explosives on protective decks.

RADIOTELEGRAPH LEGISLATION

Because of its direct bearing upon naval and military operations and upon the maritime intercourse between different countries it soon became evident that radiotelegraphy was a subject for international legislation. Accordingly, in 1903, an International Radio Telegraphic Conference was held in Berlin, principally for the purpose of securing the transmission and reception of messages between stations regardless of the system or type of apparatus employed. In 1906 a second conference was held in Berlin in which was considered the advisability of international control of radiotelegraphy, and a convention was signed by a majority of the principal countries of the world. In 1910 an Act was approved by the United States government requiring radio equipment and operators on certain passenger-carrying vessels, and in 1911 the radio service was organized by the Department of Commerce and Labor to enforce the provisions of the Act. Radio inspectors, under the Bureau of Navigation, were stationed at New York, Baltimore, and San Francisco, whose duties were to inspect and test the radio apparatus of foreign and American vessels that entered those ports.

On June 4, 1912, a third international conference opened at London This conference was attended by delegates from all of the principal countries of the world, and resulted in the adoption by the participating nations of an international code of laws regulating and standardizing the radiotelegraphic intercourse between the ship and shore stations of different countries. Among other things it was recommended that every commercial ship and shore station should be equipped to operate on two-wave lengths, 600 and 300 meters. The international distress call, S O S, was specified, a standard method of calling was adopted, and in order to insure regularity and rapidity in the handling of messages between stations of different nationalities, a set of service questions and answers for operators was devised A system of three-letter calls was adopted, series letters being assigned to each country.

On July 23, 1912, an Act was approved by the United States government extending the Act of 1910 to cargo vessels, and requiring auxiliary source of power, efficient communication between the radio room and the bridge, and two or more skilled radio operators in charge of the apparatus on certain passenger vessels.

About this time, probably due to the extremely fascinating character of the subject, a great many amateur stations had sprung up in different parts of the country, particularly along the coasts and in the neighborhood of the large seaports. Within a short time the volume and activities of these stations had increased to such an extent that they were commencing to interfere seriously with the operations of the commercial and government stations, and means were considered by Congress for bringing all radio stations, commercial and amateur, under the control of the government. On Aug 13, 1912, a third Act was approved by Congress which was designed to enforce on behalf of the United States the London International Convention. This Act provided principally that radio operators and transmitting stations coming within the jurisdiction of the United States should be licensed, and made it unlawful to operate any unlicensed transmitting station, or for any unlicensed person to serve in charge or in supervision of such apparatus. It provided further that all licenses should be issued by the United States government at the discretion of the Secretary of Commerce, and might be withdrawn by him as a penalty for violation. It designated the wave-lengths of 200 meters to amateur stations, 300 or 600 meters for calling, for commercial stations, and reserved wave-lengths between 600 and 1600 meters for government use; it provided that the logarithmic decrement of the transmitted waves should not exceed 0 2 per complete oscillation and limited the power input of amateur stations to 1 kilowatt.

Operators were divided into different classes, depending upon their ability and experience, and were licensed to operate certain types of

stations. Commercial and special stations were also divided into different classes, determined by the character of service, the grade of operators indicated, and call letters assigned.

To enforce these regulations the Department of Commerce divided the country into nine districts, each in charge of a radio inspector, with headquarters respectively at Boston, New York, Baltimore, Savannah, New Orleans, San Francisco, Seattle, Chicago, and Cleveland. The duties of the inspectors in each of these districts consisted in inspecting and testing radio apparatus, examining and licensing operators, licensing amateur stations.

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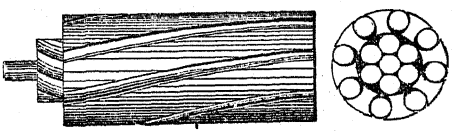
WIRELESS TELEPHONY. See WIRELESS TELEGRAPHY AND TELEPHONY.

WIRE ROPE. Rope composed of twisted strands each composed of metal wires twisted together. Wire ropes are now used generally for all purposes for which fibre ropes have been employed, and for many purposes they have displaced fibre ropes entirely. For most kinds of wire ropes steel is the metal employed, but other metals can be twisted into rope equally well, and such rope is made in limited quantities for special purposes. Steel wire rope is referred to alone in the statements which follow. To explain the construction of wire rope it is essential to note first that it is composed of two or more units called strands, and, second, that each strand is composed of two or more units or wires. Rope making consists, therefore, first in making the individual strands, and second in combining these strands into rope. In ordinary rope—special forms of rope will be considered later—the wires forming the strand are twisted together to the left; for running ropes 19 wires usually form a strand, and for standing ropes seven wires form a strand. To make the rope, six strands are twisted together to the right. The reason for using a greater number of wires for running rope is that rope which works over pulleys must be flexible, and the greater the number of component wires is, the more flexible is the rope. Ropes for certain purposes are made with as many as 400 wires. Flexibility is also increased by twisting the



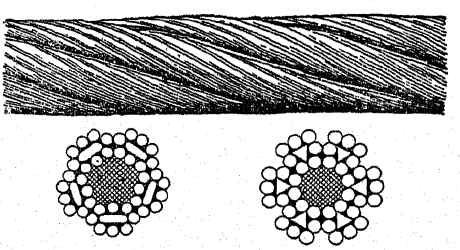
STANDING ROPE (seven-wire strands around hemp core).

strands around a centre core of hemp, and in some instances by also twisting the wires of each strand around a hemp core. The length of twist or the lay adopted in rope depends upon the diameter of the wires employed and upon the size of the rope. Broadly speaking, the lays in strands vary from 6 to 12 inches. Short-laid ropes are more flexible than those with a comparatively long lay. It has just been stated that round wire ropes of ordinary construction have the composite wires of their strands twisted in one direction, while the strands forming the ropes are closed the opposite way about. In 1880 Mr. G. Craddock, an Englishman, introduced a construction of roping



PATENT LOCK COIL WIRE ROPE.

known as "the Lang lay," in which the wires forming the strands and the strands composing the rope are all laid in the same direction. Ropes of this type have been extensively used for running or winding purposes. In recent years many special forms of wire ropes have been invented. They are generally made of wires of special section designed to interlock with each other, and increased strength and



PATENT FLATTENED STRAND WIRE ROPE.

wearing capacity may be secured by having the strands so woven as to form a flat surface which will take up the wear more evenly, as it comes on a number of wires instead of the single one nearest the periphery of the rope. The strength of wire rope varies, of course, with the strength

of the material from which the wire is made, and it is usually about 10 to 15 per cent less than the aggregate strength of the component wires. Flat wire ropes are now little used; they were generally formed of four, six, or more round ropes of alternate lays sewn together by wires in a zigzag direction. The earliest form of wire rope was the selvagee construction, in which several wires were laid parallel to each other and wound with fine wire; such ropes are still used for suspension-bridge cables

The manufacture of wire rope appears to have originated in Germany about 1821, in this year ropes of the selvagee type were made for the Geneva suspension bridge. Shortly afterward formed or stranded wire ropes were made and utilized. Wire-rope manufacture in England dates from about 1838; in that year R. S. Newall, of Dundee, invented a rope-making machine, and later he established a wire-rope works. From this origin the vast wire-rope industry of Great Britain, and afterward of the United States, was developed. Wire rope is now made altogether by machinery. The machines used are all built on the same principle, although they vary in form and arrangement and in their capacity. To understand the principle of a wire-rope machine, picture a large wheel free to revolve on a horizontal axle. At regular intervals on the side of the wheel rim assume spools or reels of wire to be attached so that they revolve with the wheel. If now we carry the free end of the wire on each wheel through a hole in a block of metal placed in line with the axle, and some distance away from the wheel, we have a crude form of rope-making machine, since by revolving the wheel the wires leading from the reels are twisted together at the metal block or head. Generally separate machines are used for twisting the wires into strands and for twisting the strands into rope, but some machines accomplish both processes simultaneously. Consult J. B. Smith, *Wire: Its Manufacture and Uses* (New York, 1891); William Kent, *Mechanical Engineers' Pocket Book* (9th ed., ib., 1916), and the catalogues of the leading manufacturers.

WIRE-TAILED BIRDS OF PARADISE. See BIRD OF PARADISE.

WIRE WORM. The larva of any one of the click beetles of the family Elateridæ. (See CLICK BEETLE; ELATERIDÆ.) The name is also sometimes applied to certain small myriapods.

WIRE-WOUND GUN. See GUNS, NAVAL; ORDNANCE.

WIRNT VON GRAFENBERG, vērnt fŏn grä'fen-bĕrk (or GRAVENBERG). A Middle High German poet of the thirteenth century. He was a Bavarian nobleman who between 1202 and 1205 wrote an epic, entitled *Wigalois*, which describes the adventures of Gawain's son, the name *Wigalois* being a corruption of Guinglain le Galois. Wirnt took his material from the French romance *Li bel inconnu* of Renaud de Beaujeu, and used it with great freedom. Though extravagant and didactic, the poem is one of the best romances of the Arthurian cycle written in Germany, apart from the work of Wolfram von Eschenbach and Hartmann von Aue. A popular prose version appeared in Augsburg in 1493, in Strassburg in 1519, in Frankfort in 1564 and 1586. *Wigalois* was edited by F. Pfeiffer (Leipzig, 1847). Consult F. Saran, *Beiträge zur Geschichte der deutschen Sprache und Litteratur*, vol. xxi (Halle, 1896).

WIRT, wĕrt, WILLIAM (1772–1834). An American lawyer, statesman, and author, born at Blandensburg, Md. He studied law, and moving to Virginia, practiced his profession and held office. In 1803 he printed his *Letters of a British Spy*, containing sketches of popular speakers, which were Addisonian in style and highly popular. A second series of essays, entitled *The Rainbow* (1808), appeared later in the Richmond *Enquirer*, and *The Old Bachelor* (1812) was first published in the same paper by Wirt and some of his friends. Wirt achieved more fame by his readable, though not very accurate, *Life of Patrick Henry* (1817) Meanwhile he had settled in Richmond in 1806 and gained a high reputation by his speech in prosecution of Aaron Burr He supported Jefferson in politics, and became a member of the Virginia Legislature (1807–08), and United States District Attorney (1816) and Attorney-General of the United States during the administrations of Monroe and J. Q. Adams (1817–29). On retiring he settled in Baltimore, and in 1832 accepted the Antimasonic nomination for the presidency. He was an able and amiable man, a good speaker, an effective though somewhat florid writer, and a lawyer and statesman of tried integrity and success. Consult the *Memoir* by J. P. Kennedy (Philadelphia, 1849); also W. P. Trent, "English Culture in Virginia," in *Johns Hopkins University Studies* (Baltimore, 1889).

WIRT, WILLIAM ALBERT (1874–). An American educator, born at Markle, Ind. He graduated at De Pauw University in 1898, did postgraduate work at the University of Chicago, and studied the educational systems of England, France, and Germany. After an experience as superintendent of schools at Redkey, Ind., he became superintendent in 1899 at Bluffton, Ind., where he worked out some experiments in educational administration and pedagogy that attracted attention throughout the country. In 1906 he was invited to complete these experiments as superintendent of schools at Gary, Ind. His success in Gary secured for him in 1914 the position of expert adviser to the Board of Education and Board of Estimate in the reorganization of the New York City schools. For the Gary Plan or Wirt Plan, as it is variously called, see SCHOOLS, *The School of Varied Activities*.

WISBECH, wĭs'bĕch *or* wĭz'-, or **WISBEACH.** A river port in Isle of Ely, Cambridgeshire, England, on the Nene, 12 miles above its mouth in the Wash (North Sea), and 40 miles north of Cambridge (Map: England, G 4). One of the principal buildings is the restored church of St. Peter and St. Paul There are manufactures of rope. Wisbech is mentioned in 664, became noted for its extensive fisheries, in 1190 it received privileges from Richard I, and in 1549 was incorporated by Edward VI. Pop., 1901, 9831; 1911, 10,822.

WISBY, wĭz'bĭ, or **VISBY,** vēs'bụ. The capital of the Swedish island and län of Gotland, on the west coast of the island, about 44 miles from the mainland of Sweden (Map: Sweden, F 8). The town is imposingly situated amid gardens on and at the foot of a rugged cliff. It has greatly declined, as is attested by the half-vacant area inclosed within the interesting mediæval walls with their 38 ancient towers. The many houses dating back to the period from the thirteenth to the seventeenth century give the place a very quaint

appearance. Of the original 16 churches, only one, the cathedral of St Mary, at the foot of the cliff, now remains in service. It was erected by the Germans and was completed in 1225. The interesting ruined church of St Nicholas, partly Romanesque and partly Gothic, dating from about 1250, has two beautiful rose windows, supposed to have contained the two carbuncles which, tradition says, now lie at the bottom of the sea with the bones of Valdemar. The charming Gothic St. Catharine Church dates from about 1230. Near the southeast corner of the walls is a monolithic cross marking the sepulchre of the defenders of the city in 1361. The Gotland Museum, rich in antiquities, the high school with a museum, the chemical station, and the library are the principal public buildings. The modern harbor, south of the old Hanseatic harbor, which has disappeared, has two basins to accommodate traffic. Pop., 1900, 8376; 1910, 9961.

The history of Wisby is that of Gotland (q.v.). The town was probably a place of human sacrifice and a trading place of some importance in pagan times. In the Middle Ages, when it was a member of the Hansa, it was a great distributing centre for the commerce between the Orient and the Baltic countries. A famous maritime code bore its name. Valdemar IV Atterdag of Denmark conquered the town in 1361, and it never regained its supremacy.

WISBY (wĭz'bĭ), LAWS OF. A collection of mercantile customs and regulations, dating from the last years of the thirteenth century and taking its name from the celebrated trading town in Gotland, Sweden. The laws of Wisby were in force throughout the Baltic Sea and were made the basis of the ordinances of the Hanseatic League. They were an important factor in the development of the modern system of maritime law.

WISCONSIN. A State in the Middle West, popularly known as the "Badger State." It is 320 miles long and 295 miles wide, ranks twenty-fifth in size among the States of the Union, and covers 56,066 square miles, of which 810 are water.

Topography. Wisconsin is naturally divided into the following geographical provinces: the Northern Highland, the Lake Superior Lowland, the Central Plain, the Eastern Ridges and Lowlands, the Western Upland. The Northern Highland is a dome-shaped, slightly dissected peneplain. It contains: the highest point in Wisconsin, Rib Hill, 1940 feet; Penokee Range, a long narrow ridge nearly 1800 feet high; parallel ridges of trap rock; isolated hills of quartzite; and glacial hills. The Lake Superior Lowland is divided into two drift-floored plains, not far above lake level. It is a reexcavated rift valley, due originally to faulting and separated from the Northern Highland by a steep escarpment. The Eastern Ridges and Lowlands, Central Plain, and Western Upland constitute a belted plain. The ridges and uplands, called cuestas, are unsymmetrical, having steep escarpments on one side. The latter include: (*a*) Niagara Escarpment, parallel to Lake Michigan; (*b*) the Magnesian Escarpment west of it, sometimes with an intermediate Trenton Escarpment; (*c*) the continuation of the Magnesian Escarpment in western Wisconsin; (*d*) Military Ridge, whose northern face is an east-west escarpment, running from Madison to the Mississippi and westward into Iowa. These escarpments, lines of cliffs and steep slopes 150 to 300 feet high, face northwest, north, or northeast. The cuesta surfaces, sloping gently in the opposite directions, are (*a*) plains of slight relief, as in eastern Wisconsin, (*b*) exceedingly hilly regions with ridges rising to the level of the cuesta surface, as in the Western Upland. In the edge of the latter is the Baraboo Range, 1620 feet, a buried and partly exhumed quartzite ridge, rising 800 feet above the Central Plain. The gorge of the Mississippi, with bluffs 230 to 650 feet high, is 1 to 6½ miles wide and receives similar tributary gorges. Most of the Western Upland, together with small parts of the Central Plain and Northern Highland, constitute the Driftless Area, within which lack of glacial modification seems responsible for the retention of hilliness, especially in the Western Upland, where there are many caves and sinkholes made by underground water. The Niagara Escarpment and part of the Magnesian Escarpment have notable simplicity of outline, while Military Ridge and the portion of the Magnesian Escarpment in the Driftless Area are markedly irregular. In front of the indented Driftless Area escarpments are isolated outlying hills. Those in the Central Plain are castellated sandstone mesas and buttes of an arid-land type, well seen near Camp Douglas, Merrillan, and Roche à Cris. Blue Mound, 1716 feet, is a limestone outlier, one of many left behind in the recession of the Niagara Escarpment, the nearest part of which now lies about 50 miles to the southwest.

The lowlands of the belted plain include (*a*) the crescentic Central Plain, (*b*) the Green Bay-Lake Winnebago-Rock River Lowland, (*c*) the basin of Lake Michigan. All three lie in belts of weak rock. The last named is thought to have been tremendously deepened by glacial erosion. In eastern Wisconsin are oval hills of glacial drift called drumlins. There are 1400 drumlins in 4200 square miles, and at least twice that number in all.

Drainage. The chief rivers are: the Mississippi; the Wisconsin, flowing southward through the centre of the State and then westward into the Mississippi, which also receives the Black, Chippewa, and St. Croix; the Rock, flowing southward into Illinois; the Menominee on the Wisconsin-Michigan boundary. The diagonal valley extending southwestward from Green Bay to the Mississippi is occupied by (*a*) lower Fox River, whose water power supports a flourishing industrial district, (*b*) Lake Winnebago (q.v.), the largest inland lake in Wisconsin, (*c*) upper Fox River, which is only 1½ miles from the Wisconsin River at Portage, where the waters sometimes unite on a swampy divide, (*d*) the lower Wisconsin. This river has a beautiful postglacial gorge—the Dalles—west of Portage. Devil's Lake, in the Baraboo Range, occupies an abandoned watergap of Wisconsin River. Lake Pepin interrupts the course of the Mississippi, where the latter is partially dammed by the deposits of the Chippewa. The Mississippi similarly forms Lake St. Croix. Numerous lakes, all small, lie in northern and eastern Wisconsin. Rapids and waterfalls furnish much water power.

Coast Line. The Lake Michigan and Lake Superior coasts include 500 miles of shore line. Milwaukee, Racine, Sheboygan, and Green Bay harbors are improved mouths of small rivers. Superior and Ashland harbors lie behind great sand spits.

Climate. Wisconsin has a variable continental climate with hot summers and cold winters,

modified slightly by the Great Lakes The mean annual temperature is 43° F. The average temperature ranges from 47° in southwestern Wisconsin to 39° in the Northern Highland. The extreme range is from 110° above to 50° below zero. The mean annual rainfall is about 36 inches, May to July being the wettest months. Tornadoes sometimes occur in summer. Thunder showers are severe Near certain lakes there are dense winter fogs.

Soil. The residual soils, chiefly in the Driftless Area, are sands, loams, and clays derived from the weathering of sedimentary rocks and older glacial drift. The transported soils are glacial till and outwash, lake clay and sand, alluvium, dune sand, peat, and marl. There are about 7,000,000 acres of swamp land. A loam, covering large areas in western Wisconsin, is the loess, brought by the wind during and soon after the Glacial Period

Geology. The State has pre-Cambrian metamorphic, igneous, and sedimentary rocks in the Northern Highland. Paleozoic sediments occupy the belted plain to the south and are folded into a broad anticlinal arch. The geological history of the State has included the following: (1) all Wisconsin was mountainous 25 to 100 million years ago, after the pre-Cambrian rocks were deposited and folded; (2) a peneplain, with a few eminences; (3) alternately submerged and elevated while the Paleozoic rocks were being deposited; (4) again dry land and being fashioned into its present form; (5) all but the southwestern quarter buried beneath a continental ice sheet; (6) the ice sheet melted away, leaving Wisconsin somewhat as before the Glacial Period, but with notable modification of topography, soil, and drainage.

Mineral Resources. Wisconsin ranked thirty-first among the States in value of mineral products in 1914 The most important products in order of importance are zinc, stone, iron ore, and clay products. Though ranking fourth in the production of spelter produced, Wisconsin ranked fifth in zinc production in 1914. The amount of zinc produced in that year was 31,113 short tons, valued at $3,173,526. The most important varieties of the stone industry are limestone and granite. The value of the output of limestone in 1914 was $1,007,106, and of granite $1,238,734. The total stone production in that year was valued at $2,413,435. Wisconsin is included in the Lake Superior District as a producer of iron ore, though it is far below Michigan and Minnesota in quantity and value of product. The production of pig iron in 1914 was 250,144 short tons valued at $3,350,199, and the State ranked fifth in this regard. The value of clay products in that year was $950,999. Other minerals produced are lead, with a production of 227,469 short tons valued at $871,820 in 1914; mineral paints; mineral waters, valued at $588,373; pyrite, and sand and gravel. The total value of the mineral production in 1914 was $11,022,643.

Agriculture. Of an approximate land area of 35,363,840 acres in 1910, 21,060,066 acres were in farms, of which 11,907,606 was improved land. The total number of farms was 177,127 and the average number of acres to the farm was 118.9, the average value per acre of farm land $43.30. The total value of all farm property, including land, buildings, implements and machinery, domestic animals, poultry, and bees, was $1,413,-118,785. Of the total number of farms 152,473 were operated by owners and managers and 24,-654 by tenants. The native white farmers numbered 107,180, the foreign-born white 69,356, and the negro and other nonwhite 591. Nearly fifty per cent of the foreign-born white farmers were born in Germany, and more than 15 per cent in Norway.

The following table shows the acreage, production, and value of some of the most important crops for 1915 as estimated by the United States Department of Agriculture.

CROPS	Acreage	Prod in bu.	Value
Corn	1,775,000	40,825,000	$27,761,000
Wheat	205,000	4,662,000	4,429,000
Flaxseed	7,000	94,000	169,000
Oats	2,150,000	99,975,000	35,991,000
Rye	420,000	7,770,000	6,760,000
Potatoes	298,000	25,926,000	11,667,000
Hay	2,576,000	*4,508,000	44,629,000
Barley	656,000	23,288,000	13,041,000
Tobacco	41,000	†36,900,000	2,214,000
Buckwheat	18,000	234,000	194,000

* Tons. † Pounds

The total value of all crops in 1909 was $148,-359,216. The leading crops are hay and forage, oats, corn, barley, and potatoes. According to the thirteenth census there were devoted to hay and forage 3,079,102 acres which yielded 5,002,-644 tons valued at $40,866,396. The acreage of oats was 2,164,570 and the production 71,349,038 bushels valued at $28,663,257; the acreage of corn 1,457,652 and the production 49,163,034 bushels valued at $25,727,654; the acreage of barley 816,449, and the production 22,156,041 bushels valued at $12,682,136; the acreage of potatoes 290,185 and the production 31,968,195 bushels valued at $7,917,754. Tobacco had an acreage of 40,458 and a production of 46,909,182 pounds valued at $3,855,033. Rye covered 339,-213 acres and had a production of 4,797,775 bushels valued at $3,163,520. The acreage of vegetables (other than potatoes) was 70,123 and their value $4,593,865.

The total acreage of small fruits was 6305 and the production 9,782,779 quarts valued at $765,-437. Most important among such fruits were strawberries, cranberries, and raspberries. Orchard fruits had a production of 2,343,517 bushels valued at $2,087,202; more than nine-tenths of the product were apples. The production of grapes amounted to 701,329 pounds valued at $25,537. The total value of the maple sirup and maple sugar made in 1909 was $150,-038. The production of sugar beets was 127,526 tons valued at $667,185. Some 13,735 tons of sorghum cane was grown from which 139,667 gallons of sirup valued at $83,026 was made.

Live Stock and Dairy Products.—The total value of livestock on farms in 1909 was $153,700,-250. According to the estimates of the United States Department of Agriculture there were (Jan. 1, 1916) on the farms 712,000 horses valued at $88,288,000; mules, 3000 valued at $360,000; milch cows, 1,675,000 valued at $92,125,000; cattle other than milch cows, 1,313,000 valued at $33,088,000; sheep, 664,000 valued at $3,519,000; swine, 2,142,000 valued at $19,278,000. The total value of milk, cream, and butter fat sold, and butter and cheese made, was $53,868,028. The milk sold amounted to 297,251,969 gallons valued at $28,640,661; the butter made amounted to 27,200,509 pounds valued at $7,101,237. The

total number of foals of all kinds on the farms was 9,433,110 and their value $4,468,703.

Forest Products. Wisconsin, formerly of first rank in the production of lumber, had, by reason of depleted forests, dropped to eighth rank in 1909. The rough lumber cut in that year amounted to 2,025,038 M feet B. M., the laths numbered 299,845 thousand, the shingles 392,863 thousand. Of the total cut 1,399,398 M feet B. M. was soft wood, of which 709,347 M feet were hemlock and 612,327 M feet white pine. The chief hard woods in order of importance were birch, basswood, maple, oak, and elm. Considerable quantities of spruce, cedar, tamarack, beech, and ash were also cut. In addition to the figures quoted above there were produced on the farms of the State forest products valued at $9,559,428.

Fisheries. The three fishing districts of the State named in order of importance are the Lake Michigan District, the Mississippi River District, and the Lake Superior District, the value of the output of the first named being more than double that of the other two combined. The gross value of equipment and other capital was $1,100,000 in 1908, and was about evenly divided between boat and shore and vessel fisheries. The industry gave employment to 2011 persons in that year. The most important species caught together with the value of the catch in 1908 are: lake trout ($340,000), lake herring ($322,000), and Buffalo fish ($103,000). The total value of all products was $1,067,000.

Manufactures. Wisconsin ranked eighth in gross value of manufactured products in 1909, in which year the total value of such products per capita was $253. The following table gives the principal figures relative to manufactures of the State as a whole and the 10 leading industries.

SUMMARY OF MANUFACTURES FOR 1909 AND 1904

THE STATE — TEN LEADING INDUSTRIES.

INDUSTRY	Census	Number of establishments	PERSONS ENGAGED IN INDUSTRY: Total	PERSONS ENGAGED IN INDUSTRY: Wage earners (average number)	Capital	Wages	Value of products	Value added by manufacture
					Expressed in thousands			
All industries . . .	1909	9,721	213,426	182,583	$605,657	$93,905	$590,306	$243,949
	1904	8,558	173,572	151,391	412,647	71,472	411,140	183,885
Lumber and timber products	1909	1,020	37,134	34,093	68,309	16,059	57,979	32,382
	1904	777	36,961	34,457	48,456	16,674	58,531	33,948
Foundry and machine-shop products.	1909	444	28,075	24,219	86,898	14,601	54,124	31,590
	1904	362	17,469	15,330	48,390	8,589	31,370	17,747
Butter, cheese, and condensed milk	1909	2,630	5,161	2,863	9,766	1,877	53,843	5,837
	1904	2,360	4,479	2,298	5,897	1,328	29,995	3,589
Leather, tanned, curried, and finished	1909	32	7,977	7,548	49,412	3,988	44,668	9,839
	1904	33	5,905	5,556	30,409	2,687	25,845	5,974
Liquors, malt . . .	1909	136	6,076	5,061	69,683	3,045	32,126	24,228
	1904	139	5,612	4,872	53,349	2,860	28,692	23,507
Flour-mill and gristmill products.	1909	322	1,931	1,184	10,663	695	31,667	4,629
	1904	389	2,096	1,351	10,546	720	28,352	3,596
Slaughtering and meat packing	1909	48	2,263	1,890	6,629	1,042	27,217	3,814
	1904	23	1,762	1,580	4,887	782	16,569	2,497
Paper and wood pulp . .	1909	57	7,878	7,467	33,738	3,891	25,962	9,269
	1904	52	6,627	6,338	24,409	2,988	17,844	7,152
Furniture and refrigerators .	1909	114	12,161	11,118	21,229	5,136	18,656	9,861
	1904	107	10,353	9,702	16,340	3,750	12,370	6,605
Cars and general shop construction and repairs by steam-railroad companies.	1909	22	9,419	8,994	3,279	5,234	14,332	5,656
	1904	30	5,745	5,444	3,916	3,128	6,512	3,441

The lumber and timber industry is the most important, and in 1909 gave employment to 18.7 per cent of the wage earners and contributed 9.8 per cent of the total value of products. (See *Forest Products.*) Foundry and machine-shop products are more important than apparent from the table below. Many machine shops manufacture distinct products, such as automobiles, etc., and were given individual classification under the Thirteenth Census. Wisconsin ranks first in the production of butter and cheese and condensed milk. Of these, butter and cheese constitute 95.6 per cent of the value of products. The principal products of the leather industry are shoe and harness leather. The hides consumed in this industry amounted to 2,471,848 valued at $16,373,708, while of skins 6,986,673 were used valued at $12,379,806. The State contributed, in 1909, 8.6 per cent of the total value of malt liquors and 25.1 per cent of the malt produced in the United States, ranking third among the States in the production of the one and second in the other.

The average number of wage earners was 182,583, of whom 159,101 were male, 5267 of the total were under sixteen years of age. For more than five-sixths of the wage earners the prevailing hours of labor were from 54 to 60 per week. The eighteen cities having over 10,000 population reported 61.8 per cent of the value of manufactured products and 62.3 per cent of the wage earners. Milwaukee, by far the most important of the cities, gave employment in 1909 to 59,502 wage earners and yielded products valued at $208,323,630. Racine gave employment to 8381 wage earners and had an output valued at $24,672,669; Kenosha gave employment to 6449 wage earners yielding products valued at $23,181,672. Other important manufacturing cities are Oshkosh, La Crosse, Sheboygan, Fond du Lac, Appleton, and Superior. See articles on these cities.

Transportation. Water transportation is supplied Wisconsin by its long coast lines on Lakes Michigan and Superior, and in the interior by the Mississippi and St. Croix rivers on the western boundary and the Fox River between Green Bay and Lake Winnebago. The railroads cover the State rather evenly, centring particularly about Grand Rapids and Madison. The total mileage of main track in 1915 was 7518, the most important roads and their mileage being

the Chicago and Northwestern, 2168; the Chicago, Milwaukee, and St Paul, 1796, the Minneapolis, St. Paul, and Sault Ste. Marie, 1351

Banking. A general banking law was passed in 1852, and in 1903 a State banking department was created with a commissioner of banking at its head. The condition of the banks in 1915 is shown in the following table:

	National banks	State banks	Savings banks
Number	136	653	5
Capital	18,115,000	18,095,450	
Surplus	8,376 000	5,450,223	103,040
Cash, etc....	7,953,000	6,934,967	12,109
Deposits...	147,830,000	169,914,288	2,043,219
Loans	123,879,000	145,374,840	1,184,110

Government. The present constitution was formulated in 1847 and 1848, but has been amended in important particulars. Amendments may be proposed in either house of the legislature, but to become a part of the constitution must be carried by a majority of both houses, agreed to by the next succeeding legislature, and approved by the voters at large A majority of the members of both houses may recommend to the electors to vote for or against a constitutional convention at the next election of the members of the legislature. If a majority of the electors vote affirmatively the legislature at its next session provides for calling such a convention.

Legislative.—The legislative power is vested in the Senate and Assembly. The Assembly must never number less than 54 members, nor more than 100. The Senate consists of not more than one-third, or less than one-fourth of the number of the members of the Assembly Members of the Assembly are chosen biennially, on the Tuesday following the first Monday of November.

Executive.—The executive power is vested in a governor and lieutenant governor, who hold office for two years. Other executive officers are secretary of state, treasurer, and attorney-general, who are elected at the same time as the governor.

Judiciary.—The judicial power of the State is vested in a supreme court, circuit courts, courts of probate, and justices of the peace. Justices of the Supreme Court are elected for a term of ten years; circuit judges for six years, probate judges for four years, and justices of the peace for two years. The State is divided into twenty judicial circuits.

Suffrage and Elections.—Every male person of the age of 21 years or upwards, who is a citizen of the United States, or if of foreign birth has declared his intention to become a citizen prior to Dec. 1, 1908, and who has resided in the State for one year preceding the election, and in the election district at least 10 days, is entitled to vote. Women have the privilege of voting in school elections. Candidates for the various State offices and for the Senate and Assembly, nominated by each political party at the primary, and the State senators who "hold over," meet at the Capitol, for the purpose of formulating the State platform of their party and electing a State central committee. General elections are held on the Tuesday succeeding the first Monday in November in even-numbered years. Judicial and school elections are nonpartisan. The use of voting machines is permitted. There is a stringent corrupt practices law which prohibits one candidate from contributing to the campaign fund of another candidate; limits the purposes for which candidates may expend money, and compels candidates to file monthly sworn statements of moneys received and expended

Local and Municipal Government.—Towns are governed by an annual town meeting, at which all officers required by law are elected. County officers are: county clerk, treasurer, sheriff, clerk of the circuit court, district attorney, coroner, register of deeds, surveyor, and superintendent of schools, all elected for two years. Cities may be governed by special or general charter, or, if they so elect, by commission form of government. In all cities the mayor is the chief executive officer and head of the police and fire departments.

Miscellaneous Provisions.—The Industrial Commission administers all labor laws, factory regulations, and the workman's compensation act. Hours of labor for women are strictly regulated. The employment of children under 14 years, and in some occupations under 16 years, is prohibited. There also is a minimum wage law and a law providing for mothers' pensions. The sale of intoxicating liquor is regulated by local option in towns, villages, and cities.

Finance. The constitution places the usual restrictions upon all expenditures. The State, with the assent of a majority of all members elected to either branch of the Legislature, may contract a public debt to defray extraordinary expenses, but the amount must not exceed $100,000. A debt of $2,251,000, incurred during the Civil War, is held by the various State educational funds. The State has no bonded debt. The chief sources of revenue are the taxes on railroads, life and fire insurance companies, and inheritances. The total receipts for the year ending July 1, 1915, amounted to $19,431,931, the disbursement $19,789,188. On July 1, 1914, there was a balance on hand of $4,300,854, and on July 1, 1915, one of $3,945,597.

Militia. The males of militia age in the State in 1910 numbered 497,922. The organized militia was composed in 1915 of 896 enlisted men and 52 officers. It included three regiments, a separate battalion of infantry, a troop of cavalry, a battery of field artillery, and four detachments of sanitary troops.

Population. The population at each Federal census was: 1840, 30,945; 1850, 305,391; 1860, 775,881; 1870, 1,054,670; 1880, 1,315,497; 1890, 1,693,330; 1900, 2,069,042; 1910, 2,333,869. The population for 1915 was 2,473,533; 1920, 2,632,067. The average number of persons to the square mile in 1910 was 42.2. The urban population, i.e., that in places of 2500 or more, was 1,004,320. The native whites of native parentage numbered 763,225; the native whites of foreign or mixed parentage 1,044,761; the foreign-born whites 512,569; the negro and other nonwhites 13,305. Of the foreign-born population 45.5 per cent were born in Germany, 11.1 in Norway, 7.5 in Austria, and 5 8 in Russia. Of the nonwhites 10,142 were Indians. Of the native born 85.6 per cent were born in the State, 2 5 per cent in Illinois, and 2.3 per cent in New York. By sex the population was divided into 1,208,578 males and 1,125,282 females. The males of voting age numbered 683,743. There were, in 1910, 23 cities with a population of 8000 or more. Those having more than 15,000, together with their population for 1910 and 1915 (estimated) are: Milwaukee, 373,857 and 428,062; Superior, 40,384

and 45,285, Racine, 38,002 and 45,507, Oshkosh, 33,062 and 37,581, La Crosse, 30,417 and 31,522, Sheboygan, 26,398 and 28,211; Madison, 25,531 and 30,084, Green Bay, 25,236 and 30,084; Kenosha, 21,371 and 30,319, Fond du Lac, 18,797 and 20,736, Eau Claire, 18,310 and 18,727, Appleton, 16,773 and 17,663, Wausau, 16,560 and 18,778; Beloit, 15,125 and 17,597.

Education. Wisconsin has one of the best school systems in the Union. There were in the State, in 1910, 57,769 persons 10 years or over who could not read or write The percentage of illiteracy among native whites was 0.6 Among native whites of foreign or mixed parentage 1.0, and among foreign-born whites 11.1 per cent. The total school population ages 6 to 20 in 1910 was 732,544. Of these 484,629 attended school. The school population in 1915, according to the reports of the State superintendent of education, numbered 782,246, of which 464,108 were enrolled in all the schools The total number of public-school teachers was 15,531, of whom 13,839 were women. The rural schools numbered 6635, the State graded schools 542, free high schools 324, independent high schools 12. The total enrollment in the high schools was 41,823. The total amount expended for the common schools in 1914 was $15,410,868. The Department of Public Instruction handles the administrative side of school supervision while the State Board of Education, a body created by the Legislature of 1915, will have charge of school finances The schools are visited by supervising teachers, of whom in 1915 there were 81 Agriculture is taught in the high schools, and provision is made for the consolidation of districts where desirable. There are normal schools at Eau Claire, La Crosse, Milwaukee, Oshkosh, Plattville, River Falls, Stevens Point, Superior, and Whitewater. The University of Wisconsin is a part of the educational system of the State. Other institutions of collegiate rank are Beloit College at Beloit, Lawrence College at Appleton, Milton College at Milton, Mission House at Plymouth, Ripon College at Ripon, Carroll College at Waukesha. These are all coeducational. Concordia College at Milwaukee is for men only, as is Marquette University, a Roman Catholic institution, at Milwaukee Milwaukee-Downer College is the only college exclusively for women in the State.

Charities and Corrections. The charitable and correctional institutions of the State include the State Hospital for the Insane at Mendota, Northern Hospital for the Insane at Winnebago, Milwaukee Hospital for the Insane at Wauwatosa, School for the Deaf at Delavan, School for the Blind at Janesville, Hospital for the Criminal Insane at Waupun, Industrial School for Boys at Waukesha, the State Prison at Waupun, the State Public School at Sparta, the Home for Feeble-minded at Chippewa Falls, the State Reformatory at Green Bay, and the State Tuberculosis Sanatorium at Wales These institutions are managed by the State Board of Control. Persons who are convicted for the first time of felony may be placed under probation. An industrial home for women and a home for feebleminded and epileptics were authorized by the Legislature of 1913. Convicts in the State prison are employed in the construction of highways. The total expenditures for the maintenance of the charitable and penal institutions of the State for the year ending June 30, 1915, were $1,526,415.

Religion. The combined membership of organized religious bodies includes about half the population. The Roman Catholics outnumber the total communicants of the Protestant bodies, which rank in the following order of numerical strength: Lutherans, Methodists, and Congregationalists

History. At the time the region now included within the State was first made known to Europeans it was the borderland between the hunting grounds of the Algonquian tribes, which were gradually pushing westward, and the Dakotas or Sioux, the great body of whom already lay beyond the Mississippi. In 1634 Champlain, Governor of New France, dispatched Jean Nicolet, a *coureur de bois*, westward along the Great Lakes to make treaties with the remote tribes of Indians, and to encourage them to trade with the French Nicolet first set foot upon what is now the State of Wisconsin late in 1634 or early in 1635. He landed first at Green Bay, where he found a large Indian settlement, thence ascended the Fox River to a point beyond its passage through Lake Winnebago, and then turned southward. He probably proceeded as far south as the site of Chicago, and returned east by way of Lake Michigan. The next white explorers in the Wisconsin region of whom we have any record were Radisson and Groseilliers, two fur traders, who reached the country in 1658–59 They followed in the track of Nicolet, but probably crossed the Fox-Wisconsin portage and descended the latter river almost, if not quite, to its mouth. Recent investigations make it seem more than probable that they were actually the first discoverers of the Upper Mississippi. In the winter of 1661 they built a stockade on the south shore of Chequamegon Bay, near the present site of Ashland. On the same spot Father Allouez, in 1665, established the La Pointe Mission—the first in Wisconsin. Subsequently (1669) he built the Mission of St. Francis Xavier at the Rapides des Peres on the Fox River, on the site of the city of De Pere. Here was built the first church in Wisconsin, and about this mission grew up the first white settlement of any permanence In 1673 Louis Joliet and Jacques Marquette, setting out from the St. Francis Mission, sailed up the Fox and descended the Wisconsin to the Mississippi. In 1674 Marquette made a canoe trip from Green Bay to the site of what is now Chicago along the shores of Lake Michigan. In the years that followed the region became one of the principal fields of activity of the *coureurs de bois*, prominent among whom were Nicolas Perrot and Daniel de Grecylon du Luth, from whom the city of Duluth takes its name. La Salle (q.v.) thoroughly explored the Wisconsin region before he attempted his remarkable trip down the Mississippi. Although the region became dotted with trading posts and missions, there was no permanent settlement in Wisconsin until towards the middle of the eighteenth century, when the De Langlade family established themselves at Green Bay, the first permanent settlement. In the French and Indian War Charles de Langlade led a body of *coureurs de bois* and Wisconsin Indians to the aid of the French, and commanded them in the battle which resulted in Braddock's defeat. After the Revolution, in which De Langlade and the Wisconsin Indians remained true to the British, although by the terms of the treaty Wisconsin became part of the United States, the British continued to exercise authority in the region. Nor did Jay's treaty of 1794,

in spite of its provisions for the surrender of the outposts, result in a change of authority During the War of 1812 the French and Indians took the field against the Americans, and an expedition starting from the British fort at Green Bay assaulted and captured an American garrison at Prairie du Chien.

For a decade after the close of the war the fur trade remained the principal business of the inhabitants of the region between Lake Michigan and the Mississippi River, and the growth in population was slow, the number of white inhabitants as late as 1824 being not more than 6000 or 7000. The authority of the United States was firmly established in 1816, when several detachments of the regular army were sent into the Territory, and forts built at Green Bay (Fort Howard) and at Prairie du Chien. In 1820–21 several bands of Oneida and Brotherton Indians from New York State were settled in the Territory In 1822 the opening of the lead diggings in the southwestern part of the Territory was followed by an influx of immigrants, largely Southerners, many of whom brought their slaves with them. By 1828 the population of the lead region was over 10,000. An uprising of the Winnebago under Red Bird in 1825 was suppressed with little bloodshed, and no further trouble was experienced from the Indians until the outbreak of the Black Hawk War (q.v.) in 1832. After the defeat of Black Hawk a large immigration of agricultural settlers from New England and New York set in and the movement for the erection of Wisconsin as a separate Territory was begun in earnest. Wisconsin had formed a part of the old Northwest Territory from 1787 to 1800, of Indiana Territory from 1800 to 1805, of Michigan Territory from 1805 to 1809, of Illinois Territory from 1809 to 1818, and in the latter year was again placed under the jurisdiction of Michigan Territory. In 1836, on the admission of Michigan into the Union, Wisconsin—including then the present States of Iowa and Minnesota and parts of the Dakotas—was erected into a Territory. Belmont and Burlington were successively temporary territorial capitals; the Legislature met at Madison for the first time in 1838. The next decade was a period of wonderful growth in population. In 1844 at Ripon was founded "The Wisconsin Phalanx," a communistic settlement organized on the Brook Farm plan. This proved one of the most successful communities of the sort ever attempted. At about the same time a Mormon settlement was planted in Racine and Walworth counties.

In 1847, a bill having passed Congress for the admission of Wisconsin as a State, a constitutional convention was held, but the instrument drawn up was rejected by popular vote. In the following year a second constitution was prepared, submitted, and adopted, and Wisconsin was formally admitted to the Union May 29, 1848. The extensive German and Scandinavian immigration which began about 1840 increased annually for a dozen years after the admission of the State, and at one time, shortly after 1848, when the revolutionary movements of that year in Europe had driven thousands of cultured Germans to this country, the project was formed of concentrating German immigration in Wisconsin and making it a German State. The early history of the State was marked by scandals in connection with the sale of public lands and the granting of railroad charters, but before the outbreak of the Civil War a better tone pervaded political life. The antislavery sentiment in the State was strong, and at Ripon in 1854 began one of the earliest movements which resulted subsequently in the organization of the Republican party. In the same year occurred the noteworthy rescue of the fugitive slave Grover at Milwaukee, which resulted in prolonged litigation, one of the most interesting points of which was the development of a pronounced nullification sentiment among the Republican and Free-Soil elements of the population, and which reached its climax when the State Supreme Court decided that the Fugitive Slave Law was unconstitutional in the State. Wisconsin's share in the Civil War was noteworthy. The State furnished a total of 91,379 men, more than the required quota, the ratio being one man to every nine of its inhabitants. In 1871 the northeastern portion of the State was visited by destructive forest fires, and in 1894 the northwestern part of the State suffered from a similar visitation In 1886 labor riots at Milwaukee necessitated the calling out of the State militia, which came into armed conflict with the mob. The first Republican Governor was elected in 1856, when Coles Bashford was chosen after a bitter contest. Since that time the State has been Republican in every presidential election except that of 1892. Democratic fusion with the Greenback movement in 1874 resulted in the defeat of the Republican candidate for Governor, since which year, with the exception of 1890 and 1892, when the issue was again complicated by a school law which alienated the support of the Germans, the State has been regularly Republican. The Legislature of 1907 passed a public-utilities law. It has enacted stringent insurance legislation, which resulted in many important companies abandoning operations in the State after Jan. 1, 1908. In the presidential election in this year Taft received 247,747 votes, and Bryan 166,632. J. O. Davidson, Republican candidate, was elected Governor. In the congressional election of 1910 Victor Berger, a Socialist, was elected to the House of Representatives. In the State election held November 8, F C. McGovern, the Republican candidate, was elected Governor. In June, 1911, the Legislature passed a resolution calling on the United States to investigate the charges of corruption in the election of Senator Stephenson, and a committee on privileges and elections reported in January, 1912, that the charges of bribery and corruption had not been proved. In the presidential election of 1912 Wilson received 164,228 votes, Taft 130,695, and Roosevelt 62,460. In the elections of 1914 E. L. Philipp, Republican, was elected Governor.

GOVERNORS OF WISCONSIN

TERRITORIAL

Henry Dodge	1836–41
James Duane Doty	1841–44
Nathaniel P. Tallmadge	1844–45
Henry Dodge	1845–48

STATE

Nelson Dewey	Democrat	1848–52
Leonard J. Farwell	Whig	1852–54
William A. Barstow	Democrat	1854–56
Arthur McArthur (acting)		1856
Coles Bashford	Republican	1856–58
Alexander W. Randall	"	1858–62
Louis P. Harvey	"	1862
Edward Salomon	"	1862–64
James T. Lewis	"	1864–66
Lucius Fairchild	"	1866–72
Cadwallader C. Washburn	"	1872–74
William R. Taylor	Democrat-Greenback	1874–76
Harrison Ludington	Republican	1876–78

William P. Smith	Republican	1878–82
Jeremiah M. Rusk	"	1882–89
William D. Hoard	"	1889–91
George W. Peck	Democrat	1891–95
William H. Upham	Republican	1895–97
Edward Scofield	"	1897–1901
Robert M. La Follette	"	1901–06
J. O. Davidson	"	1906–11
F. G. [illegible]	"	1911–15
E. L. Philipp	"	1915–21
John J. Blaine	"	1921–

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WISCONSIN, University of. The highest institution of learning in the educational system of Wisconsin, situated at Madison. It was founded in 1838, organized in 1848, and opened for instruction in 1851. In 1865 the attendance was only 304, of which number all but 51 were preparatory students. In 1880 the preparatory department was abolished. The period of rapid expansion began about 1885, the number of students reaching 500 in the college year of 1886–87. In 1915–16 there were 612 on the regular force of instruction, and an attendance of more than 7500 students, nearly 5000 being in residence during the regular session. The institution is coeducational in all its departments. The College of Letters and Science is the centre of the institution, about which the technical work has grown up. The university includes undergraduate colleges of Agriculture and Engineering. The College of Engineering includes courses in civil engineering, mechanical engineering, electrical engineering, chemical engineering, and mining engineering. In the College of Letters and Science are included special courses in commerce, pharmacy, journalism, library training, chemistry, physical education, the training of teachers, and music. The College of Agriculture includes various courses in agriculture, and a four years' course in home economics. In advance of the undergraduate colleges are the Medical, Law, and Graduate schools. The medical school offers the first two years of a medical course: the law school a three-year course; and the graduate school opportunities for advanced study and research. All schools and colleges have a summer session. A special summer school for artisans and apprentices is in operation. The division of University Extension undertakes the function of disseminating useful knowledge as widely as possible. The university confers the baccalaureate degree in arts, science, law, and philosophy, the Master's degree in arts and science, the Doctor's degree in philosophy, and the degrees of Civil, Mechanical, and Electrical Engineer. The university grounds, of remarkable beauty, cover about 1000 acres, and extend for several miles along the shores of Lake Mendota. There were in 1915 39 large buildings devoted to the work of teaching and investigation, besides a number of buildings upon the farm. In 1915 the estimated value of the buildings and equipment was over $5,000,000. The State Historical Library building was completed at a cost of $650,000, and is one of the finest and best-appointed library buildings in the United States. It contains the library of the State Historical Society, 191,047 volumes; the library of the university, 213,595 volumes; the library of the Wisconsin Academy of Sciences, Arts, and Letters, 5000 volumes; and many thousands of unbound documents and pamphlets. The income of the university for the year 1914–15 was $2,758,118. Tuition is free to all students from the State of Wisconsin. The president in 1916 was Charles R. Van Hise, Ph.D. Consult E. E. Slosson, *Great American Universities* (New York, 1910).

WISCONSIN RIVER. The principal river in the State of Wisconsin. It rises on Lac Vieux Desert, lying directly on the boundary line between Michigan and Wisconsin, and flows southwest for about 300 miles to the city of Portage, where it turns sharply westward and flows west and southwest to the Mississippi at Prairie du Chien, Wis. (Map: Wisconsin, D 5). Its entire length is about 429 miles and its drainage basin includes about 12,280 square miles. Lac Vieux Desert is about 1650 feet above the sea and the river at its mouth is at an elevation of about 604 feet. Between Rhinelander and Nekoosa, 150 miles, the fall is 634 feet, an average of more than four feet to the mile. The river is navigable to Portage.

WISDOM, Book of. See Solomon, Wisdom of.

WISE, Daniel (1813–98). A Methodist Episcopal clerical author. He was born in Portsmouth, England, came to America in 1833, and was a pastor (1837–52), editor of *Zion's Herald* (1852–56), and corresponding secretary of the Sunday School Union and Tract Society of his church (1856–72). The rest of his life was spent in literary work. Part of his duty as secretary was to edit all the publications of the society. His published works include more than 40 titles. The best known are: *The Path of Life* (1847); *The Saintly and Successful Worker* (1879); *Heroic Methodists of the Olden Time* (1882); *Our Missionary Heroes and Heroines* (1884); *Young Knights of the Cross* (1887); and *Faith, Hope, Love, and Duty* (1891).

WISE, Henry Alexander (1806–76). An American political leader, born at Drummondtown, Accomac Co., Va., Dec. 3, 1806. He graduated at Washington College, Pa., in 1825, was admitted to the bar in 1828, and settled in Nashville, Tenn., the same year, but returned to Accomac County in 1830. He was elected to Congress in 1832 as a Jacksonian Democrat and was twice reëlected. On the question of the

rechartering of the United States Bank he broke with the Jackson administration, and became a Whig, but was sustained by his constituents. After his first election in 1832 he fought a duel with his competitor for the seat in Congress. He was reelected to Congress as a Whig in 1837, serving till 1841, and was reelected as a Tyler Democrat in 1843. Wise was active in securing the nomination of John Tyler as Vice President in 1840 From 1844 to 1847 was Minister to Brazil. After his return he identified himself with the Democratic party, and in 1855, after a remarkable campaign, he was elected Governor of Virginia over the Know-Nothing candidate. During his administration the John Brown raid occurred, and one of the last acts of his term was the signing of Brown's death warrant. Wise was a member of the Virginia secession convention of 1861, and opposed immediate secession Upon the withdrawal of the State from the Union, however, he joined the Confederate army as brigadier general and afterward was promoted to the rank of major general He took part in the campaigns of western Virginia, commanded at Roanoke Island, and was present at Appomattox. After the war he resumed his law practice, and wrote an historical work entitled *Seven Decades of the Union* (1872). He died Sept. 12, 1876. Consult his *Life* (New York, 1899), written by his grandson, B H. Wise.

WISE, Henry Augustus (1819–69). An American naval officer and author, born in Brooklyn, N. Y. He entered the navy in 1834. During the Mexican War he was lieutenant on board the razee *Independence,* and took part in the operations in the Gulf of California. In the Civil War he served for a time on board the *Niagara* off Charleston, was promoted to the rank of commander in 1862, and served during the remainder of the war as assistant chief of the Bureau of Ordnance and Hydrography. He was promoted captain in 1866, and while on leave of absence died at Naples Under the pseudonym of Harry Gringo he wrote: *Los Gringos, or an Interior View of Mexico and California, with Wanderings in Peru, Chili, and Polynesia* (1849); *Tales for the Marines* (1855); *Scampavias, from Gibel-Tarek to Stamboul* (1857); *The Story of the Gray African Parrot* (1859); and *Captain Brand of the Centipede* (1860–64).

WISE, Isaac Mayer (1819–1900). An American rabbi and educator, born at Steingrub, Bohemia. He graduated at the University of Vienna in 1843 and became a rabbi at Radnitz. So advanced were his opinions in both religion and politics that he decided to seek a land of greater liberalism, and went to the United States in 1846. His first charge was at Albany, N. Y., and from 1854 until his death he was rabbi of the Congregation Bene Yeshurun, Cincinnati. Here he became a recognized leader of progressive Judaism. In 1854 he established *The Israelite* (subsequently *The American Israelite*) and afterward *Die Deborah* (published in German) and the Chicago *Israelite.* He remained the editor of these publications, and was president of the Hebrew Union College, which he founded at Cincinnati in 1873, up to the time of his death. In 1889 he organized the Central Conference of American Rabbis and became its president. His works include: *History of the Israelitish Nation* (1854), severely criticized by both Jews and Christians and said to be the first rationalistic account of Judaism in English; *Origin of Christianity* (1870); *Judaism Its Doctrines and Duties* (1872). *The Martyrdom of Jesus of Nazareth* (1874); *The Cosmic God* (1876); *Judaism and Christianity* (1883), *Reminiscences* (1901).

WISE, John (c 1652–1725) A New England clergyman and author, born in Roxbury, Mass. He graduated at Harvard in 1673, and in 1683 settled in Ipswich as pastor of the Second Church, where he remained until his death. He was noted for great physical strength and for moral and intellectual courage. In 1688 he resisted the tyranny of Andros and was in consequence fined and imprisoned. When Andros was expelled, Wise came to the front as a legislator, and in 1690 he accompanied as chaplain Sir William Phips's expedition against Canada. He is chiefly noted for the democratic stand he took against the Mathers in the ecclesiastical controversies that marked the opening of the eighteenth century. His liberal views were presented with much force and eloquence in two treatises, in *The Churches' Quarrel Espoused* (1710) and, more fully, in *A Vindication of the Government of New England Churches* (1717)—both of which were reissued on the eve of the Revolutionary and the Civil wars Consult M. C. Tyler, *History of American Literature,* vol. ii (new ed., New York, 1897).

WISE, Stephen Samuel (1872–). An American liberal Jewish rabbi, born at Budapest, Hungary. In 1887–91 he studied at the College of the city of New York, and in 1892 graduated from Columbia (Ph.D., 1901). He served as pastor of the Congregation of the Madison Avenue Synagogue, New York (1893–1900), and of Beth Israel, Portland, Oreg (1900–06), and in 1907 founded the Free Synagogue of New York, of which he was thenceforth rabbi. Besides gaining a great reputation as an eloquent preacher, Rabbi Wise became widely known as a publicist and as a leader in social welfare work. During the European War he took a stand opposed to increased military preparations on the part of the United States. In addition to editorial contributions to the *Survey* and other journals, his writings include *The Ethics of Solomon Ibn Gabirol* (1901), and *Beth Israel Pulpit* (2 vols.) and *Free Synagogue Pulpit* (2 vols.), collections of sermons.

WISEMAN, Nicholas Patrick Stephen (1802–65). An English Roman Catholic prelate. He was born at Seville, of an Irish family. He was brought to Ireland in his childhood, and received his education at the College of St. Cuthbert at Ushaw, near Durham, and at the English College at Rome. He received holy orders at Rome in 1824, and was appointed professor of Oriental languages in the University of the Sapienza, 1828, in recognition of the value of his *Horæ Syriacæ,* and in the end of that year was named rector of the English College. It was while he held this office that he delivered his *Lectures on the Connection of Science and Revealed Religion* (1836). But in England he first became known by a series of lectures on *The Principal Doctrines and Practices of the Catholic Church,* delivered at Moorfields Church (1836; 3d ed., 1851). In 1836 he established, in concert with Daniel O'Connell, the *Dublin Review,* to which Wiseman, even while residing abroad, was a regular contributor. In 1840 he was named coadjutor vicar apostolic of the central district of England, with the title of

Bishop of Melipotamus. At the same time he was appointed president of St Mary's College, Oscott, where he took up his residence. In 1850, when the Roman Catholic hierarchy in England was restored by the Pope, he was made Archbishop of Westminster and cardinal. Protestant England generally regarded the assumption of territorial titles by Catholic prelates as illegal, and excitement ran high, but Wiseman published an explanatory address of great ability and moderation, yet firmly asserting the strictly constitutional rights of his fellow Catholics, entitled *An Appeal to the Reason and Good Feeling of the People of England on the Subject of the Catholic Hierarchy* (1850), which did much to mitigate the excitement. He published numerous volumes upon controversial and literary topics, but they are mostly forgotten. Two, however, seem destined to live: *Recollections of the Last Four Popes* (Pius VII, Leo XII, Pius VIII, and Gregory XVI) (1858), and *Fabiola, or the Church of the Catacombs* (1854), the best-known Roman Catholic story in English upon this theme. Consult: W. P. Ward, *Life and Times of Cardinal Wiseman* (new ed., 2 vols., New York, 1900); Fitzgerald, *Fifty Years of Catholic Progress* (London, 1900); W. P. Ward, *Ten Personal Studies* (ib., 1908); Paul Thureau-Dangin, *English Catholic Revival in the Nineteenth Century*, Eng. trans. by Wilfrid Wilberforce (rev. ed., 2 vols., New York, 1916).

WISE MASTERS, THE SEVEN. See SEVEN WISE MASTERS.

WISE MEN OF THE EAST. See COLOGNE, THREE KINGS OF.

WISHART, wĭsh'ẽrt, GEORGE (c.1513–46). A Scottish reformer and martyr. He was probably born in 1513 at Pittarrow, and is thought to have studied Greek at Montrose. He is known to have taught the New Testament in Greek at the same place. In 1538 he fled from Scotland to escape persecution for heresy and was absent for about six years. From 1539 or 1540 to about 1543 he was in Germany and Switzerland, and on his return translated the *Confession of Faith of the Church and Congregation of Switzerland.* In 1543 he was teaching in Corpus Christi College, Cambridge, with Latimer and other reformers. In the same year or the following he returned to Scotland. The last two years of his life were spent in preaching in various parts of Scotland, in Dundee, Montrose, Ayrshire, and East Lothian. He hastened back to Dundee when he learned that the plague was raging there. When driven from the churches he preached in the fields. His most important convert and disciple was John Knox, who has left a detailed account of these two years of his life. Wishart was burnt for heresy by Cardinal Beaton, March 1, 1546, at St. Andrews. Three months later Beaton was murdered, principally in revenge for Wishart's death. Consult John Knox, *History of the Reformation*, in *Works*, ed. by David Laing (Edinburgh, 1846–64); Rogers, *Life of George Wishart the Scottish Martyr* (ib., 1876).

WISHAW, wĭsh'ą. A town in Lanarkshire, Scotland, 13 miles east-southeast of Glasgow, near the South Calder Water (Map: Scotland, E 4). Its growth and importance are due to its collieries, blast furnaces, iron and steel works, etc. Pop., 1901, 20,869; 1911, 23,742.

WISHOSKAN, wĭsh'ŏs-kan. See WIYAT STOCK.

WISH'RAM. See CHINOOK.

WISLER (wĭs-lẽr) **MENNONITES.** See MENNONITES.

WISLICENUS, vĭs'le-tsī'nus, GUSTAV ADOLF (1803–75). A German theologian, one of the leaders of the Free Congregations (q.v.). He was born at Battaune, Prussian Saxony, studied theology at Halle, and as member of the Burschenschaft was sentenced in 1824 to 12 years' confinement in a fortress. He was pardoned in 1829 and continued his studies in Berlin. After 1841, pastor at Halle, he became associated with the "Friends of Light," and in consequence of a lecture delivered at Kothen in 1844 was deprived of his pastorate in 1846. Henceforth preacher of the free congregation at Halle, his pamphlet *Die Bibel im Lichte der Bildung unserer Zeit* caused him to be sentenced to two years' imprisonment, in 1853, when he fled to America, lectured at first in Boston and in 1854 established a school at Hoboken, N. J. Returning to Europe in 1856, he opened a school at Zurich, where he wrote his principal work, *Die Bibel, fur denkende Leser betrachtet* (2 vols., 1863–64; 2d ed., 1866).

WISLICENUS, JOHANNES (1835–1902). A German chemist, born at Kleineichstadt, Prussian Saxony, a son of Gustav Adolf Wislicenus (q.v.). He studied at Halle, then went with his father to the United States, and for a time was an assistant at Harvard. In 1861 he became professor in the canton school of Zurich, in 1864 was called to the university there, and in 1870 became professor in the Polytechnic Institute at Zurich, of which in the following year he was made director. A year later he was called to Wurzburg, and in 1885 to Leipzig. He did valuable work on the alcohols, on lactic acid, and on acetic ether. Among his larger works are *Theorie der gemischten Typen* (1859) and *Lehrbuch der Chemie* (9th ed., 1876–81).

WISMAR, vĭs'mär. A seaport of the Grand Duchy of Mecklenburg-Schwerin, Germany, at the head of a bay of the same name, one of the best harbors of the Baltic, 18 miles north of Schwerin (Map: Germany, D 2). It has manufactures of tobacco, sailcloth, machinery, paper, malt liquors, and sugar. Shipbuilding and fishing are important industries. Pop., 1900, 19,758; 1910, 24,376. Wismar was the capital of Mecklenburg from 1256 to 1358 and a Hanseatic town of importance. In 1648 it passed to Sweden and in 1803 to Mecklenburg-Schwerin, Sweden, however, retaining certain rights which were not renounced till 1903.

WISSLER, CLARK (1870–). An American anthropologist, born in Wayne Co., Ind. He graduated from Indiana University in 1897, later studied at Columbia (Ph.D., 1901), and, after two years as an instructor in education at New York University (1901–02), returned to Columbia to be assistant in anthropology (1903–05) and lecturer (1905–09). From 1903 to 1906 he served as assistant in ethnology and thereafter as curator of anthropology in the American Museum of Natural History. Besides contributing to the NEW INTERNATIONAL ENCYCLOPÆDIA, he published *The Correlation of Mental and Physical Tests* (1901), *North American Indians of the Plains* (1912), and anthropological papers on the Blackfoot and Sioux Indians.

WISSMANN, vĭs'män, HERMANN VON (1853–1905). A German-African explorer, born at

Frankfort-on-the-Oder. He entered the army and became lieutenant in 1874. In 1880, with Paul Pogge (q.v.) he set out from St. Paul de Loanda on the west coast of Africa, discovered the Batwa pygmies, and reached Nyangwe in April, 1882. Thence Pogge returned to the west coast, but Wissmann kept on eastward and reached Zanzibar. In 1883–85 he explored the region of the Kassai River and other parts of the Congo Basin for the Belgian government, and in 1886–87 traveled from Lubuku on the Congo to Mozambique, by way of Nyangwe and lakes Tanganyika and Nyassa. In 1889–90, as Imperial commissioner, he suppressed the Arab uprising in German East Africa. In 1892 he failed in an attempt to take two steamers to the Victoria Nyanza via lakes Nyassa and Tanganyika. In 1895–96 he was Governor of German East Africa. He wrote: *Im Innern Afrikas* (3d ed., 1891); *Unter deutscher Flagge quer durch Afrika*, 1880–83 (7th ed., 1890); *Meine zweite Durchquerung Aequatorial-Afrikas vom Kongo zum Zambesi während der Jahre 1886 u. 1887* (1890); *Schilderungen und Ratschläge zur Vorbereitung für den Aufenthalt und den Dienst in den deutschen Schutzgebieten* (1895). Consult Ruhle, *Hermann von Wissmann* (Münster, 1892); Perbandt and others, *Deutschlands grösster Afrikaner* (Berlin, 1906).

WISSOWA, wĭs-sō'vȧ, GEORG (1859–). A German classical philologist, born at Breslau. In 1895 he became professor at Halle. He is distinguished for his studies in the field of Roman religion, and was editor of Pauly's *Real-Encyclopädie der classischen Altertumswissenschaft* (2d ed., 8 vols., 1892–1907). His more important works are: *De Veneris Simulacris Romanis* (1882); *Säkularfeier des Augustus* (1894); *Religion und Kultus der Römer* (1902; 2d ed., 1912); *Tertulliani Opera*, vol. i (1890); *Gesammelte Abhandlungen zur römischen Religions- und Stadtgeschichte* (1904); *Bestehen und Vergehen in der römischen Literatur* (1908). He also edited the second edition of Marquardt's *Römische Staatsverwaltung*, vol. iii (1885).

WISTAR, wĭs'tar, CASPAR (1761–1818). An American physician, born in Philadelphia, of German extraction. He graduated in medicine at the University of Edinburgh in 1786, and in 1789–92 was professor of chemistry and physiology at the College of Philadelphia. This institution in the latter year united with the medical department of the University of Pennsylvania, and Wistar was made adjunct professor of anatomy and surgery. In 1808 he became full professor and remained such till his death. In 1815 he succeeded Thomas Jefferson as president of the American Philosophical Society, and held the position until his death. He published, among other works, *A System of Anatomy* (1811–14), the first book on anatomy published in the United States. The Wistar Institute of Anatomy and Biology at the University of Pennsylvania was named for him, and also the wistaria vine.

WISTARIA, wĭs-tā'rĭ-ȧ (Neo-Lat., named in honor of Caspar Wistar, q.v.). A genus of climbing deciduous shrubs of the family Leguminosæ. The species have drooping racemes of bluish flowers, for which they are commonly grown against the walls of houses or over arbors and trellises. Some of them are among the most magnificent ornamental climbers known in flower gardens. The Chinese wistaria (*Wistaria chinensis*), the finest and most popular cultivated species, produces long clusters of showy blue flowers. It sometimes blossoms a second time in the fall. There are white, double-flowered, and variegated-leaved horticultural varieties. This species is not hardy in the northern United States. The American wistaria (*Wistaria frutescens*) produces clusters of dark blue flowers a little later in the season than the foregoing species. Wistarias grow in almost any soil and are propagated by seeds, layers, cuttings, and division. The young shoots are frequently layered in the summer and the young plants separated from the parent plant the next spring.



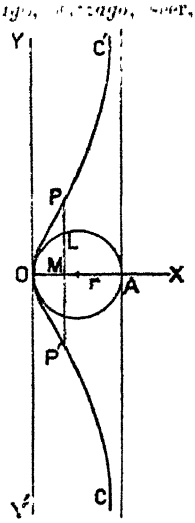
AMERICAN WISTARIA.

WISTER, OWEN (1860–). An American author, born in Philadelphia. He graduated at Harvard in 1882 and at the Harvard Law School in 1888, and was admitted to the Philadelphia bar in 1889, but after 1891 devoted himself almost wholly to literature. His stories, some of which deal with Western life and character, are skillfully and entertainingly written and became widely popular. He was elected to the American Academy of Arts and Letters. Besides contributing short stories and verse to the magazines, he published: *The Dragon of Wantley: His Tail* (1892; new ed., 1902); *Red Men and White* (1896); *Lin McLean* (1898); *The Jimmy John Boss and Other Stories* (1900); *U. S. Grant, a Biography* (1900); *The Virginian* (1902); *Benjamin Franklin* (1904), in the "English Men of Letters Series"; *Philosophy Four* (1903), a short story; *A Journey in Search of Christmas* (1904); *Lady Baltimore* (1906), southern in setting; *How Doth the Simple Spelling Bee* (1907); *The Seven Ages of Washington* (1907); *Members of the Family* (1911); *Padre Ignacio* (1913); *The Pentecost of Calamity* (1915), on the European War. Consult F. T. Cooper, *Some American Story Tellers* (New York, 1911).

WITAN, wĭt'an. A term frequently used for the national council in Anglo-Saxon England, more formally known as the Witenagemot (q.v.).

WIT AT SEVERAL WEAPONS. A comedy by Beaumont and Fletcher, possibly with assistance from Middleton, produced in 1614, printed in 1647. It gives a humorous picture of contemporary London life. Fleay suggests that it is an alteration of the *Devil of Dowgate*.

WITCH (AS. *wicca*, wizard, *wicce*, witch, probably from **wigja*, **wigiu*, **wiggā*, OHG. *wīzago*, *wīzagā*, seer, soothsayer, magician, from AS., Goth. *witan*, OHG. *wizzan*, Ger. *wissen*, to know, connected with Lat. *videre*, Gk. *ἰδεῖν*, *ἰδεῖν*, OChurch Slav. *vědětĭ*, Skt *vid*, to see, know) (versiera). A higher plane curve. It resembles somewhat the shell-shaped branch of the conchoid (q.v.) and is defined as follows. The locus of a point P so taken on the perpendiculars to the diameter OA of a circle that in the figure $\frac{LM}{PM} = \frac{MA}{OA}$. If r is the radius of the circle, the Cartesian equation of the witch referred to the axis OX, OY in the figure is $y_2 = \frac{4r^2x}{2r - x}$ (See COORDINATES.) The curve is symmetric with respect to the X-axis, lies between the Y-axis and the line $x = 2r$, and has the line $x = 2r$ as an asymptote (q.v.) to its two infinite branches. The area of the witch is four times that of the auxiliary circle and has 4-point contact (see CONTACT) with the circle at the origin.



Consult: Aubry, in the *Journal de mathématiques spéciales* (Paris, 1895); Loria, "Versiera visiera e pseudoversiera," in *Bibliotheca Mathematica* (Leipzig, 1897), Brocard, *Notes de bibliographie des courbes géométriques* (Bar-le-Duc, 1897, 1899).

WITCH, THE. A comedy by Thomas Middleton, produced about 1621, and printed in 1778 from a manuscript in the Bodleian Library. The plot is from Machiavelli's *Florentine History*, and from R. Scott's *Discovery of Witchcraft*.

WITCH BROOMS. Peculiar tufted shoots upon various trees, especially conifers, produced by certain parasitic fungi. The branches ordinarily have their structure modified, becoming larger and softer in texture. The direction and mode of branching is altered, and the number of branches much increased. The tufts of branches are often very conspicuous. See ASCOMYCETES; MALFORMATION.

WITCHCRAFT (AS. *wiccecræft*, *wiccræft*, from *wicce*, *wicca*, wizard, witch + *cræft*, OHG. *chraft*, Ger. *Kraft*, strength, power, art). The art and trade of a witch or of a wizard. In primitive society witchcraft is not always differentiated from the legitimate exercise of magical art or other powers derived from a supernatural source. The Ute of Utah and southern Colorado did not distinguish one class of benevolent and another of malevolent practitioners but put to death any medicine man who failed to cure his patient. To the Plains Indians such a method of procedure was unthinkable. Any unusual powers were attributed by the Crow Indians to the revelation of a supernatural being. If their possessor used them against a personal enemy, the aggrieved would have recourse to another medicine man but never thought of taking the law into his own hands, nor were any shamans of supposedly evil designs set apart in a distinct category. Where a classification occurred, the cleavage might follow quite different lines. Thus, the Ojibwa and related Algonquian tribes recognized one group of doctors who knew the properties of herbs and extracted malignant spirits from the body by the aid of slender tubes; another class that was immune to the effects of heat and fire; a third that practiced prophesy; a secret order that promoted the safety of the soul after death; while in addition to such arts any of the aforementioned, and the laity as well, might practice sympathetic and imitative magic to cause love, lure game, or wreak vengeance on an enemy. Nevertheless, even in primitive conditions the line is often drawn according to whether the practitioner promotes the general welfare or only his private interests. Thus, the Eskimo angakok is a shaman blessed by a guardian spirit and enabled to divine the cause of misfortune and to visit the deity controlling human destiny, while the practitioner of witchcraft uses parts of corpses and other objects to exercise sympathetic magic. The European conception of witchcraft is, however, most clearly prefigured in Africa. Throughout the Sudanese and Bantu Negro area the sorcerer suspected of evil practices is subjected to a formal juridical investigation that usually takes the form of a poison ordeal and suggests corresponding mediæval European usages.

That in Rome the witch was also exposed to the public vengeance is manifest from the account which Horace gives in his fifth Epode of Canidia, whom he threatens with stoning at the hands of the people. Her crimes form a curious parallel to those ascribed to her class in modern times, and show that these accusations depended on world-old superstition. She is made to devise the death of a boy, who is buried to the neck in the earth, and mocked by the offer of food out of his reach, to the end that the marrow of the victim, being full of desire, may be used as a love charm. Her rites included invocation of the gods below, the use of the poison of a toad, the plumage of birds of darkness, and the sprinkling of water from Acheron; yet it is not to be supposed that Horace, herein like all his contemporaries of the higher class, actually believed in the efficacy of such witchcraft. There could be no general prohibition by law of a trade which corresponded to that of the accepted augur (see AUGURIES AND AUSPICES), and enchantment, when directed against individuals with murderous intent, would be criminal exactly as any other attack on their welfare. Considering that the employment of such practitioners was universal, and their activity must constantly have been intended to destroy, it is singular that legal proceedings offer few processes. Evidently the lawgivers and judges were not in sympathy with the popular fear and indignation, and were inclined to regard the business as one followed by charlatans.

This laxity of the law was handed down to Christian time. The opinion of the Church oscillated between contempt of witchery as a delusion and abhorrence of it as a form of intercourse with evil spirits. One opinion was that belief in the existence of such power was in itself heretical, and that Christians were bound to believe in the impotence of magicians. During the Middle Ages the Church had little to do with promoting the punishment of witches,

who suffered rather from the fury of the populace, or at times from the severity of secular authority. The accepted punishment, as in the case of heresy, was by fire. These punishments were sporadic, and involved no systematic attempt to suppress the practice. It is one of the anomalies of history that the legal crusade against witchcraft should be modern, belonging to the time of the Renaissance. The impulse was religious, and witchcraft was identified with heresy, as consisting in converse with the source of all evil. With this movement the Inquisition had much to do, and the bull *Summis desiderantes*, of Innocent VIII, in 1484, gave the occasion for unexampled severity. The composition by Sprengel, one of the Inquisitors appointed by Innocent, of the *Malleus Maleficarum*, or *Hammer of Witches*, gave precision and fixed form to the charges of witchcraft. The weight of accusation now consisted, not in the evil use made of the enchanter's power, but in every exercise of that power; the witch was punished as an idolater and servant of Satan. This attitude was promoted by the imperfectly understood language of the Bible, in which witchcraft was identified with the worship of idols, and by the command of Exod xxi 18, "Thou shalt not suffer a witch to live." Judicial procedure, by the employment of torture, placed in the hands of the judge a means to enforce confession of any charges he might please to approve. Very soon, therefore, a body of evidence was constructed, supported apparently by irresistible experience. The accusations took a definite form, which was repeated with uniform persistency. The supposed witches were made to confess that they were able to fly through the air on brooms or by the aid of their familiar spirits, and thus to resort to desolate localities, where they held a Sabbath, or religious festival, in the presence of Satan, to whom they offered worship, and with whom they had criminal relations. The character of the services at the Sabbath consisted in the Black Mass, a parody and inversion of the ceremony of the mass; homage was paid to the demon in the shape of goat, dog, or ape; the worshipers held lighted candles and spat on the ground; a banquet was attended with sacrifice of children and cannibalism, and the whole meeting concluded with an orgy. Herein lies an important source of modern Satanism (q.v.). The witches, who at all times might call on the aid of their Satanic master, were supposed to have the power of transformation (especially into cats and hares), and could torment persons whom they wished to injure by thrusting invisible needles into their flesh. Accusations were multiplied by malicious intentions, and in many cases a charge of witchcraft was only a method of getting rid of an enemy or of confiscating the property of the rich. During two centuries the destruction was terrible; one judge of Nancy is said to have put to death 800 culprits in six years; at Toulouse 400 perished in a single execution; in the city of Treves alone 7000 perished. In Great Britain a peculiarly bad record belongs to Scotland. In England the law enacted in 1603 against those "making invocation or conjuration of any evil and wicked spirit, or taking up any dead person with view to employing in sorcery, or practicing witchcraft," remained on the statute book for a century. Examinations were conducted in the spirit of pure superstition; one way of ascertaining guilt was by forcing the witch to swim, it being believed that the devotee of Satan would be lighter than water. Certain bodily marks, insensible to pain, were supposed to indicate guilt, and were sought by pricking with a needle.

At all times there were incredulous persons, but their disbelief was generally held to be synonymous with atheism, this was the attitude of Luther, and of John Wesley as late as 1768. In America prosecutions for witchcraft during the seventeenth century occurred in Massachusetts, Connecticut, Virginia, and elsewhere, but the only extensive panic was that which prevailed at Salem, Mass., in 1692, near the end of the delusion, being especially nourished by the extravagant opinions of Cotton Mather The accusations were only an echo of those credited through Europe, but the colony soon became ashamed of its credulity. In England the last trial for witchcraft was that of Jane Wenham in 1712, who was not put to death; in Scotland an execution took place in 1722, and the witchcraft statute was repealed in 1735. Among the people belief in witches continued, and has hardly become extinct even yet.

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WITCH HAZEL (*Hamamelis virginiana*). A North American shrub or small tree of the family Hamamelidaceæ. It sometimes attains a height of 20 or 30 feet. The clustered, yellow, showy flowers appear in very late autumn; the fruits ripen the following year. The English name is derived from the supposed virtues of a forked twig as a divining rod. A fluid extract made from the leaves is used as a tonic, sedative,

and astringent. The bark, which is similarly employed, contains tannin, resin, and a volatile oil, is bitter and astringent, and has a sweetish



WITCH HAZEL.

pungent taste. Several investigators have failed to find any active physiological properties in it.

WITCH HILL. See GALLOWS HILL.

WITCH OF ATLAS, THE. A poem written 1819–20, by Percy Bysshe Shelley, and published in London in 1824.

WITCH OF EDMONTON, THE. A play by Rowley, Dekker, and Ford, acted in 1623 and printed in 1658.

WITCH OF ENDOR. See ENDOR.

WITENAGEMOT, wĭt'ĕ-nä-gĕ-mōt', or **WITAN** (AS., assembly of counselors). The supreme council of the English nation in Anglo-Saxon times. Each of the separate kingdoms in the so-called heptarchy (q.v.) had its Witenagemot, and when the kingdoms were brought under a common overlord he had his Witenagemot. The members of the Witenagemot were usually the King, the bishops, the ealdormen, and the dependents of the King, who were called ministri, or thanes. It is probable that the Witenagemot was earlier a much larger body, and that the less wealthy and less powerful members ceased to attend because of the expense or from lack of interest. The actual numbers recorded as present on various occasions are not large. Stubbs regards the Witenagemot of the year 966 as a fair example; there were present then the King's mother, 2 archbishops, 7 bishops, 5 ealdormen, and 15 ministri. The Witenagemot participated in the enactment of laws, both civil and ecclesiastical; assented to grants of land; was a court of last resort; gave its consent for extraordinary taxation; advised as to the determination of war and peace; consented, in theory, to the appointment of ealdormen and possibly of bishops; and elected and sometimes deposed the kings. Kemble gives some canons about the power of the Witenagemot. His first, which, as Stubbs says, "is large enough to cover all the rest," is: "First, and in general, they [the members of the Witenagemot] possessed a consultative voice and a right to consider every public act which could be authorized by the King." Its actual power would vary inversely with that of the King; under a strong King the Witenagemot would tend to become merely his council. Especially so if the King had, as seems, the right of packing the Witenagemot by introducing more ministri. Consult: E. A. Freeman, *History of the Norman Conquest* (5 vols., Oxford, 1872–79); J. M. Kemble, *History of the Anglo-Saxons in England*, vol. ii (London, 1876); Rudolf Gneist, *History of the English Constitution* (Eng. trans., ib., 1891); Sir William Stubbs, *Constitutional History of England*, vol. i (6th ed., Oxford, 1897); H. M. Chadwick, *Studies on Anglo-Saxon Institutions* (Cambridge, 1905).

WITHER, wĭTH'ẽr, or **WITHERS,** wĭTH'-ẽrz, GEORGE (1588–1667). An English poet, born at Bentworth, near Alton, in Hampshire. He spent two years at Magdalen College, Oxford (1604–06), but left without a degree. In 1610 he settled in London as a student of the law and made the acquaintance of the poet William Browne (q.v.). He published *Mournful Elegies* (1612) on the death of Prince Henry, and a collection of *Epithalamia* (1613) on the marriage of Princess Elizabeth with the Elector Palatine. A volume of satires, entitled *Abuses Stript and Whipt* (1613), led to his imprisonment for a few months in the Marshalsea. To Browne's *Shepherd's Pipe* (1614) he contributed two eclogues, and wrote, while in prison, the beautiful *Shepherd's Hunting* (pub. 1615), containing the famed address to Poesy. To about the same time belongs *Fidelia* (pub. 1617), the lament of a maiden forsaken by her lover. To the edition of 1619 was added the precious lyric beginning "Shall I, wasting in despair." This poem was followed by "Fair Virtue, or the Mistress of Philarete" (1622, but composed much earlier), the last of his pure lyrics. Wither now turned to religious verse, publishing the *Songs of the Old Testament*, to each of which was added "a new and easie Tune" (1621), and *Hymns and Songs of the Church* (1623); both volumes had considerable vogue. He collected his early poems under the title *Juvenilia* (1622; revised 1626; 2d ed., 1633). Religious verse was continued in *The Psalms of David* (1632), *Emblems* (1635), and *Haleluiah* (1641).

Joining Parliament against King Charles I, Wither sold his estates and raised a troop of horse (1642). Though unsuccessful in the field, he was appointed major. He took an important hand in the scurrilous pamphlets known as *Mercuries* and squandered his fine talents. After the Restoration he was sent to Newgate and then to the Tower for a verse pamphlet called *Vox Vulgi*. He remained in prison from March 24, 1662, till July 27, 1663. Most of Wither's works were issued by the Spenser Society (20 parts, Manchester, 1870–83). Consult: Selections from *Poems of Wither*, ed. by Henry Morley, in *Companion Poets* (London, 1891); *Fidelia* and *Fair Virtue*, ed. by E. A. Arber, in *English Garner*, vols. iv and vi (ib., 1882–83); T. H. Ward, *English Poets*, vol. ii (ib., 1880); and Charles Lamb's essay entitled "Poetical Works of Goerge Wither," in *Works* (ib., 1818; new ed., New York, 1903). The poems of Wither, under the title *The Poetry of George Wither* (London), were excellently edited by F. Sidgwick in 1902.

WITHERITE, wĭTH'ẽr-īt. A carbonate of barium occurring in orthorhombic crystals of pseudohexagonal shape. It is mined at Fallowfield, England.

WITHERS, wĭTH'ẽrz, HARTLEY (1867–). A British financial expert. He was educated at Westminster School and at Christ Church, Ox-

ford, and served as an assistant master at Clifton College in 1890. In 1891–93 he was a clerk on the stock exchange, in 1894 entered the city office of the London *Times*, of which he was city editor in 1905–10, and held the corresponding position on the London *Morning Post* in 1910–11. Withers then entered the employment of Seligman Brothers, bankers, and in 1915 became director of financial enquiries in the Treasury. His writings include *The Meaning of Money* (1909; 3d ed., 1912); *Stocks and Shares* (1910); *Money-Changing* (1913); *Poverty and Waste* (1914); *War and Lombard Street* (1915).

WITHERSPOON, wĭth'ĕr-spōōn, HERBERT (1873–). An American basso, born at Buffalo, N Y. While pursuing academic studies at Yale University he also studied harmony and theory with Horatio Parker, and later with MacDowell, and singing he studied with M. Treumann and W. J Hall of New York. He made his début in recital in New Haven in 1895, and the next year appeared as soloist with the New York Symphony Orchestra. After further study with Dubulle, Faure, and Bouhy in Paris he made his operatic début in 1898 as Ramfis in *Aida* with the Castle Square Opera Company of Boston. In 1908 he became a member of the Metropolitan Opera, appearing principally in Wagnerian rôles He gained equal reputation as a dramatic, oratorio, and concert singer.

WITHERSPOON, JOHN (1723–94). An American Presbyterian clergyman and statesman. He was born at Gifford, Scotland, graduated at the University of Edinburgh in 1742, and served as minister of several parishes in Scotland from 1745 to 1768, winning a high reputation. In 1768 he became president of Princeton College in New Jersey and held the position till his death. During the suspension of the college by the war he was a member of the constitutional convention of New Jersey in 1776, and for six years of the Continental Congress; he advocated and signed the Declaration of Independence and the Articles of Confederation; was an active member of the board of war, visiting the camps to increase the comfort of the troops. When the college was reopened he lectured on moral philosophy and rhetoric. He visited England in 1783 and 1784 to solicit funds, but without much success. For the last two years of his life he was blind. His works were collected at New York in four volumes (1800–01), and at Edinburgh in nine volumes (1804). Among them are: *Ecclesiastical Characteristics* (1753); *Essay on Justification* (1756); *Serious Inquiry into the Nature and Effects of the Stage* (1757); *Essays on Important Subjects* (1764); and *Authority of the British Parliament* (1774). A memoir by his son-in-law, the Rev. Samuel S. Smith, prefaced the New York edition of his works and also appeared separately (New York, 1795). Consult: J. Sanderson, *Biography of the Signers of the Declaration of Independence* (Philadelphia, 1865); *Proceedings at the Unveiling of the Statue of John Witherspoon*, edited by W. P. Breed (ib., 1877); D. W. Woods, *John Witherspoon* (New York, 1906).

WITHERSPOON, JOHN A. (1864–). An American physician, born at Columbia, Tenn. He graduated M.D. from the University of Pennsylvania in 1887. Settling in Nashville, Tenn., he was from 1889 a member of the medical faculty of Vanderbilt University, where he accepted the chair of clinical medicine, and from 1889 to 1894 was also connected with the University of Tennessee. He was president of the American Medical Association in 1913–14

WITHINGTON, wĭth'ĭng-tŭn. A town in Lancashire, England, 4 miles southeast of Manchester, of which it is a residential suburb and with which its chief public industries are connected. Pop., 1901, 36,201, 1911, 41,578

WITHROW, wĭth'rō, WILLIAM HENRY (1839–1908). A Canadian author, born at Toronto, and educated at Victoria College and at Toronto University where he graduated in 1863. He entered the Methodist ministry in 1864 and served on various circuits till 1874, when he became editor of the *Canadian Methodist Magazine*. Among his published works are: *The Catacombs of Rome* (1874, and several editions); *Worthies of Early Methodism* (1878); *The Romance of Missions* (1879); *Valeria, the Martyr of the Catacombs* (1880); *Barbara Heck: a Story of the Founding of Upper Canada* (1882); *Life in a Parsonage* (1882); *A Popular History of the Dominion of Canada* (1886); *The Native Races of North America* (1893); *Makers of Methodism* (1898); *Religious Progress of the Century* (1900); *The Underground Railway* (1903).

WITIZA, wē-tē'zà, or BENEDICT OF ANIANE, à'nyàn' (750–821). A French monk, born in Languedoc. He entered the Benedictine Order in 774, and five years later founded a monastery on the banks of the river Anianus. He devoted himself chiefly to the task of reforming the order by restoring its original principles, and Louis the Pious appointed him supervisor of all Frankish monasteries and decreed that the adoption of the rules advocated by Benedict should be binding upon the Benedictine Order throughout France. He was canonized upon his death in 821, the 12th of February being dedicated by the Roman Catholic church to his memory.

WITKOWITZ, vĭt'kō-vĭts. A town of Moravia, Austria, near Mährisch-Ostrau. It is noted for its extensive iron works. Pop., 1900, 19,128; 1910, 20,756.

WITMER, wĭt'mĕr, LIGHTNER (1867–). An American psychologist and educator, born in Philadelphia. He graduated from the University of Pennsylvania in 1888, and studied at Leipzig (Ph.D., 1892). At the former institution he served as assistant professor (1892–1904), and thereafter as professor of psychology. In addition he lectured at Bryn Mawr College in 1896–98, was psychologist of the Pennsylvania Training School for Feebleminded Children at Elwyn, Pa., after 1896, and gave courses on psychology at Lehigh University in 1903–05. In 1907 he founded and edited *The Psychological Clinic* He published *Analytical Psychology* (1902), and, in championship of Scott Nearing (q.v.). *The Nearing Case* (1915).

WITNESS (AS. *witnes*, from *witan*, to know). One who gives testimony in a judicial proceeding. The term is commonly used to denote any one who has knowledge of a fact sufficient to testify thereto. Thus the persons who are present at the execution of a formal instrument, such as a deed or will, are called witnesses. By statutes a certain number are usually required who must affix their signatures to make the instrument legal. The term is also used to include those who make affidavits. In a strict legal sense it means only those who

give oral testimony before a court. Legislatures frequently compel the attendance of witnesses before committees, but the investigations of such legislative committees partake of the nature of judicial proceedings. The attendance of a witness is compelled by the issue of a subpœna from the court requiring him to appear. If he fails to obey, he may be punished for contempt and his person attached and brought before the court. In some jurisdictions he is liable for damages to the party subpœnaing him. He must have been properly served and paid his legal fee for attending and traveling to and from court, the amount of which is fixed by statutes. He is free from civil arrest and service of summons while so attending or coming and going. If he is to bring books or papers with him he must be served with what is known as a subpœna duces tecum. Attendance may be compelled only of witnesses within the jurisdiction of the court. Thus the service of a subpœna of the court of one State outside the State or in a foreign country would be of no avail. By courtesy the courts of other States will compel the attendance of witnesses before duly appointed commissioners to take testimony. The giving of testimony in the interest of truth and justice has always been considered one of the highest public duties, and every safeguard surrounds the fulfillment of that duty. Commissions are also issued to take the testimony of aged or infirm persons or those about to leave the jurisdiction of the court. The question as to who may or may not become witnesses belongs properly to the law of evidence (q.v.). Under Roman law women and slaves could not act as witnesses to a will. Minors and women convicted of adultery could not testify. Heretics were not allowed to testify in England. Under the Canon law excommunicated persons were disqualified. It may be generally stated that the English and American law evolving from the Roman and Ecclesiastical law has gradually assumed and is still assuming a more liberal point of view. Now the only general competency is understanding. Even children may be allowed to testify when they do not understand the value of an oath. See CONTEMPT; DIES NON; EVIDENCE; HOLIDAY, JURISDICTION; OATH; PERJURY, SERVICE OF PAPERS AND PROCESS; SUBPŒNA, SUNDAY.

WITS, THE. A popular comedy by Sir William Davenant, generally considered his masterpiece, produced in 1633, printed in 1636.

WITT, CORNELIUS DE. See DE WITT, CORNELIUS.

WITT, JAN DE. See DE WITT, JAN.

WITT, vĭt, **OTTO NIKOLAUS** (1853–1914). A German chemist. He was born in St Petersburg and studied chemistry in Zurich, where he received the degree of Ph.D. At first, turning his attention to industrial chemistry, he served in technical establishments in Germany, Switzerland, and England, but in 1885 he was appointed professor of technical chemistry in the Royal Technical School in Charlottenburg, Berlin, of which he also served as rector during 1898. His contributions to our knowledge of dyestuffs were very great, his work including the preparation of chrysoidine and the tropäolins. In the azine series he discovered the eurhodines and eurhodols, and prepared a number of new safranines and higher indulines. He discovered in 1881 the indophenols and also prepared their leuco compounds. Witt was president of the Fifth International Congress of Applied Chemistry in 1903 and served on the juries of the international expositions at Chicago (1893) and Paris (1900). The German Chemical Society made him its permanent president and he received numerous decorations and other honors. He contributed largely to the literature of technical chemistry in varied fields, founded, and also edited for many years, the journals *Prometheus* and *Die Chemische Industrie*, and published *Chemische Homologie und Isomerie in ihrem Einflusse auf Erfindungen aus dem Gebiete der organischen Chemie* (1889) and *Chemische Technologie der Gespinstfasern, ihre Geschichte, Gewinnung, Verarbeitung, und Veredlung* (1888; new ed. with L. Lehmann, 1910–12).

WITTE, vĭt'e, **KARL** (1800–83). A German jurist and Dante scholar, born at Lochau, near Halle. At the age of 10 he began studying at Leipzig, continuing at Göttingen, Giessen, and Heidelberg. Rejected for extreme youth at 16 as privatdocent (Berlin), he was sent on a fellowship to Italy. Appointed lecturer on jurisprudence at Breslau in 1821, he became professor there in 1823 and at Halle in 1834. In collaboration with Kannegiesser, he published a translation with commentary of Dante's lyric poems (2d ed., 1842), and prepared a critical edition of the *Divina Commedia* (1862), which was followed by a metrical translation in blank verse, with commentary (3d ed., 1876). He also edited *De Monarchia* (2d ed., 1874) and *Vita nuova* (1876), translated Boccaccio's *Decamerone* (3d ed., 1859), and wrote *Alpinisches und Transalpinisches* (1858), and *Danteforschungen* (2 vols., 1869, 1870).

WITTE, vĭt'tĕ, **SERGEI YULIEVITCH, COUNT** (1849–1915). A Russian statesman. He was born at Tiflis, where his father, of German extraction, was an official. His mother was a daughter of Fadeev, Governor of Saratov, who married into one of the oldest Russian noble families. Witte was educated at the University of Odessa. He engaged in journalism, in 1870 entered the railway service, and during the Russo-Turkish War (1877–78) distinguished himself in managing the transportation of troops on the Odessa Railway. In 1879 he was appointed to an executive position on the Southwestern Railway. He was a member of Baranov's Imperial railway commission. In 1883 he published *Principles of Railway Tariffs*. In 1886 he became director of the Southwestern Railway, and in 1888, through Finance Minister Vishnegradsky, chief of the Imperial Railway Department and president of the tariff commission. He was appointed Minister of Communications in 1892 and soon afterward succeeded Vishnegradsky as Minister of Finance. He promoted industrial development, favored protection of home industries, introduced the gold standard, and established government monopoly of the sale of vodka. Witte increased the revenue and negotiated large loans abroad, particularly in France. These were used partly for railway extension, especially trans-Siberian. He concluded commercial treaties with Germany and Austria-Hungary. In 1903 he was removed from his post as Minister of Finance and was appointed president of the Committee of Ministers. He exercised little power during the war with Japan. In August, 1905, however, he came to the United States as senior Russian

plenipotentiary to negotiate peace with Japan, and at the Portsmouth Conference succeeded in obtaining for Russia terms far more favorable than it had been thought Japan would grant. (See RUSSO-JAPANESE WAR.) On his return to Russia he was created count, and by force of the liberal upheaval then in full sweep (see RUSSIA) was once more placed in a position of power. He obtained from the Czar the manifesto of Oct. 30, 1905, and became the first Russian Prime Minister.

Witte's tenure of the premiership was disturbed by liberal opposition and disagreements with the crown, and his resignation was accepted the next year. Afterward he spent much time abroad. Witte was regarded as a supporter of the Jews. His second wife was a Jewess.

WITTEKIND, wĭt'ē-kĭnd, or **WIDUKIND,** wĭd'u-kĭnd (?–c.807). A Westphalian chieftain, the most celebrated leader of the Saxons against Charles the Great. When most of the Saxon nobles submitted to the Frankish King, at the Imperial Diet at Paderborn, in 777, Wittekind fled to Siegfried, King of Jutland, whose sister Geva he is said to have married. In 778 he returned, and while Charles was absent in Spain, began to lay waste the Rhine country. In 782 he may have participated in the attack upon and annihilation of the Frankish army at the Suntelberg—an act for which Charles took frightful vengeance by the execution of 4500 Saxons at Verden. On this, all the Saxon tribes rose in arms, and the war was again led by Wittekind until 785, when Charles entered into negotiations with him, the result of which was that Wittekind repaired to the King's camp at Attigny in Champagne, and received baptism. After that he appears no more in history. According to the legend, however, that is still current among the people in Westphalia, Charles promoted Wittekind to be Duke of the Saxons, and made over Enger to him. From his castle, called Babilonie, situated in the neighborhood of Lubeck, he is said to have ruled with gentleness and justice till 807, when he met his death in a campaign against Duke Gerold of Swabia. His tomb was shown in the parish church of Enger, in the County of Ravensberg, where Charles IV in 1377 erected a monument to him. On Oct. 18, 1812, another monument in his honor was erected at Minden by the Westphalian Society. The higher of the two hills which form the Westphalian gates on the Weser, near Minden, bears the name of Wittekindsberg. Consult: Wilhelm Diekamp, *Widukind, der Sachsenführer, nach Geschichte und Sage* (Münster, 1877); Johann Dettmer, *Der Sachsenführer Widukind nach Geschichte und Sage* (Wurzburg, 1879); J. I. Mowbert, *Charles the Great* (New York, 1888).

WITTEN, vĭt'ten. A town in the Province of Westphalia, Prussia, on the Ruhr, 31 miles northeast of Cologne (Map: Germany, B 3). Coal is mined in the surrounding district, and there are extensive manufactures of machinery, iron, steel, glass, wire ropes, chemicals, beer, leather goods, soap, and wagons. Pop., 1910, 37,450.

WITTENBERG, vĭt'ten-bĕrk. A town of the Province of Saxony, Prussia, on the Elbe, 55 miles southwest of Berlin (Map: Germany, E 3). It is celebrated as the cradle of the Reformation, and the seat of the university in which Luther was professor, and which was incorporated with that of Halle in 1817. In the Schlosskirche (restored 1885–92) are the tombs of Luther and Melanchthon. Upon the doors of this church, replaced by new ones of metal in 1858, Luther hung up his 95 theses against the doctrine of indulgences. The house of the great reformer, almost unaltered, and the houses of Melanchthon and Cranach are preserved. In the market place is a bronze statue of Luther by Schadow, not far from which is also one of Melanchthon; and outside the Elster Gate a spot is pointed out where Luther burned the Papal bull. Manufactures of woolen and linen goods, hosiery, machinery, essential oils, pottery, cement, bricks, electrical apparatus, and leather are carried on. Wittenberg was down to 1422 the capital of the electors of Saxony of the Ascanian line. Later it was the residence of the electors of the Ernestine line. (See SAXONY.) The Elector Frederick the Wise founded the university in 1502. Pop., 1900, 18,333; 1910, 22,419.

WITTENBERG (wĭt'en-bûrg) **COLLEGE.** An educational institution at Springfield, Ohio, founded by the Lutherans of Ohio in 1845. Women are admitted to the undergraduate courses on the same terms as men. The institution maintains a preparatory school, with a summer school of methods and reviews, a school of expression, elocution, and oratory, a conservatory of music, and a theological seminary. In 1916 the faculty numbered 30, and the students in all departments 1119. The library contained 22,000 volumes. The productive funds amounted to about $650,000. The president in 1916 was C. G. Heckert, D.D.

WITTHAUS, wĭt'hous, RUDOLPH AUGUST (1846–1915). An American toxicologist, born in New York City. He graduated from Columbia University in 1867, and from the medical department of New York University in 1875; studied in the Sorbonne and the College of France; and was professor of chemistry and toxicology at the universities of New York, Vermont, and Buffalo successively, and at Cornell (1898–1911). He acted as toxicological expert in several famous criminal cases. His publications include: *Essentials of Chemistry* (1879); *Manual of Chemistry* (1879; 6th ed., 1908), *General Medical Chemistry* (1881); and *Laboratory Guide in Urinalysis and Toxicology* (1886). With T. C. Becker he also edited *Medical Jurisprudence, Forensic Medicine, and Toxicology* (2d ed., 4 vols., 1906–11), to which he contributed the introduction and vol. iv.

WITTY FAIR ONE, THE. A comedy by James Shirley (q.v.), licensed in London Oct. 3, 1628, printed in 1633.

WITU, vē'tōō. A nominally independent sultanate on the east coast of Africa, forming a part of the Tanaland Province of the British East Africa Protectorate. The area is about 1200 square miles and the population about 10,000, mostly Swahili. The Sultan rules but the government is conducted by the British resident. Near the capital, Witu, are valuable forests of timber suitable for furniture. Witu has a good harbor in Manda Bay. From 1885 to 1890 the district was a German protectorate.

WITWATERSRAND, wĭt-wă'tērs-rănt (South African Dutch, White-Waters Range). A gold-mining district in the southern part of the Transvaal, the most productive in the world, extending some 40 miles along a low range of hills known by the same name (Map: Cape of Good Hope, H 5). The gold-bearing conglomer-

ate or basket was first discovered in 1885, and active mining operations began two years later, when the output amounted to 23,000 ounces of gold. Since this date the development of the gold mines has proceeded very rapidly, as is well shown by the growth of the town of Johannesburg, which is situated near the centre of the district and which in 1911 contained 237,104 inhabitants, of whom 119,953 were whites. The gold is found in certain mineralized beds called reefs formed of quartz pebbles cemented by silica, iron oxides, and pyrites. In the principal series of deposits there are as many as three separate auriferous beds which have an aggregate width of 5 or 6 feet and carry about one-half an ounce or $10 per ton in gold. While the ore is low grade, the great extent of the deposits both laterally and in depth has permitted its exploitation on a large and very profitable scale. In 1913 there were 83 mines engaged in productive operations Up to the end of 1913 the total output of the Witwatersrand was 187,656,000 tons of ore from which gold to the value of $1,530,035,105 was extracted It has been estimated by high authorities that the deposits lying within 6000 feet of the surface will yet produce gold to the value of $6,000,000,000, and there is every probability that mining will be carried on below that depth. No other district in the world is known to have such enormous stores of gold. See TRANSVAAL; GOLD.

WIT WITHOUT MONEY. A comedy by Fletcher, produced about August, 1614, and printed in 1639.

WIYAT (wē'yăt) **STOCK.** A small tribe of Indians constituting a linguistic family, sometimes designated as Wishoskan, residing on the coast of northern California about Humboldt Bay. In culture they resemble the Hupa (q.v.), except that they depend more upon sea food. They numbered 152 in 1910.

WIZARD OF THE NORTH. A title frequently given to Sir Walter Scott.

WLADISLAW, vla-dĭs'läf. See JAGELLONS.

WOAD, wōd (AS. *wād, waad,* OHG. *weit,* Ger. *Waid, Wait,* woad), *Isatis* A small genus of plants of the family Cruciferæ, mostly natives of the Mediterranean region. Dyer's woad (*Isatis tinctoria*) is a biennial herb about 3 feet high, with much-branched leafy stems and small yellow flowers. It was formerly cultivated for its large root leaves, which furnish a blue dye now largely replaced by indigo. The leaves when cut are reduced to a paste, fermented in heaps for about two weeks, and then formed into balls for sun drying. These balls, which have an agreeable odor and are blue internally, are subjected to a further fermentation before being used. Woad is generally used with indigo. Woad should not be confused with weld, *Reseda luteola,* which yields a yellow dye.

WOAD'WAX'EN. See DYER'S BROOM.

WOBBERMIN, vôb'ĕr-mēn, (ERNST GUSTAV) GEORG (1869–). A German Protestant theologian, born at Stettin. He studied at Halle in 1888–90, and at Berlin in 1890–94, and traveled in Greece and Asia Minor in 1896–97. He became a privatdocent at Berlin (1898), professor at Marburg (1906), professor of systematic theology and the philosophy of religion at Breslau (1907), and subsequently was called to Heidelberg. His works include: *Religionsgeschichtliche Studien zur Frage der Beeinflussung des Urchristentums durch das antike Mysterienwesen* (1896); *Theologie und Metaphysik* (1900), *Der christliche Gottesglaube in seinem Verhaltnis zur gegenwartigen Philosophie* (1902; 3d ed., 1911); *Ernst Haeckel im Kampf gegen die christliche Weltanschauung* (1906); *Aufgabe und Bedeutung der Religionspsychologie* (1910); *Monismus und Monotheismus* (1911), *Zum Streit um die Religionspsychologie* (1913), *Die religionspsychologische Methode in Religionswissenschaft und Theologie* (1913).

WOBURN, wŭŭ'bûrn A city in Middlesex Co., Mass., 10 miles north-northwest of Boston, on the Boston and Maine Railroad (Map: Massachusetts, E 3) It is attractively laid out and has many handsome residences The public library is the most noteworthy building in the city. It contains about 50,000 volumes and a valuable art collection. The industrial interests of Woburn are chiefly confined to the manufacture of leather and leather machinery. Large chemical works are situated at North Woburn. Woburn was settled as Charlestown Village in 1640; was incorporated as a town in 1642, and chartered as a city in 1888. From its original territory several townships have been created Woburn was the birthplace and early home of Benjamin Thompson, Count Rumford. Pop, 1900, 14,254; 1910, 15,308; 1915 (State census), 16,410; 1920, 16,574. Consult Sewall, *History of Woburn* (Boston, 1868), and Hurd, *History of Middlesex County* (Philadelphia, 1890).

WODEHOUSE, JOHN, first EARL OF KIMBERLEY. See KIMBERLEY.

WODEN, wō'den. See ODIN.

WODROW, wŭd'rō, ROBERT (1679–1734). A Scotch ecclesiastical historian, born at Glasgow, and educated at the university there At an early age he devoted a considerable portion of his time to historical researches, and was appointed librarian to the university (1697–1701). In 1703 he took charge of a pastorate at Eastwood, near Glasgow, where he remained till his death. Soon after his settlement he began writing *The History of the Sufferings of the Church of Scotland from the Restoration to the Revolution,* published in 1721–22. Wodrow contemplated other works, chiefly biographical, illustrative of the ecclesiastical history of Scotland. None were published till the following century, when three volumes of his collections on *The Lives of the Scottish Reformers and Most Eminent Ministers* (1834–45), and four volumes entitled *Analecta, or a History of Providences* (1842–43) were printed by the Maitland Club. Three volumes of his correspondence were published by the Wodrow Society instituted in 1841. This correspondence covers the period 1709–31.

WOERMANN, vĕr'măn, KARL (1844–). A German art-historian and museum director. He was born in Hamburg, studied at various universities (art-history at Heidelberg and Munich), and traveled widely. He was called to the academy at Dusseldorf in 1874 as professor of the history of art and literature. In 1882 he became director of the picture gallery at Dresden, of which he wrote the first scientific catalogue (1897). His works include: *Die Landschaft in der Kunst der alten Volker* (1876); *Die antiken Odysseelandschaften vom Equilinischen Hügel in Rom* (1877); *Kunst- und Naturskizzen aus Nord- und Südeuropa* (1880); *Was uns die Kunstgeschichte lehrt* (4th ed., 1894). To the *Geschichte der Malerei,* begun by Alfred Woltmann (q.v.), he contributed the

part on antique painting, and after Woltmann's death completed the entire work. He published also *Geschichte der Kunst aller Zeiten und Volker* (3 vols, 1900–05). His work unites sound scholarship with sympathetic appreciation, and displays a generous attitude towards the research of others. He wrote, besides, several series of poems.

WOERNER, wĕr'nĕr, JOHN GABRIEL (1826–1900). An American judge and author. Born at Moehringen, Wurttemberg, Germany, he came to the United States with his parents in 1833. In 1844 he became a printer's devil on the St. Louis (Mo.) *Tribune* (published in German), of which he was subsequently editor and proprietor until 1852. Admitted to the bar in 1855, he was thenceforth active in politics, serving as city attorney for two terms and as president of the city council in 1862. As a war Democrat he served two terms in the State Senate. After 1870 he was judge of the probate court of St. Louis County. Judge Woerner was author of two standard legal works, *The American Law of Administration* (1889; 2d ed., 1899; abridged ed, edited by W. F Woerner and F. A. Wislizenus, 1913), and *American Law of Guardianship* (1897). He wrote also several novels, including *Die Sclavin* which was dramatized, and *The Rebel's Daughter* (1899).

WOFFINGTON, MARGARET (PEG) (c.1714–60) A celebrated Irish actress, born of poor parents in Dublin. When about 10 years old, she appeared in a lilliputian production of *The Beggar's Opera*, and for several years played at one of the newer Dublin theatres, often dancing between the acts. In 1737 she took the rôle of Ophelia at the Smock Alley Theatre, and this began her success. Her London début came in 1740 at Covent Garden, as Silvia in *The Recruiting Officer*. She was an immediate favorite, and when a few weeks later she repeated her Sir Harry Wildair (in *The Constant Couple*), which had already excited the enthusiasm of Dublin, she showed great versatile power. During her career at Drury Lane and Covent Garden, she played most of the heroines who then ruled the stage, in both comedy and tragedy, in the former with the greater distinction. She also played fine ladies, like Lady Betty Modish and Lady Townley. Rôles in which the heroine appears in masculine disguise afforded some special triumphs. Her last appearance was as Rosalind in *As You Like It*, in 1757. Though ill, she persisted in going on with the play, till in the epilogue she suddenly broke down with a cry of horror and was led from the stage. Three years later, in Westminster, she died. Countless stories are told both of her frailty and of her goodness of heart. Garrick, with whom she lived for a time, was only one of her lovers; but she ended her days in respectable retirement, leaving much of her property in charity. Much of her charming and generous personality is revealed in Charles Reade's novel of *Peg Woffington* and the play *Masks and Faces*. Consult: Daly, *Woffington, a Tribute to the Actress and the Woman* (Philadelphia, 1888); J. F. Molloy, *The Life and Adventures of Peg Woffington, with Pictures of the Period in which She Lived* (New York, 1899); John Fyvie, *Comedy Queens of the Georgian Era* (ib., 1906).

WOFFORD (wŏf'ĕrd) **COLLEGE.** An institution of higher learning at Spartanburg, S. C., founded in 1854 by a legacy of $100,000 from the Rev. Benjamin Wofford. The institution is under the control of the Methodist Church, South It offers an academic course leading to the bachelor's degree, and maintains a preparatory school on the college campus. The courses of instruction are arranged in four groups, within which considerable freedom of election is permitted after the sophomore year. The campus of 70 acres contains 21 buildings, together valued at $350,000. In 1916 the students numbered 445 and the faculty 19. The library contained 25,000 volumes. The endowment was $193,000, with an income of $25,000. Extension work is carried on through lectures. The president in 1916 was Henry N. Snyder, LL.D.

WÖHLER, vē'lĕr, FRIEDRICH (1800–82). A German chemist, born near Frankfort-on-the-Main. He studied medicine and chemistry at Marburg and Heidelberg, and subsequently worked under the direction of Berzelius at Stockholm. In 1825 he returned to Berlin to teach chemistry at the newly established industrial school of that city. In 1831 he received a similar appointment at Cassel. In 1836 he was made professor of chemistry in the medical department of the University of Göttingen and inspector general of the pharmacies of Hanover. He died at Göttingen. Wöhler is justly considered as one of the founders of organic chemistry, his name being connected with the most important discoveries in the early history of the science. In 1828 he effected the synthesis of urea—the first organic compound produced by artificial laboratory means, without the agency of life The first cases of isomerism (i.e., the existence of different compounds having the same composition) were likewise observed by Wohler (see CHEMISTRY; CARBON COMPOUNDS), and no less a contribution was formed by the classical research on the benzoyl compounds, carried out by Wohler in conjunction with Liebig. (See CHEMISTRY, historical section.) Many other results of importance were achieved by Wöhler in all branches of chemistry. He isolated the elements aluminium, glucinum, yttrium, and titanium, and founded the nickel industry by devising a process of manufacturing the pure metal on a large scale. As a teacher, too, he was brilliant and many-sided. His *Grundriss der Chemie* and *Die Mineralanalyse in Beispielen* passed through numerous editions and were translated into several languages. He also edited in German Berzelius's voluminous *Lehrbuch der Chemie* and *Jahresberichte*. Hofmann published an excellent biography of Wöhler in the *Berichte der deutschen chemischen Gesellschaft* (1882), and edited *Aus Justus Liebigs und Friedrich Wöhlers Briefwechsel* (1888). Wöhler published the results of his investigations in Liebig's *Annalen der Chemie und Pharmacie*, of which he became coeditor in 1838. In 1890 a monument was erected to his memory at Göttingen.

WOHLGEMUTH, or **WOLGEMUT**, vōl'gemōōt, MICHEL (1434–1519). A German painter and engraver, the chief master of the older Franconian school. Born at Nuremberg, he was a pupil of Hans Pleydenwurff, but may also have studied in Flanders or at least formed his style after Flemish models. He first appears on record in 1473 as having married Hans Pleydenwurff's widow, in whose house he established a studio which was frequented by Albrecht Dürer, among others, and exercised a far-reaching influence. From it issued a large number of carved altarpieces with painted wings, executed

for the greater part rather mechanically with the aid of journeymen. The most prominent among these include the Hofer altar (now four panels) with "Episodes from the Life of Christ" (1465, Pinakothek, Munich), an altar piece with "Scenes from the Youth and Passion of Christ" (1479, St. Mary's, Zwickau), and the Peringsdörffer altar with "Scenes from the Legend of St. Vitus, and Saints" (c.1490, Germanic Museum, Nuremberg). His last recorded work is the altar in St. John's Church, Schwabach (1508). As compared with the Flemish masters of his day, Wohlgemuth, even in his best panels, appears inferior as regards sentiment and delicacy of execution, aside from the prevalence of angular forms and the monotony of homely types. He also painted portraits and designed for wood cuts, notably the spirited illustrations for Schedel's *Weltchronik* (1493). All his paintings are reproduced in the publication *Die Gemalde von Dürer und Wohlgemuth*, 117 plates with text by Riehl and Thode (Nuremberg, 1889–95). Consult Thode, *Die Malerschule von Nurnberg* (Frankfort, 1891); F. J. Stadler, *Michel Wolgemut und der Nürnberger Holzschnitt* (Strassburg, 1913); H. Dickinson, *German Masters of Art* (New York, 1914).

WO'KING. A market town in Surrey, England, 24½ miles southwest of London (Map: London, H 2). Its chief importance is derived from the proximity of the London Necropolis Cemetery, which covers 2000 acres and to which special funeral trains are dispatched from London daily. It contains a crematory, erected in 1878, the first one established in England. It is also notable for its Oriental Institute, containing a mosque and residences for Indians visiting England. Pop., 1901, 16,222; 1911, 24,808.

WOLCOT, wul'kot, JOHN (1738–1819). An English poet, better known under the pseudonym of PETER PINDAR. He was born at Dodbrook, in Devon. He was educated by an uncle, at Kingsbridge and in France, and subsequently studied medicine in London and in Aberdeen. In 1767 he went to Jamaica with Sir William Trelawny, the newly appointed Governor. After serving two years as physician general, he went to England, and was ordained priest in the English church. He immediately (1770) returned to Jamaica, where he received a small living. On the death of his patron (1773), he left the island for good. After practicing medicine with little success in Truro and other places, he settled in London as a writer of audacious squibs and satires on all sorts of persons from George III down to liverymen. Among his 70 distinct pieces were *Lyric Odes to the Royal Academicians* (1782–86); *The Lousiad: An Heroic-comic Poem*, five cantos, in ridicule of the King's domestic life (1785–95); *Ode upon Ode . . . a Comic Account of a Visit of the Sovereign to Whitbread's Brewery* (1787); *Bozzy and Piozzi*, on Boswell and Mrs. Piozzi (1786); and *A Poetical Epistle to a Falling Minister*, i.e., Pitt (1789). These and other verses achieved wide popularity. From their sale the author received annually some £250; and the government attempted to buy him off with a pension of £300. Wolcot was severely handled by William Gifford (q.v.) in his *Epistle to Peter Pindar* (1800). Unscrupulous, impudent, and coarse, Wolcot was yet a master of burlesque humor and caricature. During his lifetime Wolcot's satires were issued in cheap quarto pamphlets. About 20 editions of the collected works appeared between 1788 and 1837. That of 1812 contains a memoir and portrait For the latest and best account, consult Theodor Reitterer, *Leben und Werke Peter Pindars* (Vienna, 1900).

WOLCOTT, EDWARD OLIVER (1848–1905) An American lawyer and politician, born at Long Meadow, Hampden Co., Mass. Towards the close of the Civil War he served in the 150th Ohio Volunteers. He studied at Yale, graduated at Harvard Law School in 1871, and settled in Colorado. In 1876 he was elected district attorney for the first judicial district of Colorado, and in 1878 was Republican leader in the State Senate. In 1879 he became attorney for the Denver and Rio Grande Railroad, and in 1884 was appointed general counsel for the road. From 1889 until 1901 he was a member of the United States Senate. He was an ardent champion of bimetallism, but supported the Republican candidates in the free silver campaign of 1896, and in 1897 was named by President McKinley as chairman of the commission sent to Europe to report on international bimetallism

WOLCOTT, OLIVER (1726–97). An American soldier, and a signer of the Declaration of Independence; the son of Roger Wolcott (q.v.). He was born in Windsor, Conn., graduated at Yale in 1747; and in King George's War (q.v.) commanded a company of volunteers, raised by himself, on the northern frontier. In 1775 Congress appointed him one of the Indian Commissioners for the Northern Department, with instructions to secure the neutrality of the Iroquois. He was a member of the Continental Congress in 1776–78 and in 1780–84, and was one of the supporters and a signer of the Declaration of Independence. Entering the army as colonel of the Connecticut militia in 1775, he became a brigadier general in August, 1776, and took an active part in the campaign against Burgoyne; and in May, 1779, he was appointed a major general. Again in 1784 he was an Indian Commissioner for the Northern Department, and as such negotiated a treaty with the Iroquois. He was Lieutenant Governor of Connecticut from 1786 to 1796, and Governor from 1796 until his death. Consult John Sanderson, *Biographies of the Signers of the Declaration of Independence*, vol. iii (new ed., Philadelphia 1865).

WOLCOTT, OLIVER (1760–1833). An American political leader, son of the preceding. He was born in Litchfield, Conn., graduated at Yale in 1778, and served in the Connecticut militia, as an aid to his father, during the latter part of the Revolutionary War. He was admitted to the bar in 1781, and was employed for several years in the financial department of the State government, acting in 1784 as commissioner, with Oliver Ellsworth, to adjust the accounts between Connecticut and the United States. He was Comptroller of the Treasury for the United States in 1788–89, was Auditor of the United States Treasury in 1789–91, and was again Comptroller of the Treasury from 1791 to 1795, when he succeeded Alexander Hamilton as Secretary of the Treasury. He was retained in this position by John Adams, and while performing the duties of his office took an active part in Hamilton's opposition to the President, but resigned from the Cabinet in November, 1800. Subsequently he was a judge of

the United States Circuit Court (1801–02), was engaged in mercantile pursuits in New York from 1802 to 1812, establishing several large factories at Wolcottville (near Litchfield); was president of the Bank of North America in 1812–14; presided over the Connecticut constitutional convention in 1817, and was Governor of that State from 1817 to 1827, when he returned to New York. He wrote several pamphlets, including an *Address to the People of the United States on the Subject of the Report of a Committee of the House of Representatives* (1802), and *British Influences on Affairs in the United States Proved and Explained* (1804). His papers have been edited by Gibbs as *Memoirs of the Administrations of Washington and John Adams* (New York, 1846).

WOLCOTT, Roger (1679–1767). A Colonial Governor of Connecticut. He was born in Windsor, Conn., was apprenticed to a weaver at the age of 12, and began an independent business career at 21. In the campaign against Canada in 1711 he was commissary of the Connecticut troops, and in the celebrated Louisburg expedition of 1745 he was second in command, with the rank of major general. After serving as a member of the executive council, judge of the Supreme Court, and Deputy Governor, he was for four years (1750–54) Governor of the Colony. He wrote some crude verse, including *Poetical Meditations, being the Improvement of some Vacant Hours* (1725), and a *Brief Account of the Agency of the Honorable John Winthrop, Esq., in the Court of King Charles the Second, A.D. 1662, when he obtained a Charter for the Colony of Connecticut* (printed in the *Collections* of the Massachusetts Historical Society, 1st series, vol. iv). His journal of the Louisburg expedition was published by the Connecticut Historical Society in 1860.

WOLCOTT, Roger (1847–1901). An American political leader. He was born in Boston, and graduated at Harvard in 1870, and at the Harvard Law School in 1874. He was a member of the Boston Common Council in 1877–79, of the State House of Representatives in 1882–85, and again a member of the Common Council in 1887–90. In 1892 he was elected Lieutenant Governor of the State, although W. E. Russell (q.v.), the Democratic candidate for Governor, was chosen. He was reëlected in 1893, 1894, and 1895. Before the termination of his fourth term he became by the sudden death of Governor Greenhalge, in May, 1896, acting Governor. In the following November he was elected Governor by the largest majority ever given to any candidate for that office in the history of the State, and was reëlected in 1897 and 1898. Subsequently he was offered by President McKinley the position of a member of the Philippine Commission, and later the Ambassadorship to Italy, both of which honors he declined. Consult William Lawrence, *Roger Wolcott* (Boston, 1902).

WOLF (AS. *wulf*, Goth. *wulfs*, Ger. *Wolf*, wolf, connected with Lat. *lupus*, Gk. λύκος, *lykos*). The name of several typically canine animals; specifically *Canis lupus*. This, the wolf of the whole Northern Hemisphere, is yellowish gray, with strong coarse hair, which is longest on the ears, neck, shoulders, and haunches, and especially on the throat; the muzzle is black, the upper lip and chin white. The ears are erect and pointed, the muzzle sharp; the legs rather longer than those of the shepherd dog; the tail bushy, but not curling; the eyes oblique, giving a vicious expression to the countenance. The wolf is swift of foot, and hunts deer and other animals, packs of wolves associating for this purpose; it often commits great ravages at night among sheep, and attacks calves, but seldom full-grown oxen or man, unless hard pressed by hunger. It is not easily trapped, being extremely cautious, and appearing to understand somewhat the nature and purpose of a trap.

Few diversities appear in the wolves of different countries of Europe and Asia. The French wolves are generally browner and smaller than those of Germany; the wolves of Russia are larger, with longer hair, in Italy and Turkey a tawny color predominates. The great black Pyrenean wolf is the most marked variety. Wolves are still very plentiful in some parts of Europe—in the Pyrenees and Ardennes, among the Carpathian Mountains, and in Turkey, and in the forests of Poland and Russia.

Although systematic naturalists have named numerous species and subspecies among American wolves, there are practically only two very distinct kinds—the large gray, timber, or Canadian wolf, which is practically identical with the wolf of the Old World; and the prairie wolf, or coyote.

The American form of the first-named species is more robust, and has longer, lighter hair on the average, than the Old World form, and throughout the West and Canada it is quite uniform, and known as *Canis occidentalis*. It is possible that the black wolf (*Canis ater*), a few of which remain in the Florida Everglades, and an Arctic species (*Canis albus*), pure white except the black tip of the tail, may prove to be distinct species. Once numerous all over the country, wolves are now unknown east of the Mississippi and Lake Huron, never having been able to hold their place, in spite of plentiful refuges in the forests and mountains, as have the wolves of Europe. They are numerous in the Rocky Mountains and on the Pacific coast, and in the northern part of British America, where they live upon the game and occasionally do great damage to the horses, sheep, and cattle on open ranches. They keep themselves hidden in the woods, and hence are known everywhere in the West as timber wolves.

The other American wolf, smaller, redder, and addicted to an open country, rather than to the forests, is the red or prairie wolf, or coyote. Until recently this wolf, which formerly ranged eastward as far as the prairies extended, but now is not known east of the dry plains, was regarded as only a single widespread and variable species (*Canis latrans*); but systematists now recognize several distinct species and subspecies of these small wolves. See Coyote.

South America has several wolflike canine animals, described under Fox Dog, Maned Wolf, and other names. For illustrations and bibliography, see Canidæ; Dog.

WOLF, Tasmanian or Zebra. See Dasyure.

WOLF, vôlf, Adam (1822–83). An Austrian historian, born at Eger. He studied jurisprudence and philosophy in Prague and in Vienna, where he established himself as docent of history at the university, in 1850. Appointed professor at the University of Pest in 1852, he became tutor of the daughters of Archduke Albrecht in 1856 and professor at the University

of Graz in 1865. His works, based on thorough investigations, are valuable contributions to the history of Austria under Maria Theresa and her successors, and include: *Oesterreich unter Maria Theresia* (1855); *Aus dem Hofleben Theresias* (2d ed., 1859), *Marie Christine, Erzherzogin von Oesterreich* (1863); *Kaiser Franz I., 1804 bis 1811* (1866). *Die Aufhebung der Klöster in Innerosterreich, 1781–1790* (1871); *Geschichtliche Bilder aus Oesterreich* (1878–80), *Oesterreich unter Maria Theresia, Joseph II. und Leopold II.* (1882); and others, besides many treatises on Austrian history in the publications of the Vienna Academy of Sciences.

WOLF, FERDINAND (1796–1866). An Austrian Romanic scholar, born in Vienna and educated at the University of Graz. Upon his return to Vienna his tastes led him to the study of mediæval literature, and he became connected in 1827 with the Imperial Library. When the Academy of Sciences was founded, he was made a member and secretary of the institution. Wolf did work of sterling value in opening the field of Romanic literature, especially that of Spain, to modern scholarship. With Ebert he founded in 1858 the *Jahrbuch für romanische und englische Litteratur*, and he edited, either alone or in company with others, a large number of texts. Some of his more important independent publications are: *Die Sage vom Bruder Rausch* (1835); *Floresta de rimas modernas castellanas* (2 vols., 1837); *Ueber die Lais, Sequenzen und Leiche* (1841); *Ueber die Romanzenpoesie der Spanier* (1847); *Studien zur Geschichte der spanischen und portugiesischen Nationallitteratur* (1859); and *Histoire de la littérature brésilienne* (1863). With Konrad Hofmann he published *Primavera y flor de romances* (2 vols., 1856).

WOLF, FRIEDRICH AUGUST (1759–1824). A German classical scholar, born at Haynrode, Prussian Saxony. He studied at Göttingen and began his career as a teacher in the seminary at Ilfeld in 1779, then became rector of the Gymnasium at Osterode (1782), and in 1783 was called to the chair of philosophy and pedagogy at Halle, where he taught until the university was closed after the battle of Jena (1806). Wolf founded his teaching upon the proposition that classical study or "Altertumswissenschaft" should properly deal with all phases of the life and thought of antiquity, as expressed in all the evidence, both literary and monumental, that has been preserved. He saw in classical antiquity a model public and private life, resting on the highest ideals, and the development of the study of antiquity along broad lines since his time may be largely traced to his influence.

In 1807 Wolf went to Berlin, where he was active in the founding of the new university. In April, 1824, he undertook a journey to southern France, in the hope of regaining his impaired health, but died at Marseilles in August of the same year. Wolf's fame rests chiefly upon his *Prolegomena ad Homerum* (Halle, 1795). In this work he traced the history of the Homeric poems from about 950 B.C., the date at which he placed the maturity of Ionic poetry, to the time of Pisistratus (about 550 B.C.), and endeavored to show that the *Iliad* and the *Odyssey* as we now have them have been materially changed from their original form, and that they are made up of separate poems, not all by the same author, but he did not deny the existence of a personal Homer, as has often been stated This view is not entirely original with Wolf, as many of his arguments had been anticipated by Giambattista Vico (whose work, however, was not known to Wolf), and by Robert Wood, but he was able to enforce his theory with many new arguments drawn from the scholia of the Venice manuscript of Homer, which had been published by Villoison (q.v.) in 1788. The *Prolegomena* called forth a storm of criticism and attack, and the Homeric question, as the question of one or many Homers came to be called, easily overshadowed all other philological discussions of the last century. (See HOMER.) Although many of Wolf's arguments, especially his principal argument based upon the age of writing in Greece, have been seriously weakened by later discoveries, the book remains of fundamental importance for the student, and the minute examination of the Homeric writings which the *Prolegomena* called forth has been of inestimable value for the knowledge and appreciation of the poems.

Bibliography. Aside from the *Prolegomena*, and editions of Homer (*Iliad*, Halle, 1794; *Iliad* and *Odyssey*, Leipzig, 1804–1807), Wolf's works include an edition of Demosthenes' speech *Against Leptines*, with introduction and commentary (1789); editions of Plato's *Symposium* (1782); *Hesiod's Theogony* (1783); selections from Lucian (1791); the history of Herodian (1792); Cicero's *Quæstiones Tusculanæ* (1792; 4th ed., 1825); Cicero's speeches *Post Reditum in Senatu, De Domo Sua ad Pontifices, De Haruspicum Responsis*, and *Pro Marcello* (1801)—wrongly regarded as spurious by Wolf; *Suetonius* (1802), and selected dialogues of Plato—the *Euthyphro*, *Apology*, and *Crito* (1812 and 1820). His editions of the *Clouds* of Aristophanes (1812) and a part of the *Acharnians* (1811) are accompanied by a translation. Other works include: *Geschichte der romischen Litteratur* (1787); *Vermischte Aufsatze in lateinischer und deutscher Sprache* (1802); *Litterarische Analekten*—a periodical, with interesting sketches of English philologists (Berlin, 1817–1820). Several of his writings were published after his death—*Vorlesungen über die vier ersten Gesänge von Homers Ilias*, edited by Usteri (1830–31); *Encyklopädie der Philologie*, by Stockmann (1831; 2d ed., 1845); *Darstellungen der Altertumswissenschaft*, by Hoffmann (1839); and *Consilia Scholastica*, by Föhlisch (1829–30). A collection of Wolf's minor works was published by Bernhardy (Halle, 1896). Consult also: Hanhart, *Erinnerungen an Friedrich August Wolf* (Basel, 1825); Körte, *Leben und Studien Friedrich August Wolfs, des Philologen* (Essen, 1833); Arnoldt, *Friedrich August Wolf in seinem Verhältnisse zum Schulwesen und zur Padagogik* (Brunswick, 1861–62); Bernays, *Goethes Briefe an Wolf* (Berlin, 1868); Bursian, *Geschichte der klassischen Philologie in Deutschland* (Munich, 1883); Mark Pattison, *Essays* (Oxford, 1889); W. Freund, *Wie studiert man klassische Philologie* (6th ed., revised by H. Deiter, Stuttgart, 1903); J. E. Sandys, *A History of Classical Scholarship*, vol. iii (Cambridge, 1908).

WOLF, wulf, HENRY (1852–1916). An American wood engraver. He was born at Eckwersheim (Alsace), studied under Jacques Lévy in Strassburg, and removed to New York in 1871. His principal works include the American Artist Series; Gilbert Stuart Portrait

Series, Portraits of Women, and Masterpieces in Galleries. Among his original engravings are "Lower New York in a Mist"; "Evening, Swan Lake, Central Park", and "Scattering Mists." His work is characterized by suavity and distinction of line and refined and sensitive interpretation, especially notable in his blocks after contemporary painters, such as J. A. Weir, Edmund Tarbell, and J. W. Alexander. In 1908 he became a member of the National Academy of Design and he was awarded many prizes, including medals at Chicago (1893), Paris (1895, 1900), and St. Louis (1904), and a grand prize at the Panama-Pacific Exposition, San Francisco (1915).

WOLF, vŏlf, Hugo (1860–1903). An Austrian composer, born March 13, 1860, at Windischgraz, Styria He received his first musical instruction on the piano and violin from his father and the village schoolmaster. In 1875–77 he studied at the Vienna Conservatory For several years he eked out a wretched living by giving piano and violin lessons, until in 1881 he secured an appointment as second conductor in Salzburg. After four months, however, he was again in Vienna struggling once more against poverty. From 1884 to 1887 he occupied the post of musical critic for the *Salonblatt*, making many bitter enemies through his enthusiastic championship of Wagner and his violent attacks on Brahms. After that he never filled another position, but lived a free life devoted entirely to composition. Unfortunately his temperament was such, that periods of highest exaltation and feverish productivity alternated with periods of depression and inactivity. In 1897 his mind became affected so that, except for a few months, the rest of his life was spent in an insane asylum. From 1898 he was also paralyzed. He died Feb. 22, 1903.

Wolf's claim to immortality rests upon his songs, the number of which is 266. His earliest works are *Zwolf Lieder aus der Jugenzeit*, written in 1877–78. During the next 10 years he composed practically nothing, devoting all his time to reading and studying the scores of the classic masters and the songs of Schubert, Schumann, and Franz. In 1888 his inspiration broke forth with almost volcanic force, for from February to May he wrote no less than 43 of his Mörike songs. It is characteristic of the master's method that he did not write music for single poems, but always for entire cycles by one poet. Thus he set to music in 1888 the Mörike cycle of 53 songs. This was followed by the Eichendorff cycle of 20 songs and the Goethe cycle of 51 songs (1888–89). Each of these three great cycles possesses a distinct style. The *Spanisches Liederbuch* of 44 songs (translations by Heyse and Geibel) was written in 1889–90; the Keller cycle (6 songs) and *Italienisches Liederbuch* (46 songs, translations by Heyse) in 1890–91 and 1896; the Michelangelo cycle of three songs in 1897. His other works are a string quartet in D minor (1879); six a cappella choruses on texts by Eichendorff (1881); *Penthesilea,* a symphonic poem (1883); *Italian Serenade,* for small orchestra (1893); three choral works with orchestra, *Christnacht* (1891); *Elfenlied* (1894); *Dem Vaterland:* and an opera, *Der Corregidor* (1895). When his mind became clouded in 1897 Wolf was working on a second opera, *Manuel Venegas,* which remained unfinished. Of his songs Wolf himself orchestrated 20, and among these *Der Feuerreiter* from the Mörike cycle has become immensely popular.

The songs of Hugo Wolf mark the highest development of the art song (Kunstlied) as established by Schubert and developed by his great successors Schumann, Franz, and Brahms As in Wagner's music-dramas, so in the songs of Wolf words and music are so closely wedded, so inseparably one, that it seems as if one mind had conceived both simultaneously Had Wolf merely transferred Wagner's dramatic method to the song, he would not be the great master that he is. Aside from the intensity and expressiveness of his music and the faultless declamation of the text, Wolf's surpassing greatness consists in this, that he combined within his own genius all the chief excellences of his great predecessors. In universality he rivals Schubert, in effective polyphonic treatment Franz, in the expressive power of the instrumental part Schumann, in breadth and sweeping outline Brahms; while in the intimate welding of word and tone he surpasses all Consult: E. Decsey, *Hugo Wolf* (4 vols., Berlin, 1903–06); K. Heckel, *Hugo Wolf in seinem Verhaltniss zu Richard Wagner* (Munich, 1905), E. Schmitz, *Hugo Wolf* (Leipzig, 1906); E. Newman, *Hugo Wolf* (London, 1907); Batka and Werner, *Hugo Wolfs musikalische Kritiken* (Leipzig, 1911); E. von Hellmer, *Hugo Wolf: eine Persönlichkeit in Briefen* (ib., 1912).

WOLF, Max Franz Joseph Cornelius (1863–). A German astronomer. He was born at Heidelberg, studied at the university there and at Strassburg, and at Heidelberg rose to be professor of astrophysics in 1902. He became also director of the Königstuhl Observatory in 1893. Wolf discovered in 1884 a periodical comet with a course of seven years, and after 1891 discovered more than 200 small planets by means of photography. His publications include: *Sur les termes élémentaires dans l'expression du rayon-vecteur* (1890); *Die Aussen-Nebel der Plejaden* (1900); *Die Entdeckung und Katalogisierung von kleinern Nebelflecken durch die Photographie* (1901); *Publikationen des astrophysikalischen Konigstuhl* (3 vols., 1902–07); *Die Photographie des Sternhimmels* (1904); *Stereoskopbilder von Sternhimmel* (1907; 4th ed., 1913); *Die Milchstrasse* (1908).

WOLFBERRY, wụlf'bĕr-i. See Snowberry.

WOLF DOG, or Wolfhound. A kind of dog used for hunting the wolf. One breed, now almost extinct, was the old Irish wolfhound. Another formerly abundant in Norway and Sweden is now almost exclusively found in Spain, into which it is supposed to have been introduced by the Goths. It is of large size, with pointed nose, erect ears, long silky hair, and a very bushy tail curled over the back. In color it is mostly white, with large clouds of tawny color or brown. Similar characteristics belong to the Russian wolfhound or borzoi. See Greyhound, and Plate of Dogs.

WOLFE, wụlf, Catherine Lorillard (1828–87). An American philanthropist, born in New York City. After the death of her parents she devoted her life to works of charity and philanthropy, on which she expended about $200,000 annually. She gave large sums to Grace Church and St. Luke's Hospital, New York City, Union College, and the American School at Athens; founded a home for incurables at Fordham, N. Y., and a newsboys' lodging house in the lower part of New York City; supplied the

funds for Dr. Ward's archæological expedition to Asia Minor; and gave to the Metropolitan Museum of Art a valuable collection of paintings, together with an endowment of $200,000 for its preservation and enlargement. For descriptions of this collection, consult *The National Magazine*, vol. xvii (New York, 1891), and the Catalogues issued by the Metropolitan Museum of Art.

WOLFE, Charles (1791–1823). An Irish clergyman and poet. He was born at Blackhall, County Kildare, Ireland. He was educated at the Abbey High School, Winchester, England, and at the University of Dublin, where he received a scholarship in 1812 and took his degree in 1814. Later he was actively employed as a tutor. His celebrated lines on *The Burial of Sir John Moore* were written in 1816, and soon afterward found their way into the newspapers. The author was at first unknown. In 1817 Wolfe became curate of Ballyclog, in the County of Tyrone, from which he was shortly transferred to the larger parish of Donoughmore. He died of consumption on Feb. 21, 1823. His literary *Remains*, consisting chiefly of sermons and a few poems, were published with a memoir in 1825 by the Rev. John A. Russell.

WOLFE, James (1727–59). A British general, born at Westerham, in Kent, Jan. 2, 1727. He was the son of Gen. Edward Wolfe, an officer of merit and distinction under Marlborough and Prince Eugene. James at an early age evinced a strong inclination for the army. After study at a school in Greenwich, he obtained his father's consent to participation in the Cartagena expedition of 1740, but was kept back by sickness. In 1741 he received a second lieutenant's commission in his father's regiment. His services were brilliant, and his rise rapid. Ensign in 1741, two years' service in Flanders and Germany, during which he was present at the battle of Dettingen (1743), secured for him first an adjutancy, then a first lieutenancy, and finally in 1744, a captaincy. He fought against the Young Pretender in 1745–46, sharing in the defeat of Falkirk and in the victory at Culloden. Returning to Flanders, he took a notable part in the battle of Laffeld, July 2, 1747. He became major in 1749 and lieutenant colonel in 1750. In the mismanaged expedition against Rochefort in 1757 Wolfe acted as quartermaster-general. The attention of Pitt was now drawn to him as an officer of whom, in any enterprise, great things might be expected. The high opinion was confirmed the next year, when he was intrusted with command of a brigade in the expedition against Louisburg, under Amherst. On June 8 he effected a landing at Freshwater Cove, in the face of a heavy fire from the enemy. The successful siege of Louisburg followed. Wolfe's skill, boldness, and activity were quite clearly understood, and he became known as "the hero of Louisburg." Pitt was now organizing his grand scheme for the expulsion of the French from Canada, and the expedition which had for its object the capture of Quebec, the enemy's capital, was confided to the care of Wolfe. On Feb. 17, 1759, Wolfe, now major general, set sail from England, and on June 27 landed on the Isle of Orleans, some four miles below Quebec. His forces numbered about 9000 men, including six companies of New England troops, while the French strength comprised a garrison of 2000 men in Quebec and 14,000 men, of whom only a small part were regulars, at Beauport, below the town. From the Isle of Orleans and from Point Levi, on the right bank of the St. Lawrence, which he occupied on June 30, Wolfe began the bombardment of Quebec, while part of his forces were sent across to the left bank of the river, where they faced the French across the small stream of the Montmorenci. On July 31 Wolfe delivered a frontal attack on the French intrenchments at Beauport, his grenadiers advancing to the assault in boats, while the forces on the left bank were ordered to cross the Montmorenci and take the enemy in flank. The movement failed and the British were compelled to retire with the loss of 400 men. But Wolfe was determined to strike a decisive blow and decided upon the desperate expedient of crossing the river and scaling the heights above the town. At 2 o'clock on the morning of September 13 the landing of the British troops began at a point now known as Wolfe's Cove. The French sentinels were surprised, and before the day broke 4500 men with two guns had climbed the steep heights and were drawn up on the Plains of Abraham, about a mile from Quebec. About 10 A.M. they were attacked by Montcalm, who had at his disposal a force equal to the British, but of inferior training. The French lines were shattered by the British fire and broke; Wolfe, as he led the charge, was struck thrice, the last time in the breast. He was compelled to lie down, and while the pursuit was still on he died.

Bibliography. Robert Wright, *The Life of Major General Wolfe* (London, 1864); A. G. Bradley, *Wolfe*, in "English Men of Action Series" (ib., 1895); Francis Parkman, "Montcalm and Wolfe," in *France and England in North America*, part vii (2 vols., Boston, 1898); H. R. Casgrain, *Wolfe and Montcalm* (Toronto, 1905); Beckles Willson, *The Life and Letters of James Wolfe* (London, 1909); Edward Salmon, *General Wolfe* (ib., 1909).

WOLFENBÜTTEL, *vōl'fen-but'el*. A town of the Duchy of Brunswick, Germany, on the Ober, 7 miles south of Brunswick (Map: Germany, D 2). The famous seventeenth-century ducal library, with 300,000 volumes and 8000 manuscripts, containing mementos of Luther and of Lessing, once its librarian, has been housed in a spacious building completed in 1886. An old castle with a notable tower, a theatre, the house in which Lessing wrote *Nathan der Weise*, now a museum, a Gymnasium, seminary, and normal school are the other prominent buildings and institutions. Iron and machine manufactures, copper-smelting, yarn-spinning, and preserving, constitute the chief industries. Wolfenbüttel dates from 1046. Pop., 1910, 18,934.

WOLFENBÜTTEL FRAGMENTS. See Reimarus.

WOLFF, *vōlf*, Albert (1814–92). A German sculptor, born at Neustrelitz, Mecklenburg. He studied under Rauch at Berlin, and his work represents the tendencies of that school in an idealistic direction. His chief works include the figures on the upper terrace of Sans-Souci, Potsdam; "Minerva and a Warrior," on the Palace bridge, Berlin; the reliefs on the "Warriors' Monument" (1854) in the Invaliden Park, ib.; the relief of "Return of the Troops in 1871" (1872), on the monument of victory, ib.; the statue of "Peace" (1878) on the Belle-Alliance Platz, ib.; "Fight with a Lion," on the stairway

of the New Museum, ib.; a group of "Bacchus with Cupid and a Panther" (1884), in the National Gallery, ib.; the bronze equestrian statue of Frederick William III in the Lustgarten, ib., the colossal statue of Frederick William IV in Konigsberg, and a number of allegorical statues decorating the university building in that city.

WOLFF, or **WOLF**, CHRISTIAN (1679–1754). A German philosopher, born at Breslau. He studied at Jena, and from 1703 to 1706 taught mathematics and philosophy at Leipzig. In 1707, on the recommendation of Leibnitz, he became professor of mathematics and natural science in Halle, where he acquired great fame. In 1723 he was banished from Prussia by a cabinet order, on the ground that his teachings were fatalistic and atheistic. He received an appointment at the University of Marburg; but in 1740 he was restored by Frederick the Great, and was welcomed in Halle with the greatest enthusiasm. From this time he devoted himself to authorship, and produced a long line of voluminous books. He was the successor of Leibnitz in the series of Cartesian philosophers, and did much to complete and develop Leibnitz's system, whence his school is often called the Leibnitz-Wolffian school. Without special genius or originality, he performed great service as an organizing and systematizing philosopher. He created a distinctly German philosophy. He divided philosophy into ontology, cosmology, psychology, and natural theology. He accepted Leibnitz's theory of monads, though he would not carry the preëstablished harmony to the length of denying a natural interaction of soul and body. He held fast to Leibnitz's optimism and determinism. His great principle was that of the sufficient reason. In theology, he admitted the possibility of revelation and miracles, but so restricted them by rational principles that he substantially denied them. He was a voluminous writer; among his works are included *Cosmologia Generalis* (1737); *Jus Gentium* (1749); *Œconomica* (1750); *Philosophia Moralis* (1750–53); *Philosophia Practica* (1744–50); *Philosophia Prima* (1730); *Philosophia Rationalis* (1740); *Psychologia Empirica* (1738); *Theologia Naturalis* (1739–41); *Vernunftige Gedancken von dem gesellschaftlichen Leben* (1740); *Vernunftige Gedancken von den Krofften des menschlichen Verstandes* (1738); *Vernünftige Gedancken von der Menschen Thun und Lassen* (1743); *Vernünftige Gedancken von Gott, der Welt und der Seele des Menschen* (1751). Consult: Watcke, *Wolffs eigene Lebensbeschreibung* (Leipzig, 1841); Piur, *Studien zur sprachlichen Wurdigung C. Wolffs* (1903); Pichler, *Ueber C. Wolffs Ontologie* (1910). See PHILOSOPHY.

WOLFF, EMIL (1802–79). A German sculptor, born in Berlin, where he became the pupil of his uncle, Gottfried Schadow. In 1822 he proceeded to Rome, where, barring several visits to Greece and to Berlin, he thenceforth remained and yielded himself entirely to the influence of Thorvaldsen. He took over the studio and unfinished commissions of his cousin, Rudolf Schadow, and in 1871 was appointed director of the Academy of St. Luke. Of his own compositions, for which he chose the subjects chiefly from Greek mythology and ideal genre, the most noteworthy are: "The Fisher-boy" (Potsdam, 1833); "Victory Teaching Youth History" (1846, Palace bridge, Berlin); "Judith" (1868), and "Circe" (National Gallery, Berlin). Among his busts and statues of celebrated persons are those of Thorvaldsen, Winckelmann, and Palestrina

WOLFF, JULIUS (1834–1910). A German poet and novelist, born at Quedlinburg. After studying philosophy and literature in Berlin, he took charge of his father's manufactory at Quedlinburg. Unfavorable circumstances causing his withdrawal from business, he founded, in 1869, the *Harzzeitung*. In 1870–71 he took part in the Franco-German War and then settled in Berlin, devoting himself exclusively to his literary labors. Besides the cycle of war lyrics *Aus dem Felde* (1871, 1907), glorifying the events of 1870–71, he produced a number of lyric and humorous epics and novels, of a clever archaic flavor. His epics and other poems are entitled· *Till Eulenspiegel redivivus* (1874); *Der Rattenfanger von Hameln* (1876); *Der wilde Jager* (1877); *Tannhauser, ein Minnesang* (1880); *Singuf, Rattenfangerlieder* (1881); *Lurley*, a romance (1886); *Die Pappenheimer* (1889); *Renata* (1892); *Der fliegende Holländer* (1892); *Assalde, Dichtung aus der Zeit der provenzalischen Troubadours* (1896); and *Der fahrende Schuler* (1900); while his novels include: *Der Sulfmeister* (1883); *Der Raubgraf* (1884); *Das Recht der Hagestolze* (1887); *Das schwarze Weib* (1894); and *Die Hohkonigsburg* (1902). Wolff's complete works with biography by Lauff in two series of 18 volumes each began to appear in Berlin in 1912. Most of his writings went through many editions. Consult Ruhemann, *Julius Wolff und seine Dichtungen* (Leipzig, 1886).

WOLFF, KASPAR FRIEDRICH (1733–94). A German anatomist, physiologist, and embryologist, born in Berlin and educated there and at Halle. During the Seven Years' War he was actively employed in the Silesian hospitals. In 1763–65 he lectured in Berlin and in 1766 he accepted an appointment in the Academy of Sciences at St. Petersburg, in which city he lived thereafter. Wolff will be remembered for combating, at the age of 26, in his *Theoria Generationis* the preformation (q.v.) views then prevalent. But it was not until after Wolff's death that, through the translations of Meckel and the writings of Oken, he obtained proper recognition as the real founder of embryology. His chief works are: *Theoria Generationis* (1759; Ger. trans., *Theorie von der Generation*, Berlin, 1764); *De Formatione Intestinorum* (1768; trans. into Ger. by Meckel as *Ueber die Bildung des Darmkanals im bebruteten Hühnchen*, Halle, 1812). Many of his unpublished writings are preserved as manuscripts in the library of the St. Petersburg Academy.

WOLFF, vôlf, PIERRE (1865–). A French dramatist, born in Paris. His dramas, characterized by bitingly ironical observation of contemporary life, and by witty dialogue, include: *Jacques Bouchard* (1890); *Leurs filles* (1891); *Les maris de leurs filles* (1892); *Celles qu'on respecte* (1893); *Celles qu'on aime* (1895); *Le boulet* (1898); *Le béguin* (1900); *Vive l'armée!* (1901); *Le secret de polichinelle* (1903); *Le ruisseau* (1907); *Le lys* (1908); *Les marionettes* (1911); *L'amour défendu* (1912).

WOLFF, vôlf, WILHELM (1816–87). A German sculptor and bronze caster. He was born at Fehrbellin, and after working in the Royal Iron Foundry at Berlin, and studying modeling with Wichmann, he perfected himself in bronze casting at Paris and Munich. Upon his return

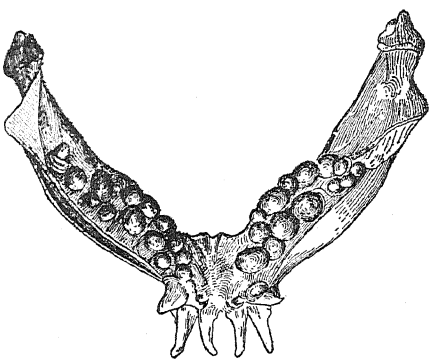
to Berlin he established a foundry of his own, which soon became famous for animal figures. Later he devoted himself exclusively to modeling, and produced a number of animal groups, remarkable for a freer, more naturalistic treatment than had before found favor in Germany. Among the best known examples are a "Bulldog with Her Young" (Berlin National Gallery), the "Dying Lioness," in the Tiergarten, Berlin; and a "Boar Attacked by Dogs," in the Grünewald, near Berlin.

WOLF-FERRARI, vôlf'fĕr-rä'rē, ERMANNO (1876–). An Italian composer, born in Venice. From 1893 to 1895 he was a pupil of Rheinberger at Munich. In 1902 he became director of the Liceo Benedetto Marcello in Venice, but resigned in 1909 and took up his residence in Munich. As a composer he attracted attention with his first opera, *La Sulamita* (1898). His reputation was increased by *Cenerentola* (1900), and especially by *Le Donne Curiose* and a large choral work, *La Vita Nuova* (after Dante), both produced in 1903 in Munich. Thereafter all his works had their first performance in Germany. The operas that followed are: *Die vier Grobiane* (1906), *Susannens Geheimniss* (*Il Segreto di Susanna*, 1909), *Der Schmuck der Madonna* (*I Gioiellj della Madonna*, "The Jewels of the Madonna," 1911), *Der Liebhaber als Arzt* (*L'Amore Medico*, 1913). With the exception of *I Gioiellj della Madonna*, which in its brutal treatment shows the influence of the modern Italian veristic style, Wolf-Ferrari's operas are typical opere buffe, distinguished by charming melody and solid technical workmanship. He wrote also a *Kammersymphonie* in B, a piano quintet in D, two piano trios, two violin sonatas, and piano pieces.

WOLFFIAN (wụl'fĭ-an) **BODY** (named in honor of Kaspar Friedrich Wolff). One of the pair of excretory organs that is functional in the adult of many fishes and of Amphibia; the mesonephros. In reptiles, birds, and mammals the Wolffian body is a purely embryonic structure, being replaced in the adult by the permanent kidney of those groups, the metanephros. In the tailed Amphibia, where the organ is typically developed, there are two, one lying on each side of the dorsal part of the body cavity as elongated structures richly vasculated and having each an efferent (the Wolffian) duct passing back to the cloaca. In the male the ducts leading the sperm from the testes enter the Wolffian body and connect with the Wolffian duct. Consult Field, "Development of the Pronephros and Segmental Duct in Amphibia," in *Bulletin of the Museum of Comparative Zoölogy*, vol. xxi (Cambridge, Mass., 1891).

WOLFFIAN BOTTLE. A form of apparatus used for washing gases, that takes its name from the English chemist Peter Wolff. It consists usually of a glass bottle with three separate openings or mouths on the neck. The gas which it is desired to wash enters through a tube, which extends to the bottom of the purifying material and then bubbles up and passes out through another tube, which enters the mouth on the opposite side of the bottle. The opening in the centre, which during the operation is usually kept closed, is used to introduce the liquid required for washing or to regulate the pressure. For manufacturing purposes Wolffian bottles of a large size are employed, and in many operations a number of them are placed side by side.

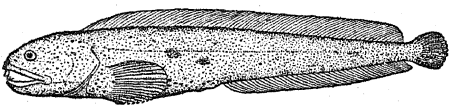
WOLF FISH. A large, carnivorous, grayish fish (*Anarrhichas lupus*) of the North Atlantic of little use as food, but noted for its voracity and ugliness. It reaches a length of 4 or 5 feet. The mouth is large, opens obliquely, and is furnished with formidable teeth; the sides of the lower jaw have very strong front teeth, big canines, and tubercle-like molars which shut against coarse molars on the palatines. This dentition is adapted to crushing mollusks and sea urchins. It bites savagely when caught, and



LOWER JAW AND TEETH OF WOLF FISH.

fishermen therefore generally dispatch it as soon as possible by knocking it on the head. It is often very destructive to nets. It is much used in Iceland, both fresh and salted; and a kind of shagreen, used for bags and pouches, is made of its thick skin.

There are other species of the genus in the North Atlantic and Pacific oceans, one of which (*Anarrhichas lepturus*) is well known in Alas-



ALASKAN WOLF FISH.

kan waters. Another Pacific coast species is the curious wolf eel (*Anarrhichthys ocellatus*). These fishes compose the family Anarrhichadidæ, and are closely related to the blennies. See CATFISH.

WÖLFFLIN, wĕlf'lĕn, EDUARD, KNIGHT VON (1831–1908). A German classical scholar, born at Basel, Switzerland. He held a professorship at the University of Munich (1880–1905). He is especially known for his contributions to the knowledge of colloquial Latin and for his long-continued and successful efforts to inaugurate a complete scientific lexicon of the Latin language. To further the latter plan, he established in 1880, with the aid of the Bavarian Academy of Science, the *Archiv für lateinische Lexikographie und Grammatik*, and under his direction a collection of lexicographical material was begun (15 vols. were published, 1880–1908). Later the Royal Academies of Berlin, Leipzig, Göttingen, Munich, and Vienna united in support of the plan for a complete thesaurus of the Latin language. A commission was appointed to carry forward the collection of material and later to edit the work, and in 1900 the first part of the work appeared. Wölfflin's publications include: a large number of articles

in various scientific journals, especially in his own *Archiv*, *Antiochus von Syrakus und Cœlius Antipater* (1872, 5th ed., 1900); *Lateinische und romanische Komparation* (1879); *Regula Benedicti* (1895), editions of Ampelius, Cæcilius Balbus, Polyænus, Publilius Syrus, etc.

WÖLFFLIN, HEINRICH (1864–). A German art historian. He was born at Winterthur (Switzerland), and studied philosophy and art history at the universities of Munich, Basel, and Berlin From 1893 he was professor successively at Basel, Berlin, and, after 1912, Munich His principal works are *Renaissance und Barock* (2d ed, 1908); *Die Jugendwerke des Michelangelo* (1891), *Die klassische Kunst* (5th ed., 1912, Eng. trans., *The Art of the Italian Renaissance*, London, 1903); *Die Kunst Albrecht Durers* (2d ed, 1908). His work combines sound scholarship with remarkably keen and original criticism, and is especially illuminating in the comparison of general styles.

WOLF HOLES. See TROUS-DE-LOUP.

WOLFHOUND. See WOLF DOG; GREYHOUND.

WOLFRAM, wul'fram A name sometimes applied to the element tungsten (q.v.).

WOLFRAMITE, wul'fram-īt (from Ger. *Wolfram*, from *Wolf*, wolf + *Ram*, *Rahm*, froth, cream, soot). A mineral iron manganese tungstate crystallized in the monoclinic system. It has a submetallic lustre, and is dark brown or dark gray in color but always nearly black. It occurs associated with tin ores in quartz and with galena, pyrite, and sphalerite. It is found in Saxony, in France, in Cornwall, England; in Bolivia, South America; and in the United States. A variety consisting almost entirely of manganese tungstate, known as *hübnerite*, is found in Colorado, Nevada, and Montana. See TUNGSTEN.

WOLFRAM VON ESCHENBACH, vŏlf'räm fŏn ĕsh'en-bäĞ (c.1165–c 1220). The greatest of Middle High German epic poets. He was born at Eschenbach, near Ansbach, in Bavaria, and passed his life chiefly at Wildenberg, now Wehlenberg, near Ansbach, but made frequent visits at the court of Hermann, Landgrave of Thuringia, where he was associated in friendly rivalry with Walther von der Vogelweide (q.v.) and is supposed to have taken part in the poetical contest of the Wartburg (q.v.). He tells us that he could neither read nor write; but he treasured in his memory as literary material all the learning of his day accessible to the layman. His thought is clear and deep, his humor unfailing, his grasp on life strong. He begins his literary production with *Dawn-Songs* (*Tagelieder*) of love in the Provençal manner, but he soon bade farewell to these exquisite trifles to deal with great spiritual questions in *Parzival* (an epic of 25,000 lines, produced between 1200 and 1210) and *Willehalm*. In the former the author borrows from French poems of Celtic origin, in the latter from French national poetry. But the treatment is entirely original. *Parzival* (see PERCEVAL), adapted from *Le conte del Graal* of Chrestien de Troyes, and the poem of an unknown author named Kyot, gave to the saga of the Grail its final form and contains much shrewd criticism of chivalry and court life. It is the story of the soul development of a young knight, and has many points of resemblance to the later *Simplicissimus* and also to Goethe's *Faust*. *Willehalm* is in the main historical and philosophic, with charming scenes of household joys and wedded love Two fragments of another epic, *Titurel*, are dubiously attributed to Wolfram. No work of the poets of his period is more instinct than his with the ideals and aspirations of chivalry at its best.

Wolfram's *Works* were edited by Lachmann (Berlin, 1833; 5th ed., 1891); *Parzival* and *Titurel* also by Martin (Halle, 1903) and by Bartsch (2d ed., Leipzig, 1875–77), with explanatory notes. Of *Parzival* there are modernized versions by Simrock (6th ed, Stuttgart, 1883); San-Marte (Halle, 1886), who has written also a volume of *Parzival-Studien;* Bötticher (2d ed., Berlin, 1893), and Hertz (Stuttgart, 1898). There is also an admirable English version by Jessie Weston (London, 1894). Consult: San-Marte, *Leben und Dichten Wolframs von Eschenbach* (Magdeburg, 1836–41); Bötticher, *Die Wolframlitteratur seit Lachmann* (Berlin, 1880); id., *Das Hohelied vom Rittertum* (ib., 1886); Sattler, *Die religiösen Anschauungen Wolframs von Eschenbach* (Graz, 1895); Panzer, *Bibliographie zu Wolfram von Eschenbach* (Munich, 1897).

WOLFRUM, vōl'frum, PHILIP (1854–). A German composer and conductor, born at Schwarzenbach (Upper Franconia). After receiving his musical education at the Royal Music School at Munich, where he studied under Bärmann, Rheinberger, and Wüllner, he began his career as music teacher at the seminary in Bamberg. In 1884 he was called to the University of Heidelberg as university music director and organist. At the same time he assumed the conductorship of the Bachverein, which soon became famous for its excellent renditions of the works of Bach. In 1898 he was made professor at Heidelberg and in 1907 general musical director. He wrote three organ sonatas, three tone poems for organ, several choruses, some chamber music, many songs, and a large choral work with orchestra, *Weihnachtsmysterium*. In 1906 he published an excellent biography of J. S. Bach.

WOLFSBANE. See ACONITE.

WOLGEMUT, MICHEL. See WOHLGEMUTH.

WOLKENSTEIN, OSWALD VON. See OSWALD VON WOLKENSTEIN.

WOLLASTON, wul'as-ton, WILLIAM HYDE (1766–1828). An English chemist and physicist, born at East Dereham, in Norfolk. He received his general education at Cambridge and also studied medicine there. After practicing as a physician at Bury St. Edmunds, he removed to London, and devoted himself wholly to scientific investigation. His researches were prosecuted over a wide range of sciences, but were preeminently fruitful in chemistry and in optics. Besides important work in connection with the atomic theory, his name is connected with the discovery of several elements, including palladium and rhodium, and with a method of making platinum malleable, which rendered the metal useful as it is. His contributions to optics are not less important. He was the first to observe the dark lines of the solar spectrum, which were later rediscovered independently and explained by Fraunhofer. Wollaston also made many valuable observations on the refraction of light and invented an apparatus for measuring the refractive power of solids. His most valuable inventions were the camera lucida, which has since proved indispensable in microscopic work, and the reflecting goniometer,

an apparatus used for determining the geometrical form of crystals. The results of his research work were published, partly in the *Philosophical Transactions*, partly in the *Annals of Philosophy*. He left a sum to the Geological Society of London to provide for the Wollaston medal to be awarded in recognition of "researches concerning the mineral structure of the earth."

WOLLASTONITE, wul'as-tun-it (named in honor of William Hyde Wollaston, q.v.). A mineral of the pyroxene group (q.v.), calcium silicate crystallized in the monoclinic system. It has a vitreous lustre, and is white, gray, yellow, red, or brown in color. It occurs in granular limestone and in regions of granite as a contact formation, or in ejected masses in connection with basalt and lava. It is found in Finland, Norway, Sweden, the Harz, Italy, Portugal, Ireland, and in the United States.

WOLLE, wol'ē, JOHN FREDERICK (1863–). An American organist and conductor, born in Bethlehem, Pa. He began his musical education with D. D. Wood at Philadelphia in 1883. In 1884–85 he was a pupil of Rheinberger at the Royal Music School of Munich, and after his return studied organ for a year with S. P. Warren in New York. From 1885 to 1905 he was organist of the Moravian Church at Bethlehem, and, from 1887, also of the Packer Memorial Church, Lehigh University. In 1905 he was called to the newly created chair of music in the University of California, where he remained till 1912, then returning to his former activity in Bethlehem. His enthusiasm for Bach led him to establish in 1898 the annual Bethlehem Bach Festival (q.v.), an event of the first importance among American music festivals. While in California Wolle tried to give the same festivals at Berkeley, but conditions were not favorable. In 1914 he founded the Choral Society of Harrisburg, Pa., and the Oratorio Society of York, Pa., in 1916 the Oratorio Society of Lancaster, Pa. In the same year he also accepted the post of organist at Trinity Church (P.E.), Bethlehem. In 1904 the Moravian College conferred upon him the degree Mus. Doc. He became known as one of America's foremost concert organists, and as the composer of several anthems and songs.

WOLLSTONECRAFT, wul'stūn-krăft, MARY. See GODWIN, MARY WOLLSTONECRAFT.

WOLOF. An African negro race. See YOLOF.

WOLOWSKI, vō-lôf'skė, LOUIS FRANÇOIS MICHEL RAYMOND (1810–76). A French political economist and statesman, born in Warsaw. He was educated in France and took part in the Polish revolution of 1830. He then settled in Paris and founded the *Revue de Législation et de Jurisprudence* (1833). In 1839 he became professor of commercial law in the Conservatoire des Arts et Métiers. In 1852 he founded in Paris the first Crédit Foncier bank; in 1864 became professor of political economy in the Conservatoire; and in 1875 was appointed a life Senator. Among his numerous published works are: *Mobilisation du crédit foncier* (1839); *De l'organisation industrielle de la France avant Colbert* (1842); *Le grand dessein de Henri IV* (1860); *Les finances de la Russie* (1864); *L'or et l'argent* (1870); *Résultats économiques du paiement de la contribution de guerre en Allemagne et en France* (1875).

WOLSELEY, wulz'lī, GARNET JOSEPH, first VISCOUNT (1833–1913). A British soldier, born at Golden Bridge, County Dublin, Ireland, June 4, 1833. He entered the army in 1852, and in the Burmese War of 1852–53 was severely wounded. He was twice wounded in the Crimean War. For his bravery in the latter struggle he was given the cross of the Legion of Honor by Napoleon III. He served as captain in the Indian Mutiny, and as lieutenant colonel in the Chinese expedition of 1860. He then went to Canada, and in 1870, as commander of the Red River expedition, he suppressed the Riel insurrection at Fort Garry. For this service he was made knight of the Order of St. Michael and St. George. As major general he commanded the British troops in the Ashanti War, 1873–74. For his courage, energy, and perseverance in these campaigns, he received the thanks of Parliament and a grant of £25,000. In 1875 he was dispatched to Natal to superintend the affairs of the colony; the next year he was nominated a member of the Indian Council, and in 1878 he was made high commissioner and commander in chief in Cyprus, from which post he was recalled in 1879 in order to proceed to the seat of the Zulu War, with supreme civil and military command in Natal, the Transvaal, and adjacent disturbed territories. He arrived just before the power of the Zulu King was broken at Ulundi, and arranged the terms of peace with the enemy. Thereupon he organized the government in Zululand. In 1882–85 he was adjutant general. His victory over Arabi Pasha (q.v.) at Tel el Kebir, in Egypt, Sept. 13, 1882, brought him a grant of £30,000 and admission to the peerage as Baron Wolseley. He had been made K.C.M.G. as early as 1867. Again commander in Egypt in 1884–85, he attempted in vain to relieve Khartum, where Gordon was besieged, the place falling into the hands of the Mahdi just as Wolseley's advance reached the vicinity, nevertheless his able service in the Sudan campaigns won him a viscountcy. In 1890 he became commander in chief of the troops in Ireland, in 1894 field marshal, and in 1895 commander in chief of the British army. This position he resigned in 1900 in favor of Lord Roberts. Wolseley was decorated with the Order of Merit in 1902. His chief writings are: *Soldier's Pocketbook for Field Service* (1882); "Narrative of the Red River Expedition," in *Travel, Adventure, and Sport* (1889); *Life of John Churchill, Duke of Marlborough* (1894); *The Decline and Fall of Napoleon* (1895); *The Story of a Soldier's Life* (1903), an autobiography.

WOLSEY, wul'zī, THOMAS (?1475–1530). A famous English cardinal and statesman. He was born at Ipswich, in Suffolk. His father was a butcher and a small merchant of somewhat unscrupulous character. Young Wolsey was sent to Oxford, where he entered Magdalen College, and graduated at 15. He was selected fellow about 1497, and ordained priest in the spring of the following year. He was appointed master of the college school soon after. In 1500 the Marquis of Dorset, three of whose sons he had educated, presented him to the living of Limington in Somerset. His career was marked by a steady rise. Besides receiving two other benefices, he became chaplain to Archbishop Deane of Canterbury, and afterward to Sir Richard Nanfan, deputy of Calais, who commended him to Henry VII. As royal chaplain he made many friendships at court, and acquitted himself so well in special embassies to the King of

Scotland and the Emperor that he rose higher. Just before Henry's death he became dean of Lincoln, and on the accession of Henry VIII, royal almoner. Other ecclesiastical dignities followed, and he took his seat in the Privy Council towards the end of 1511.

The influence which Wolsey exercised in public affairs was such as has seldom been enjoyed by a subject. After holding for a short time the deaneries of Hereford and York, he was appointed Bishop of Tournay, which had just fallen into the hands of the English, though he never actually held the see. In the spring of 1514, however, he became Bishop of Lincoln, and six months later he was translated to the archbishopric of York. His foreign policy favored the alliance with France, and gradually led the young King away from the Emperor. His position in Europe was recognized by his nomination as Cardinal by Leo X in September, 1515; and before the year's end he was Lord Chancellor in Warham's place. His revenues were of princely magnitude, and were further enlarged by subsidies from foreign potentates, anxious for his favor. He did not bear his honors meekly; in his manner of life he affected a sumptuous magnificence, and his bearing was imperious. He openly aspired to be Pope; there seemed more than once ground for supposing that this crowning object of his ambitions was actually within reach. He became the direct representative of the papacy in 1518, as legate *a latere* in conjunction with Cardinal Campeggio, and this was afterward prolonged indefinitely, with increased powers.

His purpose in cementing the alliance with France was not to commit England exclusively to that country, but to put her in a position to control the fate of Europe. In 1521, accordingly, circumstances having changed, we find him acting as commissioner for the King in negotiating an offensive and defensive alliance with Charles V against France. He was obliged to side with the war party in the Council, and his measures for raising money caused him to be very unpopular with the nation at large. His enemies were many· eager, on occasion, to discredit him with the King; and the occasion came when the King set his heart on divorcing Queen Catharine and marrying Anne Boleyn. Wolsey was definitely hostile to the King's project, and his negotiations with the Pope for securing his consent to the divorce were conducted, it seemed to Henry, in a half-hearted manner. In 1527 he set out for France as the King's ambassador, and concluded a number of treaties with Francis I at Amiens. But during his absence Henry's displeasure was carefully fanned, and the disgrace of the once powerful Minister was accomplished. In 1529 Wolsey was stripped of his honors and driven from the court. A bill of attainder was passed against him in the House of Lords, though it was thrown out in the Commons. He retired to Esher, a house belonging to the bishopric of Winchester, which by this time he had acquired, and lived in seclusion until he received orders to go to his diocese of York. He moved slowly towards Yorkshire, but on the way was arrested by the Earl of Northumberland at Cawood on a charge of high treason. Less than a month afterward (Nov. 29, 1530), as he was being conveyed towards London in custody, he died of dysentery at the abbey of Leicester.

The faults of Wolsey are obvious; but his pride, ambition, and luxury were counterbalanced by redeeming qualities. He was generous and affable to his dependents, not a few of whom remained faithful to him, at considerable risk. Of learning he was a liberal and enlightened patron; the endowment of Christ Church, Oxford, which he had designed to call Cardinal College, is a monument of this. He was a man of large capacity, and on the whole a faithful, conscientious, and salutary counselor to the monarch who so long entirely trusted him Consult, besides the state papers of the period, which are condensed in J. S. Brewer, *Reign of Henry VIII from his Accession to the Death of Wolsey* (London, 1884); Mandell Creighton, *Cardinal Wolsey* (ib., 1888, new ed., 1903); James Gairdner, "The Fall of Cardinal Wolsey," in *Transactions of the Royal Historical Society* (ib., 1899); E. L Taunton, *Cardinal Wolsey* (London, 1900); and the contemporary *Life* by George Cavendish, as edited by Henry Morley (new ed., Boston, 1905).

WOLSTAN. See WULFSTAN.

WOLTER, vōl'tĕr, CHARLOTTE (1834–97). A German actress, one of the great tragic actresses of the nineteenth century. She was born at Cologne and began her career in Budapest. Then she joined a traveling company, played at the Carltheater in Vienna, and from 1859 to 1861 was engaged at the Victoriatheater in Berlin. The sensation created there by her impersonation of Hermione in *The Winter's Tale* led in 1862 to a permanent engagement at the Hofburgtheater in Vienna where she was one of the prime favorites. From the rich repertory at her command may be singled out as her best rôles: Adrienne Lecouvreur, Maria Stuart, Lady Milford, Messalina, Iphigenie, Sappho, Medea, and Lady Macbeth. In 1874 she married Count O'Sullivan de Grasz (died 1888).

WOLTMANN, vōlt'mân, ALFRED (1841–80). A German art historian. He was born at Charlottenburg, studied at Berlin and Munich, and was appointed professor of art history successively at the Polytechnicum in Karlsruhe (1868) and at the universities of Prague (1874) and Strassburg (1878). Besides his principal work, *Holbein und seine Zeit* (2d ed., 1873–76), he wrote *Die deutsche Kunst und die Reformation* (2d ed., 1871), *Die Baugeschichte Berlins* (1872), *Geschichte der deutschen Kunst im Elsass* (1876), *Die deutsche Kunst in Prag* (1877), and *Aus vier Jahrhunderten niederlandisch-deutscher Kunstgeschichte* (1878). Conjointly with the author he adapted the fifth volume of Schnaase's *Geschichte der bildenden Kunste* for the second edition (1872), and with Karl Woermann (q.v.) began a *Geschichte der Malerei* (1878), completed after his death by his collaborator.

WOLVERHAMPTON, wụl'vẽr-hăm'tŭn. A manufacturing town in Staffordshire, England, 13 miles northwest of Birmingham (Map: England, D 4). On the south and east are coal mines, ironstone pits, blast furnaces, forges, rolling mills, and foundries. Its chief manufactures are tin plate and japanned goods, enameled hollow wares, locks and keys, edge tools, iron braziery and galvanized iron goods, gas and water tubes, cycles, automobiles, cables and railway fastenings, and iron-foundry goods of many kinds. The town possesses an exchange, an agricultural hall for the use of farmers and corn dealers, a spacious cattle market, a market hall, and a commodious and handsome town hall. St. Peter's Church, built in the fourteenth cen-

tury and recently restored, is a stately edifice. The town contains hospitals, free libraries, a school of art, and an art gallery. Originally called Hamtun or Hamtune, the town was named Wolfrunehampton after Wulfruna, sister of Ethelred II, who founded a college here in 996. During the Civil War it was for a time the headquarters of Prince Rupert. Pop., 1901, 94,180; 1911, 95,328.

WOLVERHAMPTON, HENRY HARTLEY FOWLER, VISCOUNT. See FOWLER, H. H.

WOLVERINE, wŭl'vĕr-ēn' (probably French-Canadian, from Eng. *wolf*), or CARCAJOU. The largest of the American fur-bearing animals (*Gulo luscus*), of the family Mustelidæ, and closely related to the glutton (*Gulo gulo*) of the Old World. It is bearlike in form, about 40 inches in total length, less than a quarter of which is taken by the tail, and is short-legged and square-headed. In color it is deep blackish brown, with a pale area on the back, and light spots on the throat or chest, legs, feet, and belly nearly black. It is found throughout Canada, the northern Rocky Mountain region, and thence to the Arctic shores, wherever the country is wooded; and is everywhere regarded by the trappers and Indians as the most powerful, cunning, and diabolical of creatures, because it disturbs and robs their traps and breaks into their caches and lodges. For superstitions about the animal in Europe, see GLUTTON. In reality the wolverine is simply a large, clumsy, shaggy marten, of great strength, and displaying great sagacity in procuring food where the supply is limited or precarious. It is imperfectly plantigrade, unable to climb trees, lives in dens or burrows, and does not hibernate. It feeds upon carcasses of large animals when it finds them slain, but does not destroy such creatures itself, its ordinary prey being small, a fox being about the largest of its victims. It exhibits extraordinary cunning in escaping destruction by the various methods designed to kill or capture it. Consult Elliott Coues, *Fur-Bearing Animals* (Washington, 1877), and E. T. Seton, *Life Histories of Northern Animals* (New York, 1909). See Plate of FUR-BEARING ANIMALS.

WOLVERINE STATE. Michigan. See the article STATES, POPULAR NAMES OF.

WOLZOGEN, vŏl'tsō'gen, ERNST, BARON VON (1855–). A German novelist and playwright, born at Breslau, brother of Hans Wolzogen. His mother was an English woman. He studied philosophy, German literature, and art history at Strassburg and Leipzig, and in 1901 established the so-called "Ueberbrettl," a kind of artistic variety show for the performance of lyric and minor dramatic poems, for vocal recitals, and for pantomimes. A moderate adherent of the modern realistic tendency in literature, he kept aloof from its pessimistic and erotic perversities, and, endowed with keen power of observation, proved to be a humorist in the best sense of the word. He lectured in America in 1910. A partial list of his writings includes: *Um dreizehn Uhr in der Christnacht* (1879); *Immaculata* (1881); *Heiteres und Weiteres* (1886); *Basilla, ein Thuringer Roman* (1887); *Die Kinder der Exzellenz* (1888); *Blau Blut* (1888–91), a three-volume cycle of stories; *Erlebtes, Erlauschtes, und Erlogenes* (1892); *Die Entgleisten* (1893); *Ecce Ego! Erst komme ich* (1895); *Die Erbschleicherinnen* (1895); *Der Kraft-Mayr* (1897); *Das dritte Geschlecht* (1899; 150th ed., 1905); *Feuersnot* (1901; 20th ed., 1910), an opera with music by R. Strauss, *Der Hilfs-bremser* (1905); *Seltsame Geschichten* (1906); *Der Bibeltase* (1907); *Der Erzketzer* (1911); *Konig Karl* (1913), *Das Lumpengesindel*, serio-comedy (1892), and other successful dramas, the critical essays *George Eliot* and *Wilkie Collins* (1883); a translation of Sheridan's *The Rivals;* and *Die funf Enakssohne* (1914), stories.

WOLZOGEN, HANS, BARON VON (1848–). A German author, born at Potsdam, brother of Ernst Wolzogen. He studied philosophy and philology and settled in 1878 at Bayreuth as editor of the *Bayreuther Blatter*, founded by Richard Wagner. He wrote *Der Nibelungenmythos in Sage und Litteratur* (1876); *Poesische Lautsymbolik* (1876); *Ueber Verrottung und Erettung der deutschen Sprache* (3d ed., 1890), *Die Religion des Mitleidens* (1883); *Die Idealisirung des Theaters* (1887), *Grossmeister deutscher Musik* (1897 et seq.), and for the promotion of Wagner lore. *Erlauterungen zu Wagners Nibelungendrama* (4th ed., 1878); *Richard Wagners Tristan und Isolde* (1880); *Die Tragodie in Bayreuth und ihr Satyrspiel* (5th ed., 1881); *Die Sprache in Wagners Dichtungen* (3d ed., 1889); *Was ist Stil? was will Wagner?* (3d ed., 1889); *Richard Wagners Heldengestalten erlautert* (1886); *Erinnerungen an Richard Wagner; Wagneriana* (1890); *E. T. A. Hoffmann und Richard Wagner* (1906), *Aus Richard Wagners Geistesuelt* (1908). He also produced Modern High German versions of *Der arme Heinrich* by Hartmann von Aue (1872), of *Beowulf* (1873), of the *Edda* (1877), and of Aeschylus and Euripides.

WOLZOGEN, KAROLINE VON (1763–1847). A German poet and novelist, born (von Lengefeld) at Rudolstadt, a sister of Schiller's wife, Charlotte. Married early to Councilor von Beulwitz and separated from him in 1794, she contracted in 1796 a second union with Baron Wilhelm von Wolzogen, a court official at Weimar and a schoolmate and friend of Schiller's. After 1825 she settled at Jena. Her first novel, *Agnes von Lilien* (1798), published anonymously, was by some attributed to Goethe or Schiller. At Jena she wrote *Erzahlungen* (1826–27) and the novel *Cordelia* (1840), but her most important work is *Schillers Leben, verfasst aus den Erinnerungen der Familie, seinen eigenen Briefen und den Nachrichten seines Freundes Korner* (1830; 5th ed., 1876), a faithful portrayal of the poet, based upon personal observation.

WOMAN. See WOMEN.

WOMAN HATER, THE. 1. A burlesque, the earliest-known play of Beaumont and Fletcher, printed anonymously in 1607. 2. A novel by Charles Reade (1877).

WOMAN IN WHITE, THE. A popular novel by Wilkie Collins (1860).

WOMAN KILLED WITH KINDNESS. A tragedy by Thomas Heywood, produced in 1603, printed in 1607.

WOMAN'S CHRISTIAN TEMPERANCE UNION. A well-known organization which had its origin in the great temperance crusade of 1874. When the force of that remarkable uprising had been spent, and reaction was felt, a call was issued from Chautauqua in August, signed by Mrs. Mattie McClellan Brown, Mrs. Jennie Fowler Willing, Mrs. Emily Huntington Miller, and others, summoning a national convention of temperance women to be held in

Cleveland, Ohio, Nov 17, 1874. Sixteen States were represented at the convention. Conventions have been held annually since then and in 1916 there were State and Territorial organizations in every State and Territory in the United States. (See WORLD'S WOMAN'S CHRISTIAN TEMPERANCE UNION.) The conditions of membership in the W. C T. U. are signing the total abstinence pledge, and paying annually into the treasury of the local union a sum of not less than 50 cents. Part of the money is retained for local work, and a part is used for auxiliary fees to State, national, and world's unions. The total paid membership in the United States in 1916 was about 500,000. The badge of the society is a bow of white ribbon. Mrs. Annie Wittenmyer was the first president of the national society. Miss Frances E. Willard (q v.) succeeded her in 1879. She held the position until her death in 1898, when Mrs L. M. N. Stevens of Maine became the national president; and she was succeeded by Miss Anna A Gordon in 1914. The work is carried on by means of departments, under six general heads. There are also two branches, the Young Woman's Branch and the Loyal Temperance Legion Branch, the latter having over 300,000 members.

Following is a list of the departments, under their proper groupings: (1) ORGANIZATION. Organizers, Lecturers and Evangelists; Young Woman's Branch; Loyal Temperance Legion Branch; Work Among Foreign Speaking People; Work Among the Colored; Work Among the Indians. (2) PREVENTIVE: Health in Medical Temperance. (3) EDUCATIONAL: Scientific Temperance Instruction; Physical Education; Sunday School; World's Missionary Fund; Presenting Our Cause to Influential Bodies; Temperance and Labor; Parliamentary Usage; Coöperation with Missionary Societies; W. C. T. U. Institutes; the Press; Antinarcotics; School Savings Banks, Juvenile Courts, Industrial Education and Anti-Child Labor; Medal Contests. (4) EVANGELISTIC· Evangelistic, Almshouse, and Unfermented Wine at Sacrament; the Bible in the Public Schools; Proportionate and Systematic Giving; Prison Reform, Work Among Railroad Men; Work Among Soldiers and Sailors; Work Among Lumbermen and Miners; Sabbath Observance; Humane Education; Moral Education and Race Betterment; Mothers' Meetings and White Ribbon Recruits; Rescue Work; Purity in Literature and Art. (5) SOCIAL: Social Meetings and Red Letter Days; Flower Mission and Relief Work; Fairs and Open Air Meetings. (6) LEGAL: Legislation; Christian Citizenship; Franchise; Peace and International Arbitration. There are also a Bureau of Publicity; a Bureau of Uniform Legislation; and a Special Committee on Antipolygamy Amendment to the Federal Constitution.

In pursuance of the "Do Everything" policy, the Woman's Christian Temperance Union has come to stand not only for total abstinence, but for an equal standard of purity for men and women, and for woman's equality in the home, the Church, and the State. Under its leadership every State in the Union has enacted legislation providing for the teaching of physiology and hygiene in the public schools, with especial reference to the effects of alcohol and narcotics. Similar legislation has been passed by Congress providing for such instruction in all schools under national control, including naval and military academies. It has successfully urged legislation raising the age of consent, demanded equal pay for equal work, and equal educational, professional, and industrial opportunities for women For many years Mrs Margaret D. Ellis has been its representative at Washington, D. C, and through her considerable influence on legislation has been exerted. The Sunday-school department aided greatly in securing the international series of quarterly Sunday-school lessons, and the observance of World's Temperance Sunday. The headquarters of the National Woman's Christian Temperance Union are at Rest Cottage, the former home of Miss Willard, at Evanston, Ill. Its official organ is *The Union Signal;* and it issues *The Young Crusader,* official organ for the Loyal Temperance Legion Branch, both published at Evanston. In addition there are published monthly papers by the W. C. T. U.'s of 44 of the States. See WORLD'S WOMAN'S CHRISTIAN TEMPERANCE UNION

WOMAN'S COLLEGE OF BALTIMORE See GOUCHER COLLEGE.

WOMAN'S EXCHANGE. An organization for the purpose of helping women in reduced circumstances to become self-supporting through the sale of articles of their handiwork The first Woman's Exchange in the United States was founded by Mrs. William G. Choate in New York City in 1878. Thirty articles represented the entire stock, while in 1916 the work in every department numbered thousands of articles and compared favorably with that found in the best shops. There was also a lunch room in connection with the Exchange. Similar organizations may be found in nearly every large city of the United States, while several have been established in Europe. Each, however, is entirely separate and independent. The report of the original New York Exchange for Woman's Work for the year ending Feb. 29, 1916, showed that the sum of $105,731.27 was realized from the sale of consigned goods, and the annual subscriptions aggregated $7458.50. The total amount paid to consignors since the organization was started was $2,010,346.35.

WOMAN'S RELIEF CORPS. A woman's patriotic society organized in July, 1883, and known as an auxiliary to the Grand Army. The society is composed chiefly of the mothers, wives, daughters, and sisters of Union soldiers of the Civil War, although all loyal women are eligible to membership. The organization, like the Grand Army, is divided into departments, of which there are 35, and into smaller divisions called corps, of which there are about 3000, with a total membership of about 150,000. The society has expended over $2,000,000 in charities among the widows and orphans of Union veterans. An organization, known as the Ladies of the Grand Army, is composed of the wives, mothers, daughters, sisters, blood-kin nieces, and all lineal descendants of soldiers and sailors of the Civil War; but army nurses may become members.

WOMAN'S RIGHTS PARTY. See PARTY NAMES.

WOMAN SUFFRAGE. The rise of equal suffrage is the latest and the most democratic stage in the general process of social liberation which has been gaining velocity and strength ever since the Reformation. The general tendency is to abolish sex privilege and to recognize the equal personality of woman in the household and in the state. In particular, the

woman's rights or feminist movement (see FEMINISM) is an organized effort to secure for women and men educational, economic, and political equality. The following discussion deals with the movement down to the year 1916.

RISE OF EQUAL SUFFRAGE IN EUROPE

Agitation in Europe. At the time of the Revolution in France, under leadership of Olympe de Gouges, Theroigne de Méricourt, and especially of Condorcet, a strong appeal was made for social justice to women, but, except in proclaiming the logical theory of human rights, it bore no fruit in the action of the revolutionary legislative bodies. The Code Napoléon was unjust, almost barbarous, in its provisions relating to wife and mother. At the Bourbon restoration mediævalism triumphed; and it was not until after the Revolution of 1848 that the general woman's rights movement slowly gathered force. Measures favoring equal suffrage and equal civil privilege, backed by petitions, have often been proposed. Since 1908, women may vote for and be elected members of the courts of arbitration in trade disputes. A French Woman's Suffrage Union was formed in 1909, and became a member of the International Suffrage Alliance. According to Dr Schirmacher, the most radical party of French woman's rights advocates demanded "absolute coeducation, antimilitary instruction in history; the admission of women to government positions, equal pay for both sexes; official regulation of the work of domestic servants; the abolition of the husband's authority; municipal and national suffrage for women."

Until deprived of it by the constitution of 1831, the women of Belgium had municipal suffrage. In 1908 Brussels and in 1909 Ghent each formed an equal suffrage society, which united in the Woman's Suffrage League and joined the International Alliance. Under leadership of Emilia Pardo Bazán, Concepción Arenal, and others, Spanish women began to demand release from patriarchalism and the priestly yoke. In the Cortez of 1908 a bill granting tax-paying women a voice in municipal elections was lost by a vote of 65 to 35. The deputy who introduced the measure "argued that the suffrage of a woman who is the head of a family seems more reasonable to him than the suffrage of a young man, 25 years old, who represents no corresponding interest." Since 1877, various attempts have been made in the Italian parliament to enfranchise women. The National Woman's Suffrage League, composed of several local societies, joined the International Alliance in 1906. A report of the Amsterdam Congress of the Alliance declares that the women of the Italian "aristocracy wish to vote because they are intelligent, they feel humiliated because their coachman or chauffeur is able to vote. The workingwomen demand the right to vote, that they may improve their conditions of labor and be able to support their children better." For the consideration of equal suffrage a parliamentary commission was created in 1908.

The movement for economic and educational emancipation was gaining some headway among Slavic peoples. It was so in Russia; but in that country agitation for political equality was difficult in the face of a suspicious or hostile government. Nevertheless a beginning has been made. If owners of large estates women may vote for the provincial assemblies. In rural districts, the wife who is head of the family may vote when the husband is absent or dead, and in cities women exercise the franchise by proxy if they own houses or pay taxes. Suffrage societies have been formed and united in a league. By permission of the government, a national congress of women was held in 1908. "The discussion," says Schirmacher, "concerned education, labor problems, and politics. Publicity was restricted, police surveillance was rigid, addresses on the foreign woman's suffrage movement were prohibited." Nevertheless the congress declared that "only the right to vote can secure for the Russian women a thorough education and the right to work."

In the Austrian Empire conditions were scarcely better. Universal equal suffrage was favored by the Socialists. Since 1849, except in Illyria, Carinthia, and Lower Austria, tax-paying women may vote by proxy in municipal elections; since 1861, for the members of the provincial legislatures; and since 1873, if owners of large estates, for the Imperial Parliament. In 1910 women owners of real estate in Bosnia gained the parliamentary franchise. The Imperial law regulating public meetings and organizations "excludes women from political organizations, thus making the forming of a woman's suffrage society impossible." A government resolution for the early introduction of a measure to grant national equal suffrage in Bohemia had not been carried out in 1916. In 1908 Madam Kunetica was elected a representative to the Bohemian Parliament. Her election was regular and her popularity pronounced, particularly in the Social-Democratic party. Yet "the Lord Lieutenant constantly put off the formal recognition of the results of the election; and through these technical delays the validity of the election was automatically canceled by the dissolving of Parliament July 26, 1913" (Sarka B. Hrbkova). In the Hungarian division of the dual monarchy a vigorous campaign for woman's suffrage has been in progress since 1904 under auspices of the Feminist Society.

Social and moral conditions in Germany have been very unfavorable to the feminist movement. The dominance of militarism, the tenacity with which the dual standard of sex-morality is upheld; the survival of mediæval ideals of woman's sphere, the clash between the "woman's rights movement of the middle class" and that of the socialists; the sectarian schism: all these have combined to retard and to embitter the struggle for equal rights. The woman's movement was well organized; and in many positions women were proving their capacity for public affairs. Until 1908, when an Imperial law removed the disability, women could not legally share in political meetings or organizations, except in some South German states. After the passage of this law, a National Women's Suffrage Society was formed; and since 1908, Schirmacher says, the "political woman's rights movement has been of first importance in Germany. As the women tax-payers in a number of states can exercise municipal suffrage by proxy, and the women owners of large estates in Saxony and Prussia can exercise the suffrage in elections for the diet of the Circle (*Kreistag*) by proxy, an effort is being made to attract these women to the cause of woman's suffrage."

The first appearance of a woman as a public speaker in the Netherlands, 1846, was the presage of the equal rights movement among the Dutch women. In 1883 the petitions of Alletta Jacobs, the first woman physician in the Netherlands, to secure municipal and parliamentary suffrage were denied. Interest aroused by this event resulted in the creation of a Woman's Suffrage Society in 1894. A part of its members separated from it in 1906, to form the Woman's Suffrage League; and both organizations conducted an active campaign, aided by a Men's League for Woman's Suffrage.

"Since 50 per cent of the Swiss women remain unmarried, the woman's rights movement is a social necessity" (Schirmacher, 134). Especially in gaining equal educational opportunity, progress has been rapid in Switzerland since 1880 Women in Switzerland may exercise the municipal suffrage "in those localities whose male population is absent at work during a large part of the year." They may be elected members of school boards in Canton Neuchâtel, as "members of school boards and as poor-law administrators" in Canton Zurich. The credit of starting the movement for the wider political suffrage of women belongs to Professor Hilty of Bern, in 1897. Since then organized propaganda has made some headway, under leadership of the National Woman's Suffrage League.

Adoption in Scandinavia. In Europe the honor of priority in sanctioning the actual full political enfranchisement of woman belongs to the Scandinavian peoples. Here the environment was favorable to the realization of social justice and morality. Intelligent public opinion existed and wise educational methods fostered an enlightened spirit of community action. Extraordinary progress has been made in projects for industrial and general social betterment. It was inevitable that woman should be admitted as an even partner in the nation's work. The Finnish women were first to gain equal suffrage. For five centuries preceding the cession to Russia in 1809, Finland was an appanage of the Swedish crown. Its democratic spirit and unique civilization have withstood even the Russifying policy of Nicholas II since 1898. Municipal suffrage was gained by tax-paying women living in country districts in 1863, and by tax-paying women living in cities in 1872. Under the new constitution granted by the Czar in 1906, the Finnish diet of that year granted women the full parliamentary suffrage, over 700,000 women being thus enfranchised. Of these from 55 to 60 per cent were actual voters; and to each diet from 16 to 25 women have been elected as members. "The women legislators have come from all classes of society," says Björkman. "Most of them have been over 40, and most of them have been married women. Three have husbands sitting in the diet with them. Three have given birth to children during their terms of office, but without absenting themselves from the sessions for more than a few weeks."

The first independent European nation to establish full equal suffrage was Norway. Tax-paying women gained the municipal franchise in 1901, and the full franchise in 1907. To all women the municipal suffrage was extended in 1910, and the full parliamentary suffrage, with eligibility to all offices, in 1913. About 500,000 women were thus added to the electorate; and of these from 20 to 55 per cent regularly made use of the vote.

As early as 1882 the Parliament (Althing) of Iceland granted the municipal or communal suffrage to tax-paying widows and spinsters, in 1907 it was extended to all women; while in 1914 the Althing adopted an amendment to the constitution establishing equal suffrage for women 40 years of age and over. From 50 to 80 per cent of the 11,000 enfranchised women of Iceland vote at the elections. Following the example of her nearly autonomous Norse colony, Denmark was the second independent nation to grant full political franchise to women. Since 1908 all tax-paying women, 25 years of age, and the wives of men who pay taxes have had the municipal suffrage. They have made efficient use of their vote. Owing to this fact and to the influence of the Great War, the long struggle for universal suffrage was won; on June 5, 1915, the new constitution granting full universal suffrage to both women and men was signed by the king. It went into effect June 5, 1916.

Sweden lagged behind its former dependency, Finland. In 1862 every unmarried woman or widow over 21 years of age paying a tax of 500 crowns (c. $135) was granted the municipal vote, without the right to hold office. Forty-seven years later, in 1909, the municipal suffrage, with eligibility to office, was extended to all women on equal terms with men In that year and again in 1912 a bill to grant full national suffrage to women was passed by the lower house of the Riksdag; but in each instance it was thrown out in the conservative upper chamber; it was again passed by the lower house in 1914. In Sweden about 1,400,000 women have the vote in municipal affairs; although only 15.2 to 32.9 per cent of them make use of it.

EQUAL SUFFRAGE IN THE BRITISH EMPIRE

English women were not expressly denied the parliamentary suffrage until 1832 nor the municipal suffrage until 1835, when in each case the restrictive word "male" appears in the election law. By custom, however, the exercise of the theoretical legal right of women to vote had long, though not always, been practically in abeyance. In the middle ages noblewomen as peeresses by inheritance or in their own right were sometimes summoned to appear in Parliament in person or by proxy, just as noblemen were summoned. Contrary to the dictum of Sir Edward Coke, the ancient election indentures bear witness that women below the rank of peers were legally empowered as suitors in the county court or as freeholders to join in the choice of knights of the shire; while after Henry III in some towns women could vote for the borough representatives to the House of Commons.

The express disfranchisement of women by the statutes of 1832 and 1835, which violate the principle of "no taxation without representation," gave rise eventually to the organized equal suffrage movement in Great Britain. "As long as both sexes and all parties are not given a just representation, good government is impossible," declared Anne Knight in a strong pamphlet in 1847. In 1851 the Earl of Carlisle presented to the Lords a petition drafted at a public meeting in Sheffield for the extension of parliamentary suffrage to women. This was the first address on equal suffrage formulated by English women. In the same year appeared Mrs. John Stuart Mill's powerful article on the "Enfranchisement of Women" in the *West-*

against Reform. This essay, together with Mr Mill's masterly *Subjection of Women*, published in 1869 but written in 1861—supplied the agitation with a definite program. The struggle of 1866-68, which resulted in a further extension of male suffrage, gave the women an opportunity. In 1866 Disraeli had said, "In a country in which a woman can be ruler, peer, church trustee, owner of estates, and guardian of the poor, I do not see in the name of what principle the right to vote can be withheld from her." Numerously signed petitions were presented through John Stuart Mill who had entered the House of Commons in 1865. On May 20, 1867, his motion to grant the parliamentary suffrage to tax-paying women was rejected by a vote of 196 to 73. The replacement of the term "male person" by "man" in the new election law gave a chance to win by interpretation: for a statute of 1851, "for shortening the language of the acts of Parliament," provided that man should always include woman except where otherwise expressly stated. Hence 5347 women in Manchester and many in other places had themselves registered as electors. On their votes in most cases being rejected by the revising barristers, an appeal was taken to the court of common pleas which in the case of Chorlton *v.* Lings (Nov., 1868), while conceding that in early times there may have been instances of "women having voted," decided adversely to the appellants on the ground that the fact of the right to vote "not having been asserted for centuries raises a very strong presumption against its ever having had legal existence."

From this date onward, especially after 1903, the British equal suffrage movement steadily gained in volume and force. In 1884, when a new election law, by lowering the property qualification, once more greatly increased the number of male voters, a motion in Parliament to enfranchise women was defeated. Such has been the fate of the many women's suffrage bills introduced since 1870, although the second reading was secured in 1886 and again in 1897; while in 1904 McLaren's resolution was carried by a majority of 114 in the House.

After 1903 public interest centred in the campaign carried on by the National Women's Social and Political Union, which was the organization of the suffragettes or militants, as contrasted with the suffragists of the National Union of Women's Suffrage Societies who preferred less aggressive methods and who constituted a large majority of the equal franchise advocates in Great Britain. Unfair treatment in Parliament and in political meetings, by the government leaders and their male party followers, was the primary cause assigned for the rise of the militant movement which was rendered spectacular by arrests, imprisonments, hunger strikes, and forcible feeding. The leaders of all the political parties have publicly favored votes for women. Among these are Sir Henry Campbell-Bannerman, John Redmond, Keir Hardie, A. J. Balfour, and Lord Salisbury (1891). Later, at least 420 of the 670 members of the Commons individually declared themselves in sympathy with equal suffrage. Yet both Conservative and Liberal ministries steadily refused to introduce a bill for the purpose. That is, they declined to avail themselves of an apparent majority in the House that would vote for such a government measure. Under these conditions, it was inevitable that a sentiment should arise in favor of coercing the ministry. The policy of coercion was suggested by the militant tactics often employed by men to influence Parliament. On Oct. 13, 1905, Sir Edward Grey, the future cabinet minister, spoke at a great Liberal meeting in Manchester. In true British fashion, various questions were asked by men in the audience and answered by the speaker. To Annie Kenney's question, "Will the Liberal government give women the vote?" no reply was given. When in substance the question was repeated, the "audience became a seething infuriated mob. Thousands of angry men were upon them feet shouting, gesticulating, and crying out upon the woman who had again dared to disturb their meeting." Then Annie Kenney and Christabel Pankhurst, her companion, were seized by the police and dragged from the Hall. Attempting to speak in the street, they were both arrested, charged with obstruction, and one of them, Miss Pankhurst, with assaulting the police. The next day, after a very summary trial in the police court, they were sent to prison on their refusal to pay a fine.

Thus, under the leadership of such able women as Miss Kenney, Mrs. Pethick Lawrence, Mrs. Drummond, and especially Mrs. Emmeline Pankhurst, with her daughters Christabel and Sylvia, was inaugurated a remarkable struggle for human rights. In spirit, the militancy of the women did not differ essentially from the militancy of men in like situations. In method, the suffragettes were far more ingenious, persistent, and self-sacrificing. Whether or not their methods were wise, assuredly they helped to convince the public that there was urgent need of woman's suffrage in Great Britain. Intelligent women of the leisure as well as of the working class do not endure suffering, invite martyrdom, without adequate cause. The "grounds for revolt" have been thus classified by an American observer during the years 1913–14: "The miserable status of English women; the impossibility of obtaining attention for, much less redress of, their grievances by constitutional methods; the historic precedents established by the use of force by the British people whenever the progress of freedom has been blocked by the British government; the insincerity and brutality shown by the present Liberal government in dealing with the women's agitation as compared with the leniency shown to male political offenders both past and present; the determination of the newspapers to stifle the movement by persistently excluding suffrage news and propaganda from their columns." In particular, the backward legal status of married women and the hardships of female wage earners constituted strong grounds of rebellion (Mary Winsor, in *Annals*, Oct. 1914, 135–136).

According to Christabel Pankhurst, although the demonstrations of the suffragettes brought down on their heads much hostile criticism, they "destroyed the apathy which enveloped the woman's suffrage movement as with a cloud. They have brought to the notice of both men and women the fact that there is a movement for woman's suffrage. They have made people think about the question." It "has taken half a century to teach women suffragists the lesson that political rights are never granted save in response to irresistible pressure"; and "the means of bringing that pressure to bear have now been discovered" (cf. *Bliss's New Encyclopedia of Social Reform*, 1301).

Though British women had not in 1916 won the parliamentary suffrage, they might share in all local elections In England and Wales both single and married women might vote for and be elected overseers, waywardens, churchwardens, poor-law guardians, rural and urban district councilors, and various other minor officers. Throughout the United Kingdom, they might vote for and—except in the county of London—be chosen members of school boards. In Scotland and Ireland both single and married women possessed the county and municipal franchise and might be elected mayors aldermen, and councilors on the same terms with men. In February, 1918 a law was passed enfranchising women at least 30 years old. Government officials declared that the law did not permit women to be elected to seats in Parliament, but an act was passed granting women the right to sit in Parliament, and in December, Lady Astor was elected to the House of Commons. Another woman member was elected in 1922. Full suffrage for women had been granted by 1918, by Austria, Canada, Czecho-Slovakia, Great Britain, Germany, Holland, Hungary, Ireland, and Poland In 1918 it was granted by the East African Protectorate, Rhodesia, Serbia and Sweden. In general the new countries established as a result of the war, have granted the right of woman suffrage in their constitutions.

Adoption in Australia and New Zealand. In each of the nine provinces of the Dominion of Canada property-owning spinsters and widows were granted municipal suffrage; while in one of them, New Brunswick, property-owning married women also might vote in city elections if their husbands were not electors. Moreover, in all these provinces taxpaying or property-owning women secured the school franchise: all such qualified women, married or single, in Alberta, Manitoba, Ontario, and Saskatchewan; widows and spinsters, in New Brunswick, Nova Scotia, Prince Edward Island, and Quebec; while in British Columbia the wives of school electors might also vote whether they owned independent property or not. Women were not eligible to city office even when they had the municipal vote; but all women who had the school franchise might be elected as school trustees. Organizations favoring full state and federal equal suffrage were formed, and in 1914 the National Union of Woman Suffrage Societies of Canada was organized.

In 1916 all women of 21 years, married or single, in Alberta, Manitoba, and Saskatchewan were granted full suffrage in provincial (state) elections on the same terms as men.

An equal suffrage movement began in South Africa; but the social and climatic conditions were not favorable to early success Suffrage societies were formed in Cape Colony, Natal, and Transvaal. The taxpaying women of Natal and Cape Colony voted in city affairs. Moreover, women had the municipal suffrage in Rangoon, the capital of Burma; in Belize, the capital of British Honduras; in Bombay and Baroda in British India.

The actual experience of the enfranchised women of New Zealand and of the Australian Commonwealth afforded a practical test of the workings of equal suffrage which the world was studying with keen interest. School suffrage in 1877, municipal suffrage in 1886, and full suffrage in 1893, were granted the women of New Zealand. They were eligible to all elective offices except membership in Parliament. In 1916 about 300,000 women were in possession of the ballot and were making practical use of it in nearly the same relative numbers as men.

In the six federated states of the Australian Commonwealth women were admitted to the school and the municipal franchise, beginning with New South Wales in 1867 and Victoria in 1869, but in none of these states were eligible to the municipal councils. Under a provision of the Commonwealth constitution (1900) full parliamentary suffrage was extended to the women of the federation in 1902. Before this date state equal suffrage had been established in South Australia, 1895; and West Australia, 1900 Then followed New South Wales, 1902, Tasmania, 1903, Queensland, 1905; and Victoria, 1908. Thus in four states women were voting for members of the federal Parliament before they could share in the election of the state legislators. They might be elected to the Senate or to the house of the federal Parliament; but only in South Australia and Queensland were they eligible to the state legislative bodies. In 1916 the number of women who might vote in the Commonwealth was about 1,100,000.

EQUAL SUFFRAGE IN THE UNITED STATES

America may justly be called the cradle of the equal suffrage movement. There it was first permanently organized, and there are recorded the earliest-known demands for representation by taxpaying women. In the United States the sentiment in favor of the full and equal educational, economic, and political freedom of both men and women has steadily grown in volume and strength ever since the Revolution. The beginning was even earlier. In 1647 Margaret Brent, "heir of Lord Calvert, the brother of Lord Baltimore, and executor of the estates of both in the colony," demanded "place and voyce" in the Legislature of Maryland; for representation was based upon property. "Her petition," says Mrs. Harper, "was hotly debated for several hours and finally denied." The Colonial records of Massachusetts, she continues, "show that women property holders voted under the old Province Charter from 1691 to 1780 for all elective officers"; and when the constitution of that year deprived them of the vote for Governor and Legislature they still retained it for other officials. In 1776 Abigail Adams wrote to her husband, John Adams, then in the Continental Congress: "I long to hear that you have declared an independence, and by the way, in the new code of laws which I suppose it will be necessary to make, I desire you would remember the ladies and be more generous and favorable to them than were your ancestors." If "particular care and attention are not paid to the ladies we are determined to foment a rebellion, and will not hold ourselves bound to obey any laws in which we have no voice or representation." Two years later, "Mrs. Corbin, sister of Richard Henry Lee, of Virginia, presented her own petition for the right to vote."

The Continental Congress, like the national Constitutional Convention of 1787, left the determination of the conditions of suffrage to the respective States. Only New Jersey conferred it on women, the constitution of 1776 giving the franchise to "all inhabitants" worth "fifty pounds proclamation money," etc. "In 1790 a revision of the election law used the words 'he or she,'

thus emphasizing the inclusion of women in the electorate Enough women voted to gain the enmity of politicians, and in 1807 the Legislature passed an arbitrary act limiting the suffrage to 'white male citizens'" (Harper, *Brief History*, 1-3). This action was probably a usurpation of authority, although the constitution is not clear regarding the mode of amendment.

The first half of the nineteenth century was a period of rising humanism in which a number of courageous and gifted women came to the front. Their first task was to secure for their sex facilities for higher education as an absolute condition of intelligently sharing in the world's work. Later they enlisted for the antislavery and the temperance campaigns, although the more conservative among their male allies, with society in general, were shocked by the public appearance of women as speakers or delegates. Yet slavery and intemperance were not the only evils which stirred the awakening social consciousness of women. Here and there even in these early decades a clear voice was raised for political liberation. Beginning in 1826 Frances Wright braved the derision of the public by advocating woman's suffrage on the lecture platform. For several years, commencing in 1836, Ernestine L. Rose, daughter of a Polish rabbi, in her lectures on the science of government argued for the full enfranchisement of women, and she initiated the 12 years' agitation which in 1848 resulted in securing for the married women of New York State the first installment of the property rights which the common law had denied. Other pioneers were Margaret Fuller (1840), the Rev Samuel J. May (1845), and Lucy Stone (1847). After 1839 these were joined by such men as William Lloyd Garrison, Wendell Phillips, and Gerrit Smith, who defended the right of women to take part in the business meetings and debates of the American Antislavery Society, and who became strong champions of votes for women.

The year 1848 marks the origin of the organized movement for equal political rights which, except during the Civil War, went on continuously gaining in force. On July 19 and 20 of that year a convention, called by Lucretia Mott, Martha C. Wright, Mary Ann McClintock, and Elizabeth Cady Stanton, was held at Seneca Falls, N. Y., the deliberations being continued at a second meeting held at Rochester in August. A strong "Declaration of Sentiments" or list of grievances, drafted by the callers of the convention and modeled on the Declaration of Independence, was signed; and resolutions were adopted setting forth the remedies required to redress such wrongs.

In the opening years of the twentieth century the extension of the ballot to women came to be looked upon less as a question of abstract or natural right, and more and more as a many-sided practical problem in which the welfare of society was deeply concerned. Discussion became more tolerant and serious, with constant appeal to facts. Twelve States and Territories granted full suffrage to women: Wyoming, 1869; Colorado, 1893; Utah and Idaho, 1896; Washington, 1910; California, 1911; Arizona, Kansas, and Oregon, 1912; Alaska, 1913; Montana and Nevada, 1914. In 1913 the Legislature of Illinois gave women as large an installment of the electoral franchise as could be granted without an amendment to the constitution. They might vote for presidential electors, some county and some State officials, and for all municipal officers. Relatively the grant of such partial suffrage in Illinois was very important, because of the probable influence of the women's vote on the moral, social, and political welfare of Chicago, which contained nearly half the population of the State. By the census of 1910, in the 12 suffrage States, excluding Alaska, there were 3,665,445 women aged 21 years or more In 1915 it was safe to say that in the United States about 4,000,000 women were eligible to vote. In all of the suffrage States the men greatly outnumbered the women. In two States, Montana and Wyoming, they were more than two to one; while in five others—Arizona, Idaho, Nevada, Oregon, and Washington—there were from 152 to 187 men to 100 women of voting age.

Many States in 1918 and 1919 gave the suffrage to women, but the chief interest in the question was centred in the amendment to the Federal constitution first introduced in Congress in January, 1918. The proposal received the required two-thirds in the House but failed to pass in the Senate, lacking two votes. This situation aroused much discussion and agitation for the adoption of the amendment. President Wilson, as commander of the army and navy, personally urged the Senate to pass the amendment as a war measure, but his efforts were in vain. The movement, however, was supported in the various States, fifteen of which, both Republican and Democratic, approved the resolution. Early in the spring of 1919 Congress again voted on the measure and passed it by the two-thirds vote required, the House, on May 23, by a vote of 304 ayes to 89 nays, and the Senate by a vote of 56 ayes to 25 nays. The amendment then went to the States for ratification and out of 36 States required, 35 had accepted the amendment by March 22, 1920. Of these 25 ratified the amendment in special sessions and 10 in regular sessions. The following States definitely refused to ratify: Georgia, Virginia, Alabama, Mississippi, South Carolina, Maryland, Delaware and Louisiana. Special efforts were made by the special party partisans in order that the women might take part in the coming presidential election. Before the election took place, the required number of States had ratified and the amendment became operative. Women thus took part, for the first time, in a presidential election, in 1920.

The result of their participation cannot be analyzed with any precision. For the most part it may be said that they followed the regular party affiliations Efforts were made in 1921–22 by certain organizations to establish a distinct woman's party. This was discouraged by the leaders of other parties, who urged the women to join in voting with the old established parties.

EXTENT OF THE WOMEN'S VOTE

It has often been asserted as an objection to equal suffrage, that women make small use of the ballot when they get it. Only 66.4 per cent of the eligible males of the United States cast their ballots in the presidential election of 1904; 67.6 per cent in 1908; and 60.4 per cent in 1912. In other elections the extent of the vote was often much smaller. It was a significant proof of the stimulating or socializing effect of the equal participation of the sexes in public affairs that generally the average percentage

of men voting rose after women went with them as full active citizens to the polls. In 1903, at the first Federal election in which women voted in Australia, 53 per cent of the eligible men cast their ballots, whereas the percentage had risen to 56 in 1906 and to 67 in 1910.

In the first two elections after obtaining the suffrage in New Zealand the women voted in larger proportion than the men; in the five subsequent elections they nearly held their own, while the percentage of males voting rose from 66.61 to 84.43 during the 18 years.

The laws of the American suffrage States, unlike those of Europe and Australia, did not provide for a separate record of the number of persons of each sex eligible (enrolled), registered, and voting Yet through special investigations and from careful estimates, it was clear that in all the equal suffrage States women were voting in large numbers. As a general rule, the proportion of eligible women who vote is smaller than that of the eligible men. Sometimes, however, in particular places or in particular elections, the reverse is true. It was estimated that in Utah and Wyoming the eligible men and women went to the polls in about equal proportion, while in Idaho the estimated vote of eligible women was about 10 per cent less than that of the men. In Oregon and Washington the proportion of eligible women taking part in rural and even city elections was smaller than that of the men; the same is true of Colorado and of its capital, Denver. In Illinois, notably in Chicago, the vote of the newly enfranchised women became a real menace to the vice and liquor interests. In 37 representative counties of California the percentage of eligible women who registered varied from 20 to 100; and the percentage of registered women who voted ranged from 20 to 90, the average being about 60. "Five out of 34 counties show a larger percentage of women than of men registered"; and in the State at the election of 1913 not less than 251,847 women voted (Bjorkman).

The contention that under equal suffrage the vote of the women of the red-light districts was a social menace was not sustained by the available statistics. In Seattle and Denver this vote was relatively so small as to be negligible. In Seattle and Los Angeles the larger women's vote was cast in the best residential wards, the smaller, in the poorer districts; and the "average in the precincts inhabited by people of modest means" (Creel). Such is not always the case, as some of the districts of Denver, where many foreigners dwell, show a surprisingly high percentage of women voters.

EFFECT OF THE WOMEN'S VOTE

It was asserted by the antisuffragists that women voters had not improved the laws or the social conditions in the suffrage States. Suffragists did not expect an immediate revolution; did not hope to correct all the man-made blunders in law or politics; nor promised as a return for the grant of the ballot to make no similar errors. The extension of the suffrage to each "lower" religious, economic, or race class of men has never been conditioned by a pledge to make better laws than those made by the men already enfranchised.

Nevertheless no well-informed, disinterested person can doubt that women actually improved law and government in the suffrage States. Modern law and administration are largely concerned with the affairs in which from the infancy of the race woman has been the expert: viz., the welfare of mother, infant, and child, the ordering of the household life.

The equal suffrage States were conspicuous for their remedial and constructive social legislation, and for some of the good laws of nonsuffrage States it was claimed chief credit belonged to leaders in the suffrage movement. Antisuffragists persistently denied that woman's vote bettered conditions in Colorado. The evidence to the contrary appears to be decisive. Women did something to cleanse partisan politics, and in social politics they made a splendid record of efficient legislative and administrative service. Perhaps only California could show a more remarkable achievement.

The newer forms of social control were accented in the other equal suffrage States. Effective "abatement and injunction" laws—the best weapon against commercialized vice—were enacted in California, Colorado, Idaho, Kansas, Oregon, Utah, and Washington. Everywhere women were voting against the brothel and white slavery. For the protection of young girls, the "age of consent" was raised to 18 in California, Colorado, Idaho, Kansas, Utah, Nevada, Washington, and Wyoming. Only four nonsuffrage States had reached this high standard with really effective laws Colorado, Oregon, and Washington were "experiment stations" in prison reform, and they proved the practicability of the "honor and trust" system in managing convicts. Good mother pension laws were in force in Arizona, California, Colorado, Idaho, Illinois, Kansas, Montana, Nevada, Oregon, Utah, Washington, and Wyoming (1915). Nine equal suffrage States had excellent laws restricting child labor. Arizona was the first State to adopt the model draft Act prepared by the National Child Labor Committee.

Equal suffrage was a menace to the liquor traffic, although the suffrage associations studiously kept aloof from temperance organization endorsements. In New Jersey a federation of liquor organizations was formed to combat the equal suffrage amendment which was voted upon in 1915. In the same year four equal suffrage Commonwealths—Arizona, Colorado, Oregon, and Washington—adopted State-wide prohibition by popular referendum. Idaho was 66 and Wyoming 90 per cent dry. In 1914, 18 of Utah's 28 counties were wet; but 16 of these were mining camps. Many towns in California banished the saloon after woman began to vote, but in 1914 State-wide prohibition was defeated. In Illinois, since the women were enfranchised (1913), not less than 22 counties were made entirely dry; and in the State many hundreds of saloons were closed through the women's vote.

In legislation for the protection of wage-earning women the equal suffrage States were easily the leaders (see WOMAN'S WORK). Six of the 11 Commonwealths which sanctioned a minimum wage for female toilers, granted votes to women. Only in the five equal suffrage States—Arizona, California, Colorado, Washington, and Wyoming (1915)—were women safeguarded by an eight-hour working day. In the States where women vote school teachers, men and women, received equal pay for equal service. In fact the suffrage question was very

largely a labor question. Without the ballot the 8,000,000 women in the United States engaged in gainful occupations could not have an equal voice in social control. The ballot was held to be needed to stop the exploitation of the labor of women and children through low wages, thus driving men out of employment.

The antisuffragist believed that "if women are to assume onerous duties previously discharged by men," their "traditional duties" will be less efficiently discharged This theory ignored the true function of the ballot as "the register of the individual's will in determining the character of social control." The ballot was held to be an instrument through which woman might lighten and perform more efficiently the domestic duties which devolved upon her. The evil as well as the good in the industrial and social life came into the home. It was believed that the problems of disease and vice, so far as they menaced the family welfare and threatened the happiness of mother and child, could be more rationally treated when woman might help make laws which should ignore the dual standard of sex morality. The ballot aided the mother in the education of her child, especially of her boy. Because of inefficient family training, the State was forced to hand over to the teacher a very large share in the nurture of the young. For this the father was most to blame, as, absorbed in business, he had practically abdicated his function as domestic teacher, and laid that task on the shoulders of the mother, thus doubling her burden. The boy and the girl should be trained for citizenship; for the wise conduct of persons intrusted with the ballot; yet so far as the young boy in the home was concerned, the needed training must come chiefly from the mother whose prestige was crippled as she was not a full active citizen. Not having the ballot, what could she know of its proper use? That was the psychology of the suggestion in the case. The ballot would give her prestige equal to that of the father in her boy's mind; and lighten her task as chief family teacher.

The suffragists held that two things were urgently needed in the process of socialization: that the woman should have an opportunity to do a full share of the world's work; and that the man should take a full share in the work of the home. It was true that woman's place was in the home, but it was not less true that man's place was also in the home.

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WOMAN'S VETERAN RELIEF UNION. A patriotic society that admits to membership mothers, wives, widows, sisters, daughters, and granddaughters of soldiers, sailors, or marines of the Union army who are eligible to the Union Veteran Union (q.v.), of which organization it is an auxiliary society similar to the Woman's Relief Corps.

WOMAN'S WORK. The work of primitive woman—of woman in the savage, barbaric, or other lower stage of progress—is of basic value for the evolution of industry and social culture. Research clearly discloses the great variety and relative importance of her achievements.

WOMAN THE MOTHER OF INDUSTRY

While primitive man was hunting and fighting, primitive woman was creating and practicing the arts of peace Indeed the habit of work—of labor as a conscious and persistent employment of effort for the attainment of some end—was primarily woman's contribution Mankind had to be trained to labor, and woman was the original learner and teacher. Much of the activity of early man was not labor. "The pursuit of food wherever it can be found by the members of the primitive horde," says Ward, "can no more be called labor than can the grazing of a buffalo or the browsing of an antelope. . . Only the work of the women in caring for the men and the children, and in performing the drudgery of the camp, approaches the character of labor" in the economic or institutional sense. "In early society," says Westermarck, "just as among ourselves, each sex has its own pursuits." Man's "occupations are such as require strength and ability"; while the "principal occupations of the woman are universally of a domestic kind," including agriculture Only in a very general sense is this statement true. There was not always a thorough division of activities on the sex line. Men sometimes shared in the work usually done by women; and women sometimes accompanied men in hunting or other pursuits commonly monopolized by the male.

When slavery arose as an economic institution women were the favorite, though not the exclusive, subjects of exploitation. If, as some sociologists believe, mankind was first inured to labor by slavery, then primitive women chiefly benefited, as they chiefly suffered, from this harsh discipline. Often the wife was the chattel slave of her husband; yet such absolute subjection was not the universal condition of primitive, especially of barbaric, woman.

Decidedly the woman was the chief provider for the family in its early stages. This fact may be accented by a fairly typical case. An investigation of the *Family among the Australian Aborigines*, by Malinowski, shows that "woman's work is on the whole much heavier than that done by man; her work is much more regular; it is compulsory, and it forms the chief support of the household." There is no true co-operation in economic functions; but the "relation of a husband to his wife is, in its economic aspect, that of a master to his slave." The woman's "share in labor was of much more vital importance to the maintenance of the household than man's work." Even the food supply contributed by women was more important than man's share. Moreover, "it seems as if the man's contribution, which in the main was reduced to his hunting products, was devoted much less exclusively to his family's benefit."

Woman was the chief inventor of the original types of the useful arts. Psychologically, cunning and invention are identical. This faculty enabled mankind to master the forces of nature. In the male, it was drawn out by warfare and the chase, and fostered through his later control of the state and the economic system. On the other hand, the whole struggle for food, clothing, and shelter—for race preservation—has challenged the inventive powers of the female. In countless ways woman created the archetypes, designed the first patterns, of man's later and more specialized inventions. First of

all, she developed household science. She selected for edible fruits, herbs, roots, seeds, and nuts; brewed and concocted drinks; tried out processes of cooking, seasoning, etc.

Many other inventions must be credited to primitive woman. The variety in design, the technical skill, the beauty of decoration, and the inventive genius revealed by the pottery, basketry, and textile fabrics of aboriginal tribes, such as the American Indians, challenge our admiration and render the great National Museum a monument to woman's early achievement.

Most important of all, woman was par excellence the social creator. The mother more than the father was the builder of the first types of the family constitution. The establishment of the earliest forms of marriage, that is, the usages and folkways by which for the good of the race sex relations were controlled and disciplined, was chiefly woman's work. She was the first molder of social custom. Probably there never was a general stage of gynocracy, implying the social leadership of women and eventually the political and even the military subordination of men. The inheritance of name and family rights through the mother does not necessarily mean the headship of woman in the family. Yet the very wide prevalence of mother right, even in this restricted sense, must often have tended, as among American aborigines, to place woman at the point of vantage in the development of household and matrimonial institutions.

These institutions were chiefly shaped by economic forces controlled by the mother in her struggle for the conservation of the child. From the first, well says Anna Garlin Spencer, woman "enjoyed the special tutoring of that most persistent and effective trainer in industrial education which the world of nature has yet produced, the human infant." In particular, if the "prolongation of human infancy," as John Fiske suggests, is the "chief agency towards civilization," it is because the demands of the child have made the mother, aided by the father, the principal bearer and disseminator of cumulative culture. During the years of relative helplessness the child appropriates, takes over, the elements of domestic morals and folklore. Because of this overlapping of the generations the stream of tradition, of *mores*, of "down-imitation" never stops flowing; and the heritage of knowledge is thus preserved. The function of teacher belonged to the primitive mother in quite as full measure as to the modern. The vocational training of the daughter was almost wholly in her hands; and until puberty, when his education was handed over to the "men's house," or other public control, she shared with the father in the nurture of the son.

DOMESTIC OR HAND INDUSTRY

The pursuit of war and the chase gave the male the advantage of superior bodily strength and initiative. The protector of the family became the founder of the state and the warrior became the ruler. With the decrease of warfare and the rise of the institution of property men more and more turned their attention to the industrial arts. The talent for invention forced out by militarism was used for the more specialized development of the arts which women had founded. Men discovered that labor was the best means for satisfying their multiplying wants, and a partial realignment of the social services took place. By preference men appropriated the work requiring skill and strength, while women more and more withdrew from agriculture and the other outdoor callings to devote themselves to the arts and crafts which centred in the immediate household life. With the rise of feudalism in Europe the woman of leisure, the "lady," appeared. The wife or daughter of the feudal chief, of the "gentleman," must abstain from gainful or menial toil. Thus war developed the false ideal of chivalry of helpless dependence of the female on the male.

Still the woman of the castle or the manor house was by no means always a parasite. Decidedly, under very unfavorable conditions, the woman of the feudal leisure class, in quite as full measure as her lord, contributed to the culture and refinement which constitute a precious spiritual asset of advancing civilization. On the other hand, in their homes the women of the masses were busy with many kinds of productive industry. The greater part of this work, by no means the least important, consisted of the unpaid domestic labor which everywhere women continue to perform. Nor has woman's work ever been exclusively confined to indoor activities or to the lighter kinds of toil. In modern times in Europe much of the heavy labor on the farm and in the city was done by women. The traveler might sometimes see them serving as beasts of burden and also as traction animals dragging the cart or the plow. Moreover, women in America share with the men in a vast number of the coarser and heavier kinds of gainful toil.

A picture of industrial life before the age of factory production shows that nearly all kinds of manufacture—the iron, steel, and wood crafts chiefly followed by men, as well as the textile, sewing, and other arts by preference belonging to women—were installed in the home or near by. To some extent milling, brewing, and distilling were exceptions to this rule. The industrial group was the family group, embracing the mother, father, and child, as well as the indentured apprentice. Not until the second decade of the nineteenth century was machine production well started in the United States. For the colonial period woman's share in industry is meagre. Still, research enables us to see that relatively it was very important. The prevailing economic interests of the country were agriculture and commerce, and in these the men were chiefly engaged. Manufactures, such as the men would naturally have taken up, were often hampered or entirely suppressed by act of Parliament. Woman's work was not thus hindered. Besides the unpaid household arts and miscellaneous gainful activities, the textile industries and the clothing and sewing trades were largely, though not wholly, in the hands of women. Except some of the heavier kinds, this industry included weaving, which in England was mainly men's work. In America "men were sometimes weavers, shoemakers, or tailors; and here and there women of notable executive ability, such as the famous Eliza Lucas of South Carolina, managed farms and plantations" (Abbott). Among gainful occupations undertaken by the Colonial woman—other than the usual domestic employments—were shopkeeping, the keeping of taverns and ordinaries, chair-frame making, the

running of sawmills, grist mills, distilleries, and even slaughterhouses Sometimes a woman kept a "dame school," became a nurse or midwife, printed books and pamphlets, or even published a newspaper.

These occasional occupations were of minor importance compared with the many-sided textile industry in which the mass of women were employed in their homes. This manufacture of textiles includes knitting, lacemaking, the making of "cards for combing cotton and wool, as well as sewing, spinning, and weaving" Almost literally—from the raw wool, cotton, or flax to the finished garment—the Colonial population was clothed by its women The surplus products of the spindle and the loom were sold from the home to customers; or, like butter and eggs, were exchanged at the neighboring store for other goods. Sometimes they were sold outright to the trade. Old account books of merchants reveal the important contributions of woman spinners and weavers to the family income. With the "expansion of industry, especially in the latter half of the eighteenth century, a considerable part of the work was done more in the manner of what is known as the commission system. As yarn came to be in great demand, many women were regularly employed spinning at home for purchasers who were really commission merchants. These men sometimes sold the yarn, but often they put it out again to be woven and then sold the cloth." In the clothing and garment industry, too, the product, after supplying the family needs, was usually made to order and sold to customers.

There was no cry of woman's invasion of men's work in the Colonial period. Public sentiment strongly favored the employment of women and girls in manufacturing or other productive labor. Idleness, especially for women, was a grievous sin in the eyes of the Puritan, and laws were enacted to provide work and to encourage thrift. To relieve the poor or to promote American production, so-called manufactories were built by legislative authority, by voluntary associations, or through individual enterprise These manufactories were merely a new organization of handwork. Only in the fact that a number of employees were assembled in a special room or building, where hand looms, sometimes spindles, were installed, do they represent a transition to the modern factory system. During the second half of the eighteenth century many such manufactories were built. In Boston, New York, Philadelphia, Baltimore, and some smaller towns hundreds of women and girls were employed, chiefly in weaving, but occasionally "in all the processes of cloth making." Thus it is clear that wage-earning women made their appearance in the handicraft stage Furthermore, many girls, nominally bound out to domestic service, were in reality thus earning wages as spinners and weavers. Both girls and boys were indentured as apprentices; but the girl's indenture was really a mere binding out to service. It did not mean that she should be taught a trade. Thousands of women did indeed acquire skill, craftsmanship, in weaving, spinning, and sewing; but in very slight degree was this due to conscious private or public care for their vocational education.

THE INDUSTRIAL REVOLUTION

The change from the handicraft or domestic stage to that of factory production is rightly called the 'industrial revolution." The advent of machines for manufacturing processes, with the application of power, had tremendous consequences. economic, social, and political. The solidarity of the industrial family group was broken up. Gainful work passed out of the home; and men, women, and children followed it into the factory. There was a period of transition, measured by the progress of invention and by industrial opportunity. For England the change was fairly inaugurated in 1800, in America the transition from the old system to the new was much slower In the textile industry, e g, factories for spinning preceded those for weaving. Most of the 168 cotton factories in the United States in 1810 were probably merely spinning mills. In some of them, weaving on hand looms was combined with spinning by machinery. Usually, according to Dr. Sumner, in these early spinning factories, the spinners were "girls from the neighboring towns, and the weaving was done by women, or by both men and women of the neighborhood" Occasionally the introduction of spinning machines caused a displacement of women by children; sometimes a displacement of women by men; but generally the factory was looked upon as a new opportunity to utilize women and children in productive work.

In textiles the complete factory system in the United States began in 1814 with the setting up of the first successful power loom at Waltham, Mass. First in cotton, later in wool, and gradually in all kinds of textiles the power loom stopped hand work. Women, just as they had followed their spinning, now followed their weaving into the factory It is not surprising that for many years after the advent of the complete factory system in the United States, a larger number of women than men were employed in textile industries. Public sentiment strongly favored the utilization of the labor of women and children in the factory at a time when there was a pressing demand for the labor of men in agriculture. In England the conditions were different. There, under the domestic system, weaving had been largely in the hands of men. Before the industrial revolution the manufacture of cloth had became an important industry; and the establishment of the "factory system created a disaffected class of unemployed workmen who were jealous of the new machinery which could be easily managed by women and children and which was taking the work away from them." In the United States many more females than males were engaged in manufacture; but they were not looked upon by the men as intruders. They were welcomed by moralist, economist, and statesman alike.

WOMEN VS. MEN IN INDUSTRIAL OCCUPATION

For the century since the establishment of the complete factory system in the United States the statistics of the relative employment of the sexes are enlightening and decisive. Both in the textile industries as a whole and in the very important branch of cotton manufactures the proportion of females as compared with males engaged has declined.

Cotton Industry. In 1810 Albert Gallatin, from returns from 87 mills, estimated that in the cotton industry 87.5 per cent of the employees were women and children; while in 1816 an estimate based on a report to the House of

Reports made to the percentage of women and for the cluster about 66. In the same industry for 1831, the percentage that women form of all employees was 68 in 1831; 64 in 1850, 62 in 1860, 60 in 1870; 57 in 1880; 54 in 1890, 49 in 1900, 47 in 1905; and 44.1 in 1910. During the same period, the relative decrease in the number of females employed in the cotton mills of Massachusetts is even more striking. The percentage was 80 in 1831; 75 in 1837; 70 in 1845; 62 in 1865, 59 in 1875, 55 in 1885; 60 in 1895; 48 in 1905; and 43 in 1920. Thus during the century in cotton manufacture, woman's chief industry, women have steadily been displaced by men.

All Textile Industries. A similar though less steady displacement has taken place in the entire group of textiles. In 1850 the percentage which women wage earners formed of all employees was 50.2; in 1860, 53.4; in 1870, 43.3; in 1880, 44.8; in 1890, 47.6, in 1900, 40.6; in 1905, 44.4, in 1920, 46.

Five Chief Industries. Most enlightening as to the question of displacement of the wage earners of one sex by those of the other is Dr. Abbott's study of the five industrial groups which at the beginning of the twentieth century employed the greatest number of women; and in all of which women had been engaged for more than a century.

NUMBER OF PERSONS EMPLOYED IN 1920

	Women	Men
In the cotton mills	149,185	153,269
In the clothing industry	143,718	265,643
Total	292,803	419,112
In boots and shoes	73,412	132,813
In printing and publishing	41.122	39,281
Total	114,534	169,094
In cigars and tobacco	83,960	61,262

At the beginning of the century, cotton manufacture and the clothing trades were almost exclusively women's work; while "printing and shoemaking are examples of skilled trades which may be said on the whole to have belonged to men." In the "cotton and the clothing trades, therefore, men are doing work which for the most part was once done by women. In the printing trade and in the manufacture of boots and shoes, women are doing the work which would a century ago have been done by men." But the table shows that "to-day the men's share in the two women's industries is much greater than the share of women in the two men's industries." In the readjustment of work, "men have gained more than women" Cigar making "has been called on at different times both by men and by women, and furnishes an example of the way in which work originally done by women, but later taken by men, may come to be women's work again"

There has been hardly any conscious intrusion by either sex into the occupations of the other. When the demand for labor has been keen and competition not feared men have urged women to enter industrial occupations. With an oversupply of cheap labor and menace of unemployment, men have sometimes complained of woman's invasion. Women have occasionally charged men with like conduct. The relative shares which men, women, and children have at any stage in the world's work is determined mainly by physical, economic, and social laws. Essentially the readjustment of vocations between the sexes is a bread-and-butter problem: while the division of labor incident to machine production has ever given new opportunities to women, the physically weaker sex. In fact, as Scott Nearing has demonstrated, the new alignment of occupations shows that in the main women are choosing the trades requiring dexterity and perseverance; while men are following those demanding strength and skill Thus in his graph the percentage which women form of all employees gradually falls from 99.4 in dressmaking to 2.9 in manufacturing and mechanical pursuits. It is important, too, to consider that in proportion to the population the number of both men and women engaged in manufacturing industry has rapidly increased. In 1850, according to Dr Abbott's critical estimate, 87 men and 28 women out of every thousand persons of each sex over 10 years of age were so employed, as compared with 142 men and 39 women in 1900 Relatively, therefore, the number of men engaged in manufacturing and mechanical pursuits is increasing much faster than that of the women. During the 50 years ending in 1900, while the female workers of this division show an increase of 11 per 1000 persons over 10 years of age, male workers gain five times as many. Moreover, for the years 1900–10 the relative decline in the proportion of female workers in the same industrial division is greater than in any preceding decade.

NUMBER AND DISTRIBUTION OF FEMALES IN ALL GAINFUL OCCUPATIONS

The reports of the Fourteenth Census (1920) on occupation contains an impressive exhibit of the vast amount and variety of woman's gainful service It is the more imposing when one considers that the equally valuable unpaid toil of women in the household is not included. For continental United States in 1920, of the 51,810,189 females of 10 years of age and over, 8,549,511, or 21.1 per cent, were engaged in gainful occupations; as compared with 2,647,157 or 14.7 per cent in 1880. During the same period for the same age class, the number of male breadwinners advanced from 14,744,942 to 33,064,737, or from 78.7 to 78.2 per cent. Thus a still clearer light is thrown on the process of readjustment in the choice of occupations between the sexes; for, as above seen, while in the division of manufacturing and mechanical pursuits the relative gain in the number of male workers is much greater than in that of the females, in the whole field of paid labor the relative gain in the number of female workers is much larger than that of the males.

The relative distribution of the total number of male and female breadwinners in the five great divisions of occupation for 30 years is shown in the table on the following page taken from the reports published by the Bureau of the Census for 1920.

In each of the great divisions, it will be seen the absolute number of females employed has increased from decade to decade; but in the relative proportions there are sharp variations and contrasts. While in two divisions—domestic and personal service and manufacturing and

mechanical pursuits—the relative percentage has fallen, notably in the last decennium; in two other divisions—trade and transportation and agricultural pursuits—the last decade shows a decided gain in the relative distribution. More enlightening is the classification of the number and proportion of females in the specified occupations into which the grand divisions are separated From the table it will be seen that the males in all occupations increased from 30,901,554 in 1910 to 33,064,737 in 1920, while the females in all occupations remained practically the same. It is a notable fact that the number of females in domestic and social service declined from 2,620,857 in 1910 to 2,186,924 in 1920. The number of women in professional service increased from 673,418 in 1910 to 1,016,498 in 1920. The number of females engaged in agricultural pursuits decreased from 1,807,050 in 1910, to 1,084,128 in 1920. It is clear that economic necessity is forcing women to take up work which commonly is looked upon as suitable only for men.

For England and Wales in 1911 the number of females over 15 years returned as occupied was 4,648,241 or 35.4 per cent of all living. In addition 182,496 or 10.4 per cent of the girls aged 10 to 15 were gainfully employed Dress, textiles, and domestic service employ about 67 per cent of these women The changes in the relative distribution of woman's work were slight compared with the variations in the United States. Between 1881 and 1901 there was a net gain in percentage in the following groups: government, commercial, professional, 3 3; conveyance, 0.1; metals and precious metals, 0.5; bricks, chemicals, skins, paper, 1.5; food 3.3. On the other hand, there was a net loss in domestic offices and services of 4.4; agriculture, 0.5; mines, 0 1; textiles, 2 0; dress, 1.1; unspecified, 0 6 (Hutchins) The seemingly decided loss in domestic offices and service, however, was due largely to a change in classification, not to any actual decline. The census of 1911 shows but slight changes in gains and losses.

SEX AND GENERAL DIVISION OF OCCUPATION	1910		1900		1890		1920
	Number	Per cent distribution	Number	Per cent distribution	Number	Per cent distribution	Number
Male							
All occupations	30,901,564	100 0	23,753,836	100.0	19,312,651	100 0	33,064,737
Agricultural pursuits	10,760,875	35 8	9,404,429	39.6	8,378,603	43 4	9,869,020
Professional service	1,151,709	3.8	827,941	3 5	632,646	3.3	1,127,391
Domestic and personal service	2,740,176	9.1	3,485,208	14 7	2,553,161	13.2	1,217,968
Trade and transportation	6,403,378	21.3	4,263,617	17.9	3,097,701	16.0	6,425,715
Manufacturing and mechanical pursuits	9,035,426	30.0	5,772,641	24.3	4,650,540	24.1	10,888,183
Female							
All occupations	8,075,772	100.0	5,319,397	100 0	4,005,532	100.0	8,549,511
Agricultural pursuits	1,801,050	22.4	977,336	18 4	769,845	19.2	1,084,128
Professional service	673,418	8 3	430,597	8 1	311,687	7.8	1,016,498
Domestic and personal service	2,620,857	32.5	2,095,449	39.4	1,667,651	41.6	2,186,924
Trade and transportation	1,202,352	14.8	503,347	9.5	228,421	5.7	880,846
Manufacturing and mechanical pursuits	1,772,095	21.9	1,312,668	24 7	1,027,928	25.7	1,930,341

In Great Britain and Ireland the relative distribution of the sexes in gainful occupations affords even more striking proof of woman's service. Of the population of England and Wales aged over 10 years, 83.8 of the males and 32.5 of the females were reported in 1911 as occupied. Thus the proportion of female breadwinners in those lands was much larger than in the United States. The proportion (1901) was less in Ireland and greater in Scotland than in England or Wales. In 1911 the whole population of England and Wales comprised 17,445,608 males and 18,624,884 females. The excess of 1,179,276 females has great economic meaning, especially when it is considered that the disproportion is much higher in urban than in rural districts. It is chiefly due to the lower death rate of the females For males the average duration of life in 1909 was 44 13 as contrasted with 47.77 years for the females. It appears that women, though physically weaker, are constitutionally stronger, "have a more tenacious hold on life than men." They have a longer period for productive work. Even in an industrial district, such as Lancashire, "where a large proportion of young women work in the mills, their life is still conspicuously better than of men at the same age."

In England and Wales, the census of 1911 shows 39,124 women engaged in making brick, cement, pottery, and glass; 36,870, in chemicals, oil, grease, soap, and resin; 30,208, in skins, leather, hair, and feathers; 94,722, in agriculture; and 101,050 in metals, machines, implements, and conveyances. In 1911 about 14 per cent of all female breadwinners, over 10 years of age, were married or widowed. The necessity of providing labor to supply the military needs during the war revolutionized the industrial position of women in Great Britain. From July, 1914 to July, 1918 there were approximately 1,200,000 "new entrants," women in the field of industry, exclusive of the 400,000 women who came in from domestic service and small workshops. These women filled positions to which the demobilized army looked for employment, and to complicate matters further, there were many agreements which the government had made with trade unions which provided for the return of discharged soldiers to their former employment, as well as opening certain occupations to women for the period of the war only. Efforts were made during 1919 and the following years to solve this problem. An exhaustive study of the condition was made by the Women's Employment Committee of the Brit-

the Ministry of Reconstruction. Among its recommendations were the demands that local government clerical posts be opened to men and women alike; that in all industry the principle of "equal pay for equal output" be applied to men and women; recommending the establishment of minimum wage rates and trade boards and the adoption of a scheme of mothers' pensions on the American model; sanctioning trade unionism for women and urging the women to add them to organize either separately or in unions made up of both men and women; the vocational training of women on a scale not hitherto attempted; the establishment of a 44-hour week with an annual two weeks' holiday with pay; and various extensive programmes of safety and health legislation and welfare work. In May, 1921 the Central Committee on Women's Training and Employment appointed by the Minister of Labor announced that it would soon put into operation a scheme for giving intensive training in the domestic arts to unemployed women between the ages of 18 and 35. The employment of women and young persons in plants in which lead and zinc and other poisonous materials are produced was prohibited, under certain conditions, in a law passed by Parliament.

STRUGGLE FOR THE SHORT WORK DAY

The movement for safeguarding the interests of wage-earning women had in view mainly the sanctioning of a normal short labor day, with restriction of night work: the securing of a living wage: the improvement of the sanitary and other conditions affecting the welfare of females, and the raising of the efficiency of woman's work through industrial education. The modern factory system was first installed in Great Britain; and there the first factory laws were enacted. The first half century of the dramatic struggle to socialize industry centres in the movement for a 10-hour day. Under influence of Dr. Percival, pioneer of sanitary reform, the credit for starting that movement belongs to the magistrates of Manchester, who in 1784 refused to allow indentures binding apprentices to owners of "cotton mills and other works in which children are obliged to work in the night or more than 10 hours in a day." The early acts of Parliament were confined to the labor of children and young persons, including girls. Women were wholly unprotected. In consequence, employers often substituted them for children in the low-paid occupations. First, in the Act of 1844 relating to textiles, women were restricted to a 12-hour day which had been granted to young persons in 1833. The Act of 1847, for young persons and women engaged in textiles, established from July 1, 1848, a workday of 10 hours and a work week of 58 hours. Soon operators took advantage of the wide range of 15 hours—from 5·30 AM to 8·30 PM.—within which they were able legally to select the period for the 10 hours' work. By a cunning system of shifts, women were sometimes worked 13½ or even 15 hours a day. To prevent this abuse, an amendment was secured in 1850, lengthening the work day to 10½ continuous hours, except for meals, and to 60 hours in one week.

Since 1850 various improvements have been made in the details of the law; and many other occupations have been included. In the textile industry the work of young persons—those aged 14 to 18—and women is restricted to 55½ hours a week. In other regulated industries the weekly limit is 60 hours, except that in some occupations women may work a carefully defined amount of overtime.

The Act of 1907 came far short of securing the normal day for women workers in laundries. The hours of male workers were not regulated by the factory acts. Men relied on their bargaining power through the trade-unions, but in industries where the work of men and women was correlated the effect of the short hour laws for women was to establish the same limit for men.

In the United States, legislation for shorter hours for women made a feeble beginning in 1847, the year of the triumph of the 10-hour movement in Great Britain. Previously the working day was very long. In the cotton factories of Lowell and the whole eastern district of the United States in 1832, the working week was 73½ hours, in the middle and southern districts, 75½ hours. Some classes of operatives, whose toil was especially fatiguing, worked fewer hours; but overtime was a common abuse. The agitation for a 10-hour working day, beginning about 1831, bore fruit in 1847, when New Hampshire passed the first 10-hour law. By 1853 10-hour laws had been enacted in Maine, Pennsylvania, New Jersey, and Rhode Island; but they were generally evaded or not enforced. Usually they applied only to corporations. Sometimes, as by the New Hampshire Act, contracting for longer hours was permitted. If the operatives refused to sign contracts, they were summarily discharged; and often they were blacklisted. In New Jersey and Pennsylvania many factories adopted the 10-hour law; but with a reduction of wages, causing strikes. Meantime many of the mills of Massachusetts, in the efforts to stem the rising tide of the 10-hour movement, voluntarily adopted shorter hours. In effect, without legislation, Massachusetts thus took the lead in shortening the work day of factory women; and the passage of its 10-hour law in 1874 marks the beginning of the modern period of State regulation of woman's work. Since that date many States have reduced the length of the legal working day for both men and women. Later, under guidance chiefly of the National Consumers' League, the short-hours movement made swift progress. At least 22 States took favorable action during the legislative sessions of 1913. In that year three great industrial States—Connecticut, New York, and Pennsylvania—joined Indiana, Massachusetts, Nebraska, and 14 nations of Europe in abolishing night work of women in factories—a principle sanctioned by the British Acts of 1844 and 1847. At the same time four States—California, Ohio, Oregon, and Wisconsin—adopted the novel method of vesting in industrial welfare or like commissions, within the maximum limit established by law, the authority to fix the hours of woman's work so as to conserve life, health, and welfare. Kansas created an Industrial Welfare Commission with similar powers in 1915.

In 1915, 39 States had regulated the daily or weekly hours of woman's work. The maximum was 11 hours a day and 58 hours a week in Vermont (1912); in South Carolina (1912), 11 hours a day and 60 hours a week for cotton and woolen mills, and 12 hours a day and 60 hours a week for mercantile occupations; in Tennessee (1913), 10½ hours a day and 58

hours a week, the one-half hour being expressly allowed in order to provide one short day; in New Hampshire (1913), 10¼ hours a day and 55 hours a week, except at night when the maximum period is 8 hours or 48 hours a week; in Kentucky (1913), Louisiana (1908), Maryland (1913), Oregon (1913), New Jersey (1912), and, for cotton and woolen mills, in Georgia (1911) the limit is 10 hours a day and 60 hours a week. But in Oregon the Welfare Commission (1914–15) was establishing shorter labor days for women. Illinois (1911), North Dakota (1905), South Dakota (1913), and Virginia (1912) had also established a 10-hour day without specifying the number of working days a week. In Connecticut (1913), Delaware (1913), and Wisconsin (1913) the maximum was 10 hours a day and 55 hours a week; while the same daily period with 54 hours a week was sanctioned in Massachusetts, Ohio, Pennsylvania, Rhode Island, and Texas, each in 1913, and in Michigan, 1911. In Kansas the Industrial Welfare Commission might limit the hours of women's work

The movement for a still shorter working day was led by the equal-suffrage States. The law and the extension of old legislation to cover new conditions. In 1919 Utah adopted an 8-hour law for women in private employment. North Dakota limited women's work to 8½ hours a day, six days, and 48 hours a week Existing limitations were extended to new classes of women in Arkansas, California, Michigan, New York, Ohio and Oklahoma. In Massachusetts the hours of labor for women were reduced to 9 hours a day and 48 hours a week. New York restricted the employment of women on local traction lines and elevators, setting a minimum age of 21 years for the first and of 18 for the latter employment. At the close of 1920 eight States, Arizona, California, Colorado, Montana, Nevada, Utah, Washington, Wisconsin and Porto Rico and the District of Columbia had laws which limited the working hours of women in certain occupations to 8 hours. Massachusetts, North Dakota, and Oregon have laws which limit the working week for women in certain occupations to 48 hours, but do not limit the daily hours to 8. Minnesota had established a basic 48-hour week for all women workers. Five States, California, Connecticut, Missouri, New York and Pennsylvania have laws stating that

INDUSTRIES	NUMBER OF EMPLOYEES				MEDIAN WAGE PER WEEK			
	Men		Women		Men		Women	
	1890	1900	1890	1900	1890	1900	1890	1900
New England cotton mills	1,668	2,182	2,640	2,653	$8 00	$8 50	$5 50	$6.00
Boots and shoes	1,372	2,177	362	421	11 00	11 50	6 00	6 00
Cigar making	697	1,065	254	573	11 00	11.50	6 00	5 50
Clothing	737	1,094	1,263	2,051	11 50	10 00	4 50	4 00
Printing	3,082	3,033	374	572	16 00	15.00	5 00	5 00

sanctioned 9 hours a day in Arkansas (1915), Idaho (1913), Kansas, Missouri (1913), Minnesota (1913), Montana (1913), Nebraska (1913), New York (1913), Utah (1911), and Maine (1915). By an amendment, 1915, the Nebraska Act was practically restricted to about one-fourth of the State. In New York the 9-hour maximum applied not only to factories, but also to "mercantile establishments in any second-class city"; while the Minnesota Act permitted a 10-hour day and a 58-hour week in mercantile and certain other enumerated occupations. Only in Arizona (1913), California (1913), Colorado (1913), Washington (1911), Wyoming (1915), and Porto Rico (1913) had women been granted a general working day of 8 hours. For public work or service Kansas (1913), Massachusetts (1909), Nevada (1912), Oregon, Ohio, and Wisconsin (each in 1913) adopted the same short day. Only in the case of night work for a public-service corporation in cities had Nebraska (1913–15) sanctioned the 8 hours' work period.

Several States, while not prohibiting, restricted the night work of females. For those under 18 years it was prohibited by Arkansas, California, and Michigan; under 21, by Georgia; in mercantile occupations, by South Carolina; for more than 8 hours in one night or 48 hours a week, by New Hampshire and Wisconsin. In some cases certain employments were exempt from the application of the short-hour statutes.

The conditions following the war and the entrance of women into new fields of industry made necessary the adoption of new legislation 8 hours shall constitute a day's work, unless otherwise agreed. Five other States, Illinois, Indiana, Montana, Ohio and Wisconsin, together with the Federal government, have laws providing that 8 hours shall be a day's work in a limited number of occupations. The territory of Alaska is the first political division of the United States to pass an all inclusive 8 hour law. This law, however, has been declared unconstitutional by an Alaskan court.

STRUGGLE FOR A LIVING WAGE

There has been no complete survey of women's wages in the United States; but through the investigation of experts, notably in the works of Abbott, Sumner, Nearing, and Persons, evidence has been gathered sufficient to reveal the essential truth. During the century following the rise of machine industry women received very low wages, and relatively, in like occupations, their wages were much lower than those of men. Thus in the cotton mills of Waltham, Mass., in 1821, 52 of the 63 men employed in all divisions of the industry received a weekly wage of $4 or more; while 136 of the 284 women were paid less than $2.50, and only one woman as much as $4. During the same period wages in Lowell corresponded closely with the rates in Waltham; and in Merrimack, 1824, the "lowest wage for men" was "higher than the highest wage for women." These figures may be taken as typical for the textile industry. Taking all trades together, in 1863 the average wages of women in New York were said to be about $2 a week. The above table, derived from the

Dewey report prepared for the twelfth census, for the decade 1890–1900, shows the weekly median wage for all occupations in the New England cotton mills and in four other important industries in the whole country.

The comprehensive "report of the Census Bureau in 1905 covering more than 588,000 female workers over 16 years of age, in manufacture . . . shows 18.4 per cent receiving under $4.00 per week; 49.8 per cent under $6.00, and 79.9 per cent under $8.00" (C. E. Persons, in *Quarterly Journal of Economics*, XXIX (Feb., 1915), 208). More recent statistical reports afford similar results for various manufacturing industries (cf. Scott Nearing, in *Popular Science Monthly*, May, 1915).

From the Dewey report on 22 manufacturing industries, giving returns for 156,569 men 16 years old and over and for 16,724 women of the same age group, Dr. Abbott computed that in 1900 one-fourth of the men received a weekly median wage of less than $8.31; one-fourth of the women, below $4.49; one-half of the men, below $10.55, one-half of the women, below $5.64; three-fourths of the men, below $13.93, three-fourths of the women, below $6.86.

From the available statistical sources covering the years 1908–10 Dr. Nearing (*Wages in the United States*) computed the wage scale of adult males and females employed east of the Rockies and north of the Mason and Dixon line. Deducting 20 per cent for lack of employment, he estimated that the annual earnings of one-fifth of the women were under $200, of one-tenth of the men and six-tenths of the women, under $325; of one-half of the men and nine-tenths of the women, under $500, of three-fourths of the men and nineteen-twentieths of the women, under $600; of nine-tenths of the men, under $800.

Even from these general averages the inference is inevitable that many thousands of working women were receiving a wage insufficient to sustain a safe standard of living. Special investigations and estimates of experts for the great cities put this inference beyond question. In Boston, New York, or Chicago it is conservative to say that a just minimum wage would be not less than $8 a week; whereas in Chicago alone it was held by the Women's Trade Union League that the average wage of the 125,000 working women was less than $6 a week.

Movement for a Legal Minimum Wage. As early as 1828 Mathew Carey began his now famous crusade against the low wages of that "numerous and very interesting portion of our population, the working women." About two-thirds of the women then employed in the sewing trades of Boston, New York, Philadelphia, and Baltimore, he said, "could not earn, by constant employment for 16 hours out of the 24, more than $1.25 per week" (Sumner). The effort to secure social control of the standard of living took in later years the form of minimum-wage legislation. Minimum-wage boards for private employments have been established by law in New Zealand since 1894, later followed by New South Wales, Western Australia, and the Australian Commonwealth; in Victoria since 1896, later followed by South Australia, Queensland, and Tasmania; and in the United Kingdom since 1909. In all these cases the minimum-wage laws affect both male and female workers. The New Zealand type of legislation aimed primarily at the settlement of trade disputes, while the Victorian type, followed by the United Kingdom, had in view chiefly the evils of the sweating system. In the United States the first laws establishing a minimum wage related to public employees in cities or States, both men and women. Thus in 1913 the city of Spokane by popular vote established a flat minimum wage scale of $3 a day on public work. Among the States which have provided a wage rate of from $2 to $3 a day are California, Indiana, Maryland (for the city of Baltimore), Massachusetts, Nebraska, and Nevada. The first attempt to protect the "American standard of living" in behalf of private employees was made by Nebraska in 1909. The unsuccessful bill of that year sought to establish a flat minimum rate of 20 cents an hour and $9 a week for men and women working in stores, factories, packing houses, and workshops. In 1912 Massachusetts enacted the first minimum wage statute. Similar laws were passed by California, Colorado, Minnesota, Nebraska, Oregon, Utah, Washington, and Wisconsin in 1913, and by Kansas in 1915. These Acts applied to females and to male minors under 18 in all States, except in Minnesota and Wisconsin where the age limit for males was 21, in Utah, where the statute applied to females, and in Kansas, where women, learners, and apprentices were included. The inclusion of adult men was opposed by the trade-unions, or objected to on alleged constitutional grounds.

Except in Colorado and Utah, the administration of these laws was vested in a State commission, working in connection with subordinate wage boards for each particular industry. The commission consisted of three members in all States, except in California and Washington, where there were five; and in Nebraska, where there were four. In Colorado the administration was vested wholly in a State wage board of three members. In all States except Oregon, Washington, and Wisconsin at least one member must be a woman; in Nebraska one must be a member of the Political Science department of the State University; and in Colorado, Minnesota, and Oregon both employers and employees must be represented on the commission. Utah in the Act itself fixed a daily flat minimum wage rate of $1.25 for experienced adults, 75 cents for females under 18 years, and 90 cents for adult learners and apprentices. Equal representation of employers and employees on the subordinate wage boards was required in all States except in Wisconsin, followed closely by Kansas, where the advisory wage board must be constituted "so as to fairly represent employers, employees, and the public." In all cases the commission had authority to make the initial investigation of industrial conditions, and to fix the minimum wage rates. It had power to fix such rates and the "conditions of work" in Washington; such rates and conditions as well as the "hours of work" in California, Kansas, Oregon, and Wisconsin. In determining the rate for particular industries the commission might act on the reports of subordinate trade boards. The establishment of such boards was mandatory only in Kansas, Massachusetts, Nebraska, and Wisconsin. Jurisdiction extended to all trades (or industries) and occupations in each State, except in Colorado, where it covered only mercantile and manufacturing establishments, laundries, hotels, restaurants, and telephone and telegraph offices. By the California

law the minimum rate was declared to be a wage adequate to sustain "the necessary cost of proper living and to maintain health and welfare." In Wisconsin a living wage was a wage sufficient to maintain conditions consistent with welfare, and welfare was defined to include "reasonable comfort, reasonable physical well-being, decency, and moral well-being"

Arkansas (1915), like Utah, established flat daily minimum rates: $1 for apprentices, and $1 25 for experienced workers. On April 13, 1914, for women over the age of 18, Washington adopted a minimum wage of $10 a week. The Oregon Industrial Commission established the following State-wide minimum rates· $1 a day for girls between the ages of 16 and 18 working in manufacturing or mercantile establishments, millinery, dressmaking, or hairdressing shop, laundry, hotel, or restaurant, telephone or telegraph office; $8 a week for experienced adult women and $6 for inexperienced adult women employed in any industry. Also in the city of Portland the following rates for experienced adult women. $8.64 a week of 50 hours in manufacturing establishments; $9.25 a week in mercantile establishments; and $40 a month in offices, including eleven classes of work On Nov. 23, 1914, the commission of Minnesota fixed the minimum wage of women and minors as follows: in mercantile establishments, telephone and telegraph occupations, and all office work, $9 a week in cities of the first class; $8.50 in cities of the second, third, and fourth classes, and $8 in all other parts of the State; in manufacturing, laundry, restaurant, and hotel employments, 25 cents less than these weekly rates, except that the lowest rate sanctioned is $8. The Massachusetts commission first investigated conditions in the brush-making, corset, and confectionery industries. In its report to the commission, the brushmakers' wage board found $8.71 a week or $453 a year to be the minimum, "without which no girl worker can supply the necessary cost of living and maintain herself in health." For experienced female employees in this industry the commission decreed (Aug. 14, 1914) a minimum rate of 15 cents an hour; and 65 per cent of this amount for learners and apprentices, the period of apprenticeship to be not more than one year.

The constitutionality of the Oregon minimum wage law was twice sustained by the State Supreme Court, and was carried before the Supreme Court of the United States for final decision.

In 1921 Texas repealed the existing minimum wage law which was created in 1919, leaving twelve States in which such laws existed, together with the District of Columbia and Porto Rico. These laws apply only to females and minors. Revisions were made during 1921 by the District of Columbia, Massachusetts, Washington and Wisconsin. Changes in the existing laws were made by Arkansas and Minnesota. In the latter State the Minimum Wage Commission was abolished and its powers were transferred to the Division of Women and Children of the Department of Labor and Industries. Efforts were made in Ohio, without success, to secure the enactment of a law establishing a minimum wage.

In England and Wales minimum rates of wages for agricultural labor were revised as far as they affected male workers under 21 years of age, women and girls. For women and girls the minimum rates payable in all districts except Yorkshire and Somerset were increased, the new rates ranging from 3d. an hour for workers under 14 years, to 8d an hour for workers 18 years and over Minimum wage laws were passed in Australia and Switzerland in 1921.

SOCIALIZATION OF INDUSTRIAL CONDITIONS

The productive power of women in industry is often inferior in quantity and quality Justly as well as unjustly, looked at simply as an economic situation, men have monopolized the better paid and the more highly skilled employments The chief causes of this relative inefficiency are not hard to find. In last analysis not woman but society is at fault The working woman is the victim of social conditions a.. ' customs which may be changed. If she has been passive, lacking in class consciousness, it is partly because of ancient prejudices and traditions regarding her proper place in the social order. She has not enjoyed the same opportunity as man for industrial education. She has had small share in vocational training either in school or in apprenticeship. She has been slow to grasp the meaning of organization; and grudgingly, as a means of self-protection, have men admitted her to the trade-union. For many women wage earning was always looked upon as a transition stage of life while awaiting marriage. Girls living with their parents accepted low pay in store or factory as a means of adding to their luxuries; although this sort of parasitism, of pin money, was by no means so important a factor in the low wage standard as was once imagined. Yet, after due allowance is made for actual inefficiency, there is abundant evidence to prove that the bad, often the shameful, conditions of woman's work were due largely to merciless exploitation. In many European lands her lot is still deplorable In Great Britain conditions were worse than in the United States; although the "darkest spots in America are in many ways quite as dark as any of those in the older country."

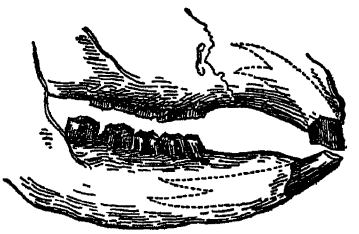
In the second decade of the twentieth century there were distinct signs of an era of social justice for women engaged in the world's work. The battle for the short day and a living wage was being won. Old traditions and prejudices were giving way. Marriage was ceasing to be a trade for a great number of women. Slowly better facilities for industrial training were being provided. Departments of household economics were making home building a profession. In various ways toiling mothers were being protected. More efficient factory inspection was being established. Through requirement of toilet rooms, rest rooms, and other facilities, decency, morality, and health were being safeguarded. The National Consumers' League was successfully warring upon the sweatshop. Swiftly class consciousness was rising. Women were learning the value of organization. In the United States and in Great Britain they were increasing their bargaining power and bettering the conditions of labor by entrance into trade-unions and through such organizations as the Woman's Trade Union Leagues, the National League of Women Workers, and the National Women's Labor League.

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WOMB. See UTERUS.

WOMBAT, wŏm'băt (from *wombach, wombach*, the Australian name). One of the Australian marsupials of the phalanger family and genus *Phascolomys*, resembling in form a miniature bear or large blunt-nosed woodchuck, the best-known species of which is *Phascolomys wombat*. It is two or three feet long, plump, with a thick coat of long, grayish brown, coarse, woolly hair; the head large, flat, broad, with small eyes and ears, the upper lip cleft; the feet plantigrade; the tail very short. The incisors are two in each jaw, long, and chisel-like; they are hollow at the base, and continue to grow as they are worn away; there are no canine teeth; and the molars are five on each side in both jaws; there is a wide gap between the incisors and



DENTITION OF THE WOMBAT.

the molars. It is nocturnal in its habits, slow in its motions; feeds on vegetable substances, and digs up roots with its claws; makes its abode in holes among rocks, or in burrows dug by itself. It produces three or four young at a birth. It is a creature of little intelligence, but gentle, and easily domesticated to a certain extent. Its flesh is preferred to that of any other quadruped of Australia, as it is generally fat, and in flavor resembles pork. The hairy-nosed wombat (*Phascolomys latifrons*) is easily recognized by the silky fur, hairy muffle, and greater curvature of

the incisors The third species (*Phascolomys platyrhinus*) is yellowish-brown and the largest of the group. Wombat remains have been found in recent bone caves in Australia See Plate of PHALANGERS.

WOMBWELL, wŏom'wĕl A coal-mining town in the West Riding of Yorkshire, 4½ miles southeast of Barnsley (Map: England, E 3). Pop, 1901, 13,252, 1911, 17,536.

WOMEN. In law, women have always enjoyed certain privileges and immunities and been under certain disabilities which are a curious intermingling of the ideas of protection and of subjection to man. Under the common law marriage changed the legal status of a woman completely, but modern statutes generally have abolished most of the disabilities of coverture. (See HUSBAND AND WIFE.) In most of the United States, both married women (*feme coverte*) and spinsters now enjoy practically equal property rights with men. This is true also of the right to enter into binding obligations or contracts. Women are liable for both their crimes and torts. They may keep and use their earnings in spite of the fact that the husband is still under the duty of support, and may at will cut off the husband's inchoate right of curtesy although the wife's dower right may not be destroyed without her consent. Statutes sometimes make certain distinctions in their favor, as, e.g, women are usually exempt from civil arrest. They have not been generally accorded the privilege of exercising the elective franchise, but enjoy freedom from jury duty and military service. They may sue and be sued in all States. Consult Blackstone's *Commentaries;* Parsons on *Contracts* (9th ed., Boston, 1904)

WOMEN, EDUCATION OF. Among Oriental nations generally little or no attention is paid to the education of women. The Chinese women of the wealthier classes may receive some literary training, but it is given privately. In India, excepting among the Parsis (q.v.), it is thought improper for any except the dancing women to be able to read and write The Spartans provided physical exercise for girls in public gymnasiums similar to those prescribed for boys. The Athenian girls received no education outside of the home The ideal woman was the prudent housewife. In the age of Pericles we find women of literary culture appearing. They were the so-called hetæræ (q.v.) and were typified by Aspasia. As they were not wives and mothers, their ideas of instruction for women cannot be said to have prevailed at Athens. Plato, who saw no essential difference between the natures of man and woman, planned the same education for both sexes in his ideal republic. At Rome, however, the education of women was mostly carried on at home or under private tutors. In some cases girls attended the *ludus* or primary school, but the higher schools were exclusively for boys.

The Christian conception of education as a preparation for the future life implied the necessity of education for women as well as for men. St. Jerome advocated the ascetic idea in female education and advised women to learn to read the Scriptures. The sister of St. Benedict, called Sister Scholasticus, established a conventual order that paid much attention to education. The Renaissance gave decided impulse to women's education. Polite learning became a social accomplishment, as desirable in women as in men. But there was no extensive movement for the establishment of schools for girls. Women were taught by leading masters of the period, and there were many notable women teachers—some even occupying chairs in the universities of Italy and Spain.

Luther urged the elementary education of both girls and boys, and advised the employment of women as teachers. The German *Volksschule* adopted the first of these ideas, but it was not until the nineteenth century that women were employed in teaching A seminary for training women to teach was established at Munster in 1830. To-day in Germany about 10 per cent of the normal schools are for women, and a still larger proportion of the elementary teachers are of that sex. Higher schools for girls began to exist in Germany at the beginning of the nineteenth century. In 1872 the German Association for the Higher Education of Women came into existence. All teaching positions in girls' secondary schools were in 1894 thrown open to women. In 1893 a gymnasium for girls was established in Karlsruhe, duplicating the instruction given in gymnasiums for boys. The whole system of secondary education for girls was revised in 1908 in Prussia, and the schools now offer not only a type of education specially adapted to the needs of girls, but courses corresponding to those given in secondary schools for boys and preparing for the universities, to which women are now admitted as matriculated students.

The small amount of education given to most girls in France in the seventeenth century is shown in Fénelon's treatise *De l'éducation des filles.* He advocates literary and historical studies for women. Very little progress was made towards establishing girls' schools before the nineteenth century. Since 1833 the French have aimed to give public elementary instruction to both boys and girls. Indeed, national elementary education everywhere in Europe is for both sexes. In 1880 lycées for girls were decreed, and higher normals were soon established to prepare women to teach in them. A great number of secondary schools for girls sprang into existence, and in 1913 there were 52 lycées, 81 communal colleges, and 50 secondary courses maintained by the State for the education of girls.

In England, before the nineteenth century, girls were educated by tutors or in small private schools, most of which were of an inferior character. The development of the elementary schools has increased the facilities for the education of girls. In these schools both women and men were employed as teachers. In 1871 a National Union for Improving the Education of Women of All Classes was formed. It led to the formation in 1872 of the Girls' Public Day School Company, which still conducts a large number of schools Since 1902 a large number of schools have been established for girls by public authorities under the Education Act of that year. There are, in addition, a large number of private semipublic schools.

In the English colonies in America no provision was made for the secondary education of women outside the home Girls were given instruction in elementary schools and women often taught them. In the nineteenth century, however, in the United States, the opportunities for female education rapidly developed, until today the State schools provide equally well for both sexes. The first girls' high school was es-

tablished in 1826. It failed, but was reestablished in 1852. In the early part of the century an important movement for the establishment of girls' academies sprang up.

For the higher education of women consult the articles on COLLEGIATE EDUCATION FOR WOMEN and COEDUCATION. See also NATIONAL EDUCATION, SYSTEMS OF.

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WOMEN IN INDUSTRY. In primitive society men were fishers, fighters, hunters, while women fashioned the hut, gathered and stored the seeds, roots, and fruits, prepared the meat and skins from the animals slain by men, and made garments and utensils. When the pastoral stage followed immediately on the hunting stage, women's former varied activities were narrowed until only certain duties—those of indoor life and preparing products for home use—remained. Woman was looked upon as the rearer of children, the minister to men's comfort and pleasure, and the producer of domestic necessities, and was made economically dependent. It is of special interest that among savage tribes where women were as efficient food producers as men they held respected positions.

Woman's work through historic times has, however, been dependent upon the class to which she belonged. The principal wives of chiefs were the first to be relieved of all labor. The middle class show more clearly the changes of the centuries. In the lowest class even in the twentieth century, among barbarians as well as among European peasants, women undertake heavy manual labor. As long as a large portion of necessary articles were made by men in the homes or on a small scale, women supplemented household duties by aiding in weaving, sewing, and dairying. The factory system and the improvements of the nineteenth century changed the household from a centre of production to one mainly for consumption. These changes have had a momentous effect on woman's economic position. Women have now two important economic functions in the industrial world: (1) as buyers and (2) as producers. The invasion of the domestic sphere by factory-made products has made every woman a buyer. The importance of this function has only recently been recognized. Many women have also entered the field of production, and their number continues to increase. In 1835 only seven industries were open to women besides domestic service in the United States. The census of 1910 makes a return of 428 separate occupations, in only 43 of which are there no women workers.

The introduction of machinery created a demand for the cheap labor of women. In 1816 there were 66,000 women spinning; in 1860, 65 per cent of those employed in textile work were women. American and English women of the lower classes, both married and unmarried, entered factories. A large number filled positions as domestic servants, more servants being required as the country grew richer. This work soon fell into the hands of foreigners—Irish, Germans, Swedes, who in turn filled the factories. The steps have been from the kitchen to the factory, and then to shops. Women of the middle class were also forced into industrial life. The rising standard of living made it impossible for men to support so many idle women, the same reason made the prospect of marriage uncertain, especially in England and eastern America, where women are in excess. These women became dressmakers, teachers, and clerks. The Civil War was an important agent in determining the future of many women, as it left them dependent upon themselves. Among the well-to-do one class, stimulated by the spirit of the age, has made demands to enter business and the professions. From these women arose the cry for equal rights, equal education, and equal opportunities. The members of the other class, as the result of freedom from labor, have either become economic parasites, or they are using their freedom to improve social conditions.

Prejudice has met the efforts of women to enter the professions and higher positions, but the development of business after 1880 opened many positions in the clerical forces necessary for large establishments. The extension of the factory system to food, clothing, and laundry increased the demand for women workers.

The increase in female labor in the United States is shown by the fact that they constituted only 14.7 per cent of all persons gainfully employed in 1880 as compared with 17.4 per cent in 1890, 18.8 compared in 1900, and 23.4 per cent in 1910. A part of the increase from 1900 to 1910 was due to a difference in the basis of enumeration, especially of agricultural laborers. In the Southern States females constituted a larger proportion of persons gainfully employed than in the country as a whole. Their proportion varied from about one-fifth in the North Central, mountain, and Pacific States, to one-fourth on the New England, South Atlantic, and East South Central States, and to one-third in Mississippi, South Carolina, and the District of Columbia. These variations are due in part to the greater or less proportion of females in the population as a whole. Likewise the proportions of females who were employed varied from 16.1 per cent in the West, North Central, and mountain States to over 30 per cent in the Southern States. These variations are explained by the character of the industries, especially cotton growing and manufacture, by the larger numbers of foreign born in certain areas, and by the presence or absence of numerous urban centres. In the South the per cent of females employed is due largely to the great number of negro women employed in agriculture. In the East South Central States 61 per cent of negro females 10 years and over were gainfully employed. In 1910 there were 8,075,772 females 10 years of age and over gainfully employed as compared with 30,091,564 males. They were distributed by occupations as follows: agriculture, 1,807,050, of whom 1,514,423 were agricultural laborers; in mining, 1094; in manufacturing and mechanical pursuits, 1,820,980; in trade, 468,088; in transportation, 106,596; in public service (not otherwise classified), 13,558; in domestic and personal service, 2,530,846; and in clerical occupations, 593,224. There were 447,760 dressmakers; 520,004 laundresses; 352,039 textile workers; 257,720 saleswomen; 263,315 typewriters and stenographers; 67,103 retail dealers; 187,155

bookkeepers and accountants; 234,259 clerks; and 96,481 telephone and telegraph operators; 122,447 milliners, 117,117 midwives and untrained nurses, besides 76,508 trained nurses; and 1,309,549 servants In higher positions were found 2634 bankers, brokers, and money lenders, 4699 manufacturers and officials of companies, 849 builders and contractors; 925 wholesale dealers, 2586 local officials and 9537 State and national officials; 15,429 artists and sculptors; 84,478 musicians; 478,027 teachers, and 9015 physicians. Women were found engaged in such unusual occupations as blacksmiths, brick and stone masons, elevator tenders, longshoremen and stevedores, machinists, sailors, etc.

The objections to women in industrial life are: (1) theoretical—the proper place for a woman is in a home, supported by a man; (2) their willingness to accept low pay; (3) the bad conditions under which they are frequently forced to work, with the resulting injury to health, (4) injury to morals, from working with men, subordination to men, and temptations accompanying freedom; (5) competition with men, depriving men of their occupations, lessening their respect for women, and frequently making them dependent upon women; and (6) demoralization of the home when married women with young children are employed. The advantages urged are the training resulting from industrial life under social rather than personal relations; the development of technical skill and the utilization of special abilities; the breadth of view obtained from contact with men; the moral training of self-support; and the importance of economic independence. Among the reasons for woman's low wages are: her position as a new economic factor; her low standard of living; her frequent partial support; the insufficiency of her equipment, often due to the expectation of marriage; the restricted field of employment; her anomalous political position, her lack of trade organization, protective factory legislation, limiting her when in competition with men; her loss of time through illness; and her traditional inferiority.

In England and on the Continent many women are employed in factories, domestic service, low-grade teaching positions, and low-paid government positions in the post office, telegraph offices, and as clerks. In England and Belgium agricultural courses are being provided. In Austria and other parts of Europe many women are day laborers. In France women assist their husbands and many have been successful in commerce. In Germany, Denmark, Great Britain, and the United States a successful effort is being made to organize working women. In the United States this movement is led by the National Women's Trade Union League.

In recent years marked attention has been given to the effects of industrial life on the health and vitality of women. There has resulted a general prohibition of night work, the closing of certain dangerous trades to women, a movement for an eight-hour day, pensions for working mothers before and after childbirth, and numerous lesser regulations. Moreover, to check the exploitation of women, minimum wage laws have become general. See DOMESTIC SERVICE; INDUSTRIAL REVOLUTION; LABOR PROBLEMS; WOMAN SUFFRAGE; WOMAN'S WORK.

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WOMEN'S CLUBS. Organizations of women which originated after the Civil War as an outcome of the new demand for coöperation and popular education, and which from 1880 to 1900 became a characteristic feature of woman's activity Previous to the nineteenth century associations of women were practically unknown The first in the United States were for religious and charitable purposes, such as the Female Society for the Relief and Employment of the Poor (1798), church societies auxiliary to men's associations, female Bible societies, the American Female Guardian Society (1834), and the Daughters of Temperance (1840–50). The organizations which arose during the Civil War—the Sanitary Commission, the Woman's Loyal League, the Freedmen's Bureau—showed women what they could do After the war, economic changes long at work had freed the energies of a large class of women for new work. In 1868 Mrs. Croly founded Sorosis (q.v.). This gave the impulse for other clubs. The Woman's Club of Brooklyn was organized in 1869–70. The Association for the Advancement of Women, organized in New York in 1873, decided to stimulate the formation of clubs. Simultaneously with Sorosis the New England Woman's Club was started by Mrs. C. M. Severance, but with the coöperation of men. A horticultural school for girls, a coöperative building association, and a registry for higher employment were undertaken in addition to literary programmes. Mrs. Julia Ward Howe and Mrs. Ednah D. Cheney were prominent members. A correspondence with other clubs was started in 1888. Even older than these large clubs was the pioneer of the reading-circle type—the Friends in Council of Quincy, Ill. (1866). Many clubs have grown out of reading circles and classes.

Women's clubs usually are incorporated and are self-governing and self-supporting. Fees are low in comparison with men's clubs, and the aim is to be democratic. The work of clubs may be summed up as: (1) *Educational:* through classes in history, art, economics, literature; readings, preparation for travel, lectures, and preparation of papers; (2) *Social:* teas and receptions for prominent men and women, and at homes; (3) *Practical:* (*a*) originating and aiding all kinds of philanthropic movements; (*b*) civic betterment, sanitary, artistic, and political; (*c*) educational, for fostering schools, libraries, art galleries, kindergartens, vacation schools, and scholarships for women; (*d*) legislation, the promoting of laws for the benefit of women and children—factory inspection, child labor, age of consent, police matrons, tenement houses, and parks. Women's clubs have started special associations—Housekeepers' Alliance, Legal Aid

Societies, Tree Bath and Sanitary Leagues; and they have worked with religious associations to and in the schools. An interesting development begun in certain middle Western cities has been the establishment of town rest rooms for farmers' wives.

There was no effort to unite the various clubs until 1889, when delegates from 61 clubs met in New York in response to an invitation from Sorosis, which wished to observe its twenty first anniversary. At a convention in 1890 the General Federation of Women's Clubs was formed. The Federation began with 63 clubs in 17 States. Biennial meetings of the Federation are held in large cities.

The biennial meetings have been characterized by varying recommendations which have dominated each period. The first at Chicago, in 1892, was the time of acquaintanceship, then came the development of ideals of club and federation at Philadelphia in 1894 and Louisville in 1896. At this meeting the slogan became "Scientific knowledge of educational principles." At this time State federations were begun and fostered, 21 being formed from 1894 to 1898.

At Denver in 1898 and Milwaukee in 1900 industrial betterment and altruistic service were emphasized. The clubs worked for child labor and factory laws, and their concomitant compulsory education; they worked for manual training and domestic science in the schools. With the departure from their homes of the butcher, the baker, and candlestick maker, women were obliged to see that the municipal housekeeping was well done, the four walls of brick and mortar had broadened into the walls of the city, the State, and the nation.

In Los Angeles, 1902, and St. Louis, 1904, the literary and artistic instincts were given full sway. The period from 1904, through St Paul in 1906, to Boston, 1908, marked the systematic cooperation between all the large and diverse units, the Bureau of Information as a permanent centre force was then instituted. From 1908 through Cincinnati, 1910, to San Francisco, 1912, came unusual coöperation with national organizations. The clubs were constructive, alive to the needs of their special work; they recognized the persistent, conservative efforts of the General Federation towards right ends; they realized the power of organized, intelligent women and asked assistance. The Federation in turn realized that its power must come in urging its diverse elements to coöperate with the specific agency, whose work they wished to further.

The Federation did not intend to touch national issues, politics, suffrage, prohibition, or religious tenets, but in 1914 at Chicago and in 1916 at New York the pressure became insistent enough to pass resolutions bearing on questions of the day.

Until 1894 the Federation was composed of individual clubs. At that time the State Federation appeared. There were in 1915 48 State federations, besides those in Alaska and the District of Columbia. The membership of the Federation included individual clubs with 185,000 members, the State federations with 8800 clubs, including nearly 700,000 members, and allied national organizations in America and abroad with over 600,000 members. This allied membership included clubs in Canada, Canal Zone, China, India, Japan, England, Germany, France, Sweden, Philippine Islands, South America, South and Western Australia, and the West Indies. The General Federation has, besides its business and board committees, standing committees on art, civics, civil-service reform, conservation, education, home economics, industrial and social conditions, legislation, literature and library extension, music, and public health. Each of these has various subcommittees, as those on shelter, food, sanitation, textiles, clothing, and home management under home economics. The scope of activities of the State federations is similar, though diversified to meet local conditions. The New York State Federation with 436 clubs and 300,000 members is by far the largest of the State groups.

Foreign Clubs. In England the club arose out of the emancipation movement. The provision of smoking rooms is typical of the adaptation of men's club life to English women's associations. The Albemarle Club was started in 1874 for both men and women. In 1878 the Somerville Club provided a reading room, library, and lectures for women journalists. Later clubs are the Alexandra (1884), a social centre for 900 women who must be eligible to attend the Queen's drawing-room, the University Club (1887), limited to 300 college graduates; the Pioneer Club (1892) for professional women; the Writers' Club (1892); the Victoria (1894), providing a town home for country members; the Sesame (1895); and various social clubs; the Green Park, Empress, New Victoria, Ilchester, and Sandringham. Many clubs have been started since 1894, the most important of which is Grosvenor Crescent (1896), which is a centre for women's work. Women's clubs exist now in the principal cities of the United Kingdom. In central and eastern Europe the movement for women's clubs of the American type has made slow progress owing to the lesser degree of freedom, but in Scandinavia, Germany, and France a strong movement for woman suffrage (q.v.) and for many feminist demands exists (see FEMINISM). In Germany the woman's movement is led by the National Council of German Women, a federation comprising branches in every state and having more than 500 local associations. Its interests, however, are not primarily cultural, but connected with problems of economic and sex life.

Working Girls' Clubs. These were the outcome of the spirit of helpfulness which became manifest in the last 20 years of the nineteenth century. While learning much from women's clubs, these clubs were less spontaneous, more the result of outside influence. In London, the Soho Club and the House of 1880, the Club and Working Girls' House, and the St Giles Evening Club for Working Girls were among the earliest. Libraries and evening classes, musical drill, safe pleasures, country visits and excursions, are provided, and the Girls' Club Union publishes a magazine. In America the movement began in 1883 with the Industrial Society of Hoboken and the Working Girls' Society of Thirty-eighth Street in New York (later Irene Club). The movement has since spread over the entire country. Some clubs were organized through the initiative of the girls themselves; others grew from church and related activities; and still others were formed by women's club leaders. The most important organization is The National League of Women Workers formed in 1897 at Philadelphia by the Irene Club of New York, the Industrial Society of Hoboken,

the New Century Guild and the St James Guild of Philadelphia, and the Shawmut Club of Boston By 1916 it had grown to include about 15,000 members in over 120 clubs embraced in six State federations in Massachusetts, Rhode Island, Connecticut, New York, eastern and western Pennsylvania, besides the Baltimore Council It has an executive board of 25 members, maintains traveling secretaries, and a central correspondence office in New York City. It held conventions at Buffalo (1901), New York (1904), Providence (1905), Philadelphia (1906), and since then biennially at Washington (1908), Boston and Gloucester (1910), Montreal and Quebec (1912), New York (1914), and Pittsfield (1916). Its official publication is *The Club Worker*, issued monthly from October to June It has aided in the organization of new clubs and in the training of club secretaries. Its principles are self-government, nonsectarianism, and self-help It has a mutual benefit fund for savings and insurance; and it conducts important investigations into the industrial training of women. Individual clubs maintain one or all of the following· vacation houses, week-end camps, teas with music and lectures, club headquarters, club hikes, lunch and rest rooms, employment registers, educational classes.

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WON'DERBERRY. See NIGHTSHADE.

WONDER BOOK, THE. A series of tales for children by Nathaniel Hawthorne (1851), founded on the most famous myths of classic mythology, and followed by a second series, the *Tanglewood Tales* (q v).

WONDERS OF THE WORLD, THE SEVEN. See SEVEN WONDERS OF THE WORLD.

WÖNSAN, wŭn'săn' (Sinico-Korean; in Chinese, *Yuen-san;* in Japanese, *Gensan*). A dirty, poorly built, but important town of Korea; situated at the head of the southern arm of Broughton Bay, near the middle of the east coast (Map: China, N 4). The harbor is large, having an area of nearly 40 square miles, and is both deep and well sheltered. The town was opened by treaty to Japanese residence and trade in 1880, and two and one-half years later to other treaty nations. The foreign settlements are on the west shore. Pop, about 20,000, including foreigners, of whom 2000 are Japanese.

WOOD (AS. *wudu, widu,* OHG. *witu,* wood; connected with OIr. *fid,* Welsh *guid, gwydd*). Popularly considered, the aggregated tougher portions of the vascular bundles of seed and fern plants. Only the seed plants yield wood which is of any value as lumber, and among them nearly all the wood of commerce is produced by the conifers and the dicotyledons, the monocotyledons producing comparatively little. In the latter group only the larger bamboos and a few of the palms yield important timber The density, strength, and much of the grain of wood depend upon the rapidity of the growth of the cells composing it In regions which have pronounced wet and dry periods, or where summer and winter are characterized by decided temperature changes, the effect of seasonal fluctuation is more apparent in the appearance of wood than where there are constant conditions for growth. In temperate regions the wood cells formed in the spring are of larger calibre and often have thinner walls than those formed later in the season, and the larger ducts of many dicotyledons occur in the spring wood. The small-celled tissue of the autumn wood abutting against the larger-celled tissue of the spring wood results in the distinct appearance of the growth rings. In most cases only one ring is found each year, but if a long Indian summer succeeds a period of rather cool weather or a severe drought is succeeded by abundant rainfall, or where growth is resumed after defoliation from any cause, additional rings may be formed, just as a second flowering may occur in fruit trees under similar conditions, so that the number of growth rings (annual rings) may not always indicate the age of the tree As trees grow older the inner portion of the wood (heart wood or duramen) assumes a characteristic color, as white in holly, yellowish in many pines, brown in walnut, black in ebony, etc. The youngest few years' growth, surrounding the heartwood and usually lighter in color, is called sapwood or alburnum.

WOOD, ANTONY, or ANTONY À (1632–95). An English antiquary He was born at Oxford, where the greater part of his life was spent. He studied at Merton College, and devoted his life to the collection of materials for the history of the city and University of Oxford. His first important published work was *Historia et Antiquitates Universitatis Oxoniensis* (1674), not published in English until 100 years after the author's death, by John Gutch, in five volumes under three separate titles—*The History and Antiquities of the Colleges and Halls,* in the University of Oxford (1786); *Fasti Oxonienses, or a Commentary on the Supreme Magistrates of the University* (1790), printed as appendix to the foregoing; and *The History and Antiquities of the University of Oxford* (1792–96). These volumes formed the standard treatise on the subject until very recent years. Hardly less important is Wood's *Athenæ Oxonienses,* a history of notable Oxford graduates from 1500 to 1690 (2 vols., London, 1691–92). A second edition was published in 1721. The Rev. Andrew Clark published *The Life and Times of Antony Wood* (Oxford Historical Society, 5 vols., 1891–1900), containing Wood's autobiography (first published in 1730), and diaries for the years 1657–95. These give the facts of his life in remarkable fullness. The greater part of his books and manuscripts are now to be found in the Bodleian Library.

WOOD, DE VOLSON (1832–97). An American engineer, physicist, and educator. He was born at Smyrna, N. Y., was educated at the State Normal School at Albany, and graduated C.E. at the Rensselaer Polytechnic Institute, Troy, in 1857. He taught mathematics in the Normal School, 1854–55, was professor of civil engineering in the University of Michigan, 1857–72, held the chair of mathematics in the Stevens Institute of Technology, at Hoboken, N. J., until 1885, and

that of mechanical engineering in the same institution until his death. Among his works were *The Resistance of Materials* (1871; 7th ed., 1897), *Bridges and Roofs* (1873, 2d ed., 1880); *Elements of Analytical Mechanics* (1876); *Coördinate Geometry* (1879); *The Principles of Elementary Mechanics* (1882; 10th ed., 1902), *Thermodynamics* (1887; 8th ed., rev., 1905); *Turbines, Theoretical and Practical* (1896), besides various works which he edited. He invented a rock drill, an air compressor, and a steam pump. Consult obituary sketch in *Stevens Indicator*, vol. xiv, July, 1897 (Hoboken).

WOOD, EDMUND BURKE (1820–82). A Canadian administrator and jurist. He was born near Fort Erie, Ontario, was educated at Overton College, Ohio, and was called to the Upper Canada (Ontario) bar in 1848. He was a Liberal member of the Canada Legislative Assembly in 1863–67, and after confederation in the latter year was elected both to the Ontario Legislature and the Dominion House of Commons, but he resigned his seat in the House of Commons in 1872. He was provincial treasurer in the Ontario administration of John S. Macdonald (q.v.) in 1867–71, was elected to the House of Commons in 1873, and was Chief Justice of Manitoba in 1874–82. He was a remarkably forceful and eloquent political speaker. Consult J. C. Dent, *Canadian Portrait Gallery* (Toronto, 1880).

WOOD, EDWARD STICKNEY (1846–1905). An American chemist. He was born in Cambridge, Mass., and graduated from Harvard College in 1867 and from Harvard Medical School in 1871, after which he studied physiology and medical chemistry at Berlin and Vienna. In 1871 he was appointed assistant professor of chemistry in Harvard Medical School, and from 1876 to his death was professor. From 1873 he was also chemist to the Massachusetts General Hospital. He was a member of the Medical Commission on Boston's Water Supply in 1874 and of the Committee of Revision of the *United States Pharmacopœia* in 1880. An accepted authority on toxicology, he contributed largely to the literature of his specialty, including a translation of Neubauer and Vogel's *Analysis of Urine* (1879).

WOOD, ELLEN (PRICE), better known as MRS. HENRY WOOD (1814–87). An English novelist, born at Worcester, England. In 1836 she married Henry Wood (died 1866), a banker and merchant, with whom she lived for 20 years in France. There she began contributing largely to *Bentley's Miscellany* and the *New Monthly Magazine*. In 1867 she became the editor of the *Argosy*, in which appeared her later novels. Her first great success was *East Lynne* (1861), which was followed by about 40 long novels and many tales, including *Mrs. Halliburton's Troubles* (1862); *The Channings* (1862); *The Shadow of Ashlydyat* (1863), her own favorite among her novels; *Lord Oakburn's Daughters* (1864); *Roland Yorke* (1869); *Within the Maze* (1872); and *Edina* (1876). These novels represent the range of Mrs. Wood's powers from exciting melodrama to the portrayal of everyday life. Consult the *Memorials* by her son, C. W. Wood (London, 1894). Some of these novels had very large sales, particularly *East Lynne*, which also in various dramatized versions was widely successful on the stage in both England and America. Unduly prized at first, they are now unduly depreciated.

WOOD, SIR EVELYN (1838–). An English general. He was born at Braintree, Essex, entered the navy at 14, and took part in the siege of Sebastopol, where he served with great distinction. He subsequently entered the British army as ensign, in 1860 won the Victoria Cross, and in 1862 became major. He fought with great note during the Ashanti War of 1873–74 and received the brevet rank of colonel. In 1874 he was called to the bar in the Middle Temple. He served through the Zulu War of 1879, commanded in the Transvaal War (1880–81), and served in the expedition to Egypt (1882), receiving the thanks of Parliament. From 1882 to 1885 he was Sirdar or commander in chief of the Egyptian army. He was created K.C.B. (1879), G.C.M.G. (1882), and G.C.B. (1891). He was appointed a quartermaster-general to the forces (1893–97), adjutant general (1897–1901), and was made a field marshal in 1903. He wrote *The Crimea in 1854* (1894); *Cavalry at Waterloo* (1896), *From Midshipman to Field Marshal* (1906), an autobiography; *The Revolt in Hindustan* (1908).

WOOD, FERNANDO (1812–81). An American politician, born in Philadelphia, Pa., of Quaker parentage. He removed to New York in 1820, received a good education, and engaged in the shipping business, in which he was so successful that he retired with a large fortune in 1850. As a young man he took an active part in politics, and was widely known as a campaign speaker and writer. In 1840 he was elected a Democratic member of Congress and served one term. After 1850 he turned his attention to municipal politics, and within a few years his genius for political management and organization was made evident by his complete control of the Tammany Hall machine. In that year (1850) he was the unsuccessful Tammany candidate for mayor, but in 1854 he ran again under the same auspices and was elected. He was re-elected in 1856, but internal strife in the Tammany organization forced him out of its membership, and he gathered his personal followers into a rival organization known as Mozart Hall. As the candidate of Mozart Hall he was defeated in 1858, but in 1860 was elected mayor for a third term over both the Tammany and Republican candidates. During his last term in office he attracted wide criticism and ridicule by suggesting the secession of New York City at the outbreak of the Civil War and its establishment as a free city. Subsequently he gave his support to the administration's war policy. He was elected to Congress as a Democrat in 1862, serving continuously until 1877, except for the years 1865–67, which he spent in Europe.

WOOD, FRANCIS ASBURY (1859–). An American philologist, born at Point Bluff, Wis. He was educated at Northwestern University (A.B., 1880; A.M., 1883), at Göttingen (1888–90), and at the University of Chicago (Ph.D., 1895). After holding several less important positions he was professor of German at Cornell College, Iowa, from 1897 to 1903, and thereafter was connected with the University of Chicago, where by 1914 he had become professor of Germanic philology. He contributed frequently to philological publications both in America and Europe, directing his attention principally to semasiology (q.v.; see also BRÉAL), and edited the series entitled "Linguistic Studies in Germanic," published by the University of Chicago. The following are the most important of his works: *Verner's Law in Gothic and the Reduplicating Verbs in Germanic* (1895); *Color-Names*

and their Congeners (1902); *Indo-European a: ai: au, A Study in Ablaut and in Word Formation* (1905); *Elckerlijc-Everyman, the Question of Priority* (1910); *Iteratives, Blends, and Streckformen* (1911); *Uebersichtstabellen zu Lautentsprechungen und zur Kasusbildung des Nomens und Adjektivs im Germanischen* (1911); *Some Parallel Formations in English* (1913); *The Hildebrandslied,* translated into English alliterative verse (1914).

WOOD, FRANCIS CARTER (1869–). An American pathologist, born in Columbus, Ohio He graduated from Ohio State University in 1891 and from the College of Physicians and Surgeons, Columbia University, in 1894. After postgraduate work in Berlin and Vienna he settled in New York City, where he became pathologist and attending physician to St. Luke's Hospital, and held several positions at Columbia, being professor of clinical pathology in 1906–12, and thereafter professor and director of cancer research under the George Crocker Special Research Fund. He published, besides papers on cancer, *Clinical Diagnosis* (1899) and *Chemical and Microscopical Diagnosis* (1905).

WOOD, GEORGE BACON (1797–1879). An American physician, botanist, and author. He was born in Greenwich, N. J. After studying in New York City, he graduated in medicine at the University of Pennsylvania in 1818 He held the chair of medicine at the Philadelphia College of Pharmacy (1822–31) and the chair of materia medica (1831–35). In the University of Pennsylvania he was professor of materia medica (1835–50) and of the theory and practice of medicine (1850–60). After having served as president of the College of Physicians, Philadelphia, for many years, Wood endowed an auxiliary faculty of medicine in the University of Pennsylvania. In 1855 he was president of the American Medical Association. Among his works are: *A Treatise on the Practice of Medicine* (1847; 6th ed., 1866) and *A Treatise on Therapeutics and Pharmacology or Materia Medica* (1856). With Franklin Bache he prepared and published *The Dispensatory of the United States* (1833).

WOOD, HENRY A(LEXANDER) WISE (1865–). An American aeronautical engineer, inventor, and writer, son of Fernando Wood (q.v.), born in New York City. His autoplate, a machine for making printing plates for newspapers, brought him in 1908 the Elliott Cresson gold medal of the Franklin Institute; and he invented other mechanisms for the printing art. He acquired various corporation interests. Vice president of the Aéro Club of America and president of the American Society of Aéronautical Engineers, he was appointed from the latter body its representative on the Naval Consulting Board (1915); but he resigned in December of the same year because of his disagreement with the President's naval and military policy. Subsequently he was a leader in the movement for increased armament, as chairman of the Conference Committee on National Preparedness; and he urged the nomination of Roosevelt in 1916. He edited *Flying* and published *Fancies* (1903), a volume of poems; *The Book of Symbols* (1904); *Money Hunger* (1908).

WOOD, SIR HENRY JOSEPH (1870–). An English orchestral conductor and composer. He received his musical education from his father and at the Royal Academy of Music. After 1895 he won for himself a European reputation as the conductor of the Queen's Hall Symphony and of the Promenade Concerts. He succeeded in bringing his orchestra to a rank with the best organizations of Great Britain. In 1904 he appeared in the United States as guest conductor with the New York Philharmonic Society, and thereafter was in great demand in the principal cities of Europe and at the great English festivals. He was knighted in 1911. His compositions include: the oratorio *Saint Dorothea* (1889); the comic opera *Daisy* (1890), the operettas *Returning the Compliment* (1890) and *A Hundred Years Ago* (1891); and many songs and instrumental numbers. Consult Rosa Newmarch, *Henry Joseph Wood* (London, 1904).

WOOD, HORATIO CURTIS (1841–1920) An American physician. He was born in Philadelphia, and in 1862 graduated in medicine at the University of Pennsylvania, where he was professor of botany (1866–76), clinical professor of nervous diseases (1875–1901), and professor of therapeutics (1876–1907). Besides monographs on acetic ether, nitrite of amyl, ergot, hyoscine, quinine, and on sunstroke, he published: *A Treatise on Therapeutics, Materia Medica, and Toxicology* (1874; 14th ed., rev. by his son, H. C. Wood, Jr., 1908), containing a standard classification of drugs; *Fever* (1880); *Nervous Diseases and their Diagnosis* (1887); and *Syphilis of the Nervous System* (1889) He was the editor of *New Remedies* (New York, 1870–73), of the Philadelphia *Medical Times* (1873–80), of the *Therapeutic Gazette* (1884–90), and, with others, of the *United States Dispensatory* (1883–1907).

WOOD, IRVING FRANCIS (1861–) An American biblical scholar, born at Walton, N. Y. After graduating from Hamilton College in 1885 he taught in Jaffna College, Ceylon, until 1889 and then studied at Yale (B.D., 1892). For a year he was a reader in the New Testament at the University of Chicago (where he took his Ph.D. in 1903), and in 1893 became professor of ethics and biblical literature at Smith College and, later, of biblical literature and comparative religion. Hamilton College gave him the degree of D.D. in 1915. He was author of *The Spirit of God in Biblical Literature—A Study in the History of Religion* (1904); *Adult Class Study* (1911); and coauthor with Elihu Grant of *The Bible as Literature* (1914), and with Newton M. Hall of the following: *The Bible Story* (5 vols, 1906); *Adult Bible Classes* (1906); *The Days of the Kings of Israel* (1908). He contributed to the NEW INTERNATIONAL ENCYCLOPÆDIA.

WOOD, MRS. JOHN (1833–1915). An English actress, born in Liverpool. Her maiden name was Matilda Charlotte Vining. She made her stage début in 1841, and first appeared in the United States in 1854 at Boston. From 1869 to 1873 she managed St. James's Theatre, London, which she made a great success, with a notable company. One of her best parts was that of Lady Franklin in *Money* (1882) Mrs. Wood reached the height of her popularity in the Pinero farces, *The Magistrate* (1885), *The Schoolmistress* (1886), *Dandy Dick* (1887), and *The Cabinet Minister* (1890), and in Ralph Lumley's plays *Aunt Jack* (1889) and *The Volcano* (1891). In 1905 she played at Drury Lane in *The Prodigal Son.*

WOOD, JOHN GEORGE (1827–89). An English writer on natural history, born in London. After graduating from Merton College, Oxford

(1848), he was employed in the anatomical museum. He was ordained priest in the English church (1854). From 1869 to 1875 he was precentor to the Canterbury Diocesan Choral Union, whose festivals he conducted with great ability. Widely known for his numerous popular books in natural history, he took up lecturing in 1879. He visited the United States in 1883–84, where he delivered Lowell Institute lectures at Boston. Among his 60 distinct publications, most of which have little scientific value, are *The Illustrated Natural History* (1851–53), *Sketches and Anecdotes of Animal Life* (1852); *Bees: Their Habits and Management* (1853); *My Feathered Friends* (1856); *The Common Objects of the Country* (1857), *Man and Beast* (1874). Consult the *Memoir* by his son, Rev T. Wood (London, 1890).

WOOD, LEONARD (1860–1927). An American soldier and administrator, born at Winchester, N. H. He graduated at the Harvard Medical School in 1884, and in 1885 became a contract surgeon in the army. In the following year he was a medical and line officer in Lawton's campaign against the Apaches, led by Geronimo, and for his services he received the congressional Medal of Honor (1898). Upon the outbreak of the Spanish-American War he and Theodore Roosevelt organized the regiment of Rough Riders, with Wood as colonel and Roosevelt as lieutenant colonel. Wood commanded the regiment at Las Guasimas, and afterward was in charge of one of the brigades of General Wheeler's division in the battle of San Juan Hill. On July 8, 1898, he was commissioned brigadier general of volunteers and on the 7th of the following December was promoted major general of volunteers. After the surrender of Santiago (July, 1898) he was put in command of the city, and in the following October was assigned to the command of the Department of Santiago. In the following year he was chosen to succeed General Brooke as Governor-General of Cuba. He held that position until the United States formally withdrew from the island. In 1903 he was placed in command of a division of the army in the Philippines, and in the same year he was made a major general in the regular army, having been brigadier general since 1901. He was commander of the Department of the East in 1908–09, and again after 1914. In the interval he was a special ambassador to Argentina (1910), and Chief of Staff of the United States army (1910–14). During the European war General Wood was a leading advocate, with his long-time friend, Colonel Roosevelt, of vigorous measures to place the United States in a position of military preparedness. He received the degree of LL.D. from several universities. An account of his administration in Cuba down to Jan. 1, 1901, is contained in *Cuba: Civil Report of General Wood* (Washington, 1901). In 1915 he published *The Military Obligation of Citizenship*, and in 1916 *Our Military History*.

WOOD, MARY ANNE EVERETT. See GREEN, MARY ANNE EVERETT.

WOOD, ROBERT WILLIAMS (1868–). An American physicist, born at Concord, Mass. He graduated at Harvard in 1891, and later studied at Johns Hopkins (1891–92) and at Berlin (1892–94). He taught at the University of Wisconsin (1897–1901), and thenceforth was professor of experimental physics at Johns Hopkins. In 1898 he originated the method of thawing frozen water mains and service pipes by passing a current of electricity through them. For his work in color photography he received a silver medal from the London Society of Arts (1900), the John Scott medal from the Franklin Institute in 1907, and the Ehrenpreis at the Dresden International Exhibition in 1909. He was also awarded the Rumford medal by the American Academy of Arts and Sciences for his researches pertaining to the theory of light. Besides scientific papers, he published: *Physical Optics* (1905, rev. ed., 1911); *Man Who Rocked the Earth* (1915), with A. C. Train, and two books of humorous verse, *How to Tell the Birds from the Flowers* (1907) and *Animal Analogues* (1908).

WOOD, THOMAS JOHN (1823–1906). An American soldier, born at Munfordville, Ky. He graduated at West Point in 1845; served under General Taylor in the Mexican War, and became captain in the First Cavalry in 1855. When the Civil War began he took the side of the Union. He was made a brigadier general of volunteers in October, 1861, and commanded a division at Shiloh, in the advance on Corinth, at Perryville, and in the battle of Stone River, where he was severely wounded. Later he commanded a division at Chickamauga, Missionary Ridge, the relief of Knoxville, at Dalton, Kenesaw Mountain, the siege of Atlanta, and Lovejoy's Station, where he was again severely wounded. He commanded the Fourth Corps in the battles of Franklin and Nashville, and in the pursuit of Hood. He was brevetted major general, United States army, in 1865, and retired from the service in 1868.

WOOD, THOMAS MCKINNON (1855–). An English cabinet officer. He was born in London, where he was educated in University College there. A leader of the municipal Progressive party of London, he served as a member of the London County Council from 1892 to 1907, and was chairman of that body in 1898–99. He was also chairman of the Parliamentary Committee in 1895–98, and an alderman in 1907. Elected a Liberal member of Parliament for Glasgow in 1906, he was Parliamentary Secretary to the Board of Education in 1908, Parliamentary Undersecretary to the Foreign Office in 1908–11, Financial Secretary to the Treasury in 1911–12, and thereafter Secretary for Scotland.

WOOD, THOMAS WATERMAN (1823–1903). An American genre painter. He was born at Montpelier, Vt., and studied art in Boston under Chester Harding and for two years in Paris. In 1867 he settled in New York, being elected an Academician in 1871. From 1878 to 1887 he was president of the American Water Color Society, and from 1891 to 1899 president of the National Academy of Design. The Metropolitan Museum, New York, possesses "The Contraband," "The Recruit," and "The Veteran," three pictures in one frame.

WOOD, WILLIAM (c.1580–1639). An English colonist in America. He was born and educated in England, emigrated to America in 1629, remained in New England several years, and in 1633 returned to England. There he published *New England's Prospect* (1634). This work, containing several curious maps, was the first published account of Massachusetts. It was reissued in Boston in 1764 and 1865, in the latter year by the Prince Society. On his return to America Wood settled in Lynn, which town he represented in the General Court in

1636. In 1637 he removed to Sandwich, where he was town clerk until his death.

WOOD, WILLIAM CHARLES HENRY (1804–). A Canadian historian. He was born at Quebec, and was educated at Wellington College, England, and in Germany He returned to Canada, entered the militia service in 1887, and in 1907 became lieutenant colonel of the Eighth Regiment, Royal Rifles He published: *The Fight for Canada* (1904), *Logs of the Conquest of Canada* (1909); *Tercentennial Quebec* (1910); *One Sea, One Fleet, and Canada* (1910); with Dr. A. G Doughty, *The King's Book of Quebec* (2 vols, 1911); *Wolfe* (1912); *Montcalm* (1912); *In the Heart of Old Canada* (1913); *All Afloat* (1914); *The Passing of New France* (1914), *The Winning of Canada* (1914), *Folksongs of New France* (1915); *Select British Documents of the War of 1812* (3 vols., 1915); *Laurenciana: Lands and Waters of the Maritime St. Lawrence* (1916).

WOOD, WILLIAM PAGE, first BARON HATHERLEY. See HATHERLEY.

WOOD ALCOHOL. See METHYL ALCOHOL; WOOD DISTILLATION.

WOOD ANT. The English name of the red or hill ant (*Formica rufa*). It was formerly supposed to occur in the United States, but the American red ant is another species (*Formica exsectoides*). The wood ant forms large mounds of small sticks and straws and bits of leaves, so arranged as to leave many spaces and contain galleries which penetrate the mounds and the earth below. Paths extend in all directions from the mounds, usually straight towards the object aimed at. Frequently these objects are oak trees infested by Aphides, for which the ants are constantly in search. Another ant of the family Myrmicidæ (*Myrmica lævinodes*) sometimes lives in perfect harmony with the wood ant, together with several inquilines (q.v.). The workers have at least two different forms, the large workers carrying the building materials, and the smaller workers searching for honeydew. The mounds are frequently of great age, perhaps a century or more. See ANT.

WOODBERRY, wụd'bĕr-ĭ, GEORGE EDWARD (1855–). An American literary critic and poet, born in Beverly, Mass. He graduated at Harvard in 1877, and became professor of English at the University of Nebraska. In 1878–79 he was on the staff of the *Nation*, New York, and during the following two years was again at the University of Nebraska. From 1882 until 1891 he lived at Beverly, engaged in literary work; he contributed to the *Atlantic Monthly*, and for a time was literary editor of the Boston *Post*. In 1891–1904 he was professor of comparative literature at Columbia University. He was elected to the American Academy of Arts and Letters. His first book was *A History of Wood Engraving* (1883). This was followed by an authoritative *Life* of Edgar Allan Poe in the "American Men of Letters Series" (1885); *The North Shore Watch, and Other Poems* (1890); *Studies in Letters and Life* (1890); *Heart of Man* (1899); *Wild Eden* (1900); *Makers of Literature* (1900); *Nathaniel Hawthorne* (1902); *Collected Poems* (1903); *America in Literature* (1903); *Swinburne* (1905); *The Torch: Eight Lectures on Race Power in Literature* (1905); *Emerson* (1907); *The Appreciation of Literature* (1907); *Great Writers* (1907); *Life of Poe* (2 vols., 1909); *The Inspiration of Poetry* (1910), *Wendell Phillips* (1912), *The Kingdom of All Souls* (1912), poems, *A Day at Castrogiovanni* (1912); *North Africa and the Desert, Two Phases of Criticism, The Flight and Other Poems* (all 1914) He edited *The Complete Poetical Works of Percy Bysshe Shelley* (1892); *Lamb's Essays of Elia* (1892), *The Works of Edgar Allan Poe* (1894), with E. C. Stedman; and *Select Poems of Aubrey de Vere* (1894); besides the "National Studies in American Letters," and *Columbia University Studies in Comparative Literature* (9 vols.).

WOOD BETONY. See PEDICULARIS, STACHYS.

WOODBINE (AS. *wudubind*, from *wudu*, *wudu*, wood + *bindan*, to bind). A popular name for one of the European honeysuckles (*Lonicera periclymenum*), and by extension for various other kinds of honeysuckle (q.v.); and in America, the Virginia creeper (*Ampelopsis quinquefolia*, or *Psedera quinquefolia*). See AMPELOPSIS.

WOODBINE. A borough in Cape May Co., N. J., 56 miles southeast of Philadelphia, Pa., on the Pennsylvania and the Atlantic City railroads (Map: New Jersey, C 5). It is known chiefly as the seat of the Baron de Hirsch Agricultural School. There are manufactories of clothing and an iron foundry. Pop., 1910, 2399.

WOOD'BRIDGE, FREDERICK JAMES EUGÈNE 1867–). An American philosophical scholar and educator, born at Windsor, Ontario, Canada. He graduated from Amherst in 1889 and from Union Theological Seminary (New York) in 1892, and attended the University of Berlin in 1892–94. Thereafter, until 1902, he taught philosophy at the University of Minnesota, from 1895 as professor. Accepting a professorship of philosophy at Columbia in 1902 he became Johnsonian professor there in 1904, and after 1912 was also dean of the faculties of political science, philosophy, pure science, and fine arts. He was one of the leaders in the neorealistic movement in philosophy (see REALISM). Woodbridge became editor of *The Journal of Philosophy, Psychology, and Scientific Methods*, and of the *Archives of Philosophy*. Besides articles in periodicals he wrote *Philosophy of Hobbes* (1903).

WOODBRIDGE, WILLIAM (1780–1861). An American political leader. He was born at Norwich, Conn., moved with his father to Marietta, Ohio, in 1791, was admitted to the Ohio bar in 1806, and was elected to the Assembly in the following year. He was prosecuting attorney of his county in 1808–14, and a State Senator, and was later appointed Secretary of Michigan Territory. In 1819–20 he was Territorial Delegate to Congress, was judge of the Superior Court in 1828–32, State Senator in 1837, Governor of Michigan in 1839–41, and United States Senator in 1841–47. Consult the *Life* by Charles Lanman (Washington, 1867).

WOOD'BURN, JAMES ALBERT (1856–). An American historian, born at Bloomington, Ind. In 1876 he graduated at Indiana University, where he taught in the preparatory department in 1878–86. He was a fellow at Johns Hopkins in 1889–90, then returning to his alma mater as professor of American history and politics. Besides editing several works, he published: *Higher Education in Indiana* (1890); *The American Republic and its Government* (1903); *American Politics: Political Parties and Party Problems in the United States* (1903;

rev. ed., 1914); *American History and Government* (1906), with T. F. Moran, *Elementary American History and Government* (1910, new ed., 1914); *Life of Thaddeus Stevens* (1913).

WOODBURY. A city and the county seat of Gloucester Co., N. J., 8 miles south of Philadelphia, Pa., on Woodbury Creek, and on the West Jersey and Seashore Railroad (Map: New Jersey, B 4). The principal manufactures are pianos, patent medicines, and glass, including cut glass. The Deptford Institute Free Library is noteworthy. Pop., 1900, 4087; 1910, 4642.

WOODBURY, Waldron Charles Herbert (1864–). An American marine painter. He was born at Lynn, Mass., and studied in Paris under Boulanger and Lefebvre. On his return to America he settled in Boston and became well known for his fresh, broadly executed, and virile representations of the Atlantic seaboard. Good examples are "The North Atlantic" (Worcester Museum), "At Sea" (Indianapolis Art Association), "Off the Florida Coast" (Boston Museum); "The Cliff" (Carnegie Institute, Pittsburgh), "The Ground Swell", and "A Heavy Sea." He was elected to the National Academy of Design in 1907, and was awarded numerous prizes, including a gold medal at Atlanta (1895) and a gold medal and medal of honor at San Francisco (1915).

WOODBURY, Daniel Phineas (1812–64). An American soldier, born at New London, N. H. He graduated at West Point in 1836, entered the artillery, and until 1840 served as assistant engineer in building the Cumberland Road (q.v.). He superintended the construction of Forts Kearny and Laramie (1847–50), but in 1851 he was recalled to the East. In 1861 he was promoted to be major of engineers and lieutenant colonel on the staff. He fought at the first battle of Bull Run, afterward was engaged until 1862 upon the defenses of Washington. He then commanded the Engineer Brigade during the Peninsula campaign. From December, 1862, to March, 1863, he participated in the Rappahannock campaign, and at Fredericksburg earned the brevet of brigadier general in the regular army. In 1863 he was commandant of the district of Key West and the Tortugas, where he died of yellow fever on Aug. 15, 1864. He published works on *Sustaining Walls* (1845) and the *Theory of the Arch* (1858).

WOODBURY, Levi (1789–1851). An American jurist, born at Francestown, N. H. He graduated at Dartmouth College in 1809, and was admitted to the bar in 1812. In 1816 he was elected clerk of the State Senate, and near the close of the year he became judge of the State Superior Court. He was elected Governor of New Hampshire in 1823, and in 1825 was Speaker of the Lower House of the State Legislature. In the same year he was elected to the United States Senate, and soon became closely allied politically with Andrew Jackson. He was Secretary of the Navy in Jackson's cabinet (1831–34), and Secretary of the Treasury (1834–41), being retained in that office by President Van Buren. In 1841 he was again elected to the United States Senate, but resigned in 1845 to become an associate justice of the United States Supreme Court as the successor of Joseph Story (q.v.). His *Political, Judicial, and Literary Writings* were edited by N. Capen (Boston, 1852).

WOODBURY PROCESS. See Photography, *Photomechanical Processes.*

WOOD CARVING. A form of sculpture, employed from very early times. While virtually unknown in the Babylonian, Assyrian, Persian, and other styles of western Asia, it was common in very early Egyptian sculpture. Some of the most realistic portrait and genre statues of the Ancient Empire were carved in wood, such as the so-called "Sheikh-el-Beled" and his wife, and a number in the Bulak Museum (now removed to Ghizeh). Wood was a convenient ground for the polychromatic decoration so popular with Egyptian artists. In Greece it was probably the earliest form of archaic sculpture; and its connection with early sacred images, the xoana, led to the preservation of worship of many early wooden statues. The later Greeks and the Romans used it comparatively little, but among the most remarkable works of early Christian sculpture are the carved wooden doors of Santa Sabina, Rome.

When wood carving was revived in the eleventh century it was practiced especially in the north of Europe (Scandinavia, Germany, and part of France). The material was not only used in its native simplicity, but was covered with canvas or cloth, stuccoed and painted. Among the earliest Romanesque pieces are colossal wooden crucifixions in the Cluny and Louvre museums. Church furniture employed wood, and in Flanders and Germany especially altarpieces, triptychs, station reliefs, passion crosses, and other monumental works were multiplied to such an extent that wood carvings formed the most important part of German sculpture during the fifteenth and sixteenth centuries, and stone sculpture was influenced by it. It came to delight in most wonderfully intricate or realistic details of handling. The art had its great masters, like Wohlgemuth, Veit Stoss, Riemenschneider, Pacher, Multscher, Hans Bruggemann, and Jan Borman, and its centres were Franconia (especially Nuremberg), Suabia, and the Rhine region. In the modern wood carvers of primitive Germanic districts, such as Tirol, we find survivals of these old schools.

The Italian Renaissance used wood carving in very different fashion. Its masterpieces were the elaborate choir stalls, in such superb examples as those at San Pietro, Perugia, at the cathedral of Orvieto, and at Santa Giustina in Padua; elaborately carved ceilings, as in the Palazzo Vecchio and the Laurentian Library, Florence; and minor works of industrial art, like carved wedding chests. In Spain wood carving flourished to a still greater extent, especially in the elaborate retablos, usually painted, and choir stalls. Here the art at first showed Moorish influence, but during the late Gothic period French, and in the sixteenth century Italian, influence. During the seventeenth century polychrome sculpture in wood was perhaps the most characteristic form of Spanish sculpture, which even the foremost sculptors, like Berruguete, did not disdain to create. In France it was also the choir stalls and screens that were the masterpieces of the art, as at Rouen, supplemented by carved doors.

Bibliography. The best general treatise in English is Alfred Maskell, *Wood Sculpture* (London, 1911). Good practical manuals are Eleanor Rowe, *Practical Wood Carving* (London, 1907), and P. N. Hasluck, *Wood Carving* (Philadelphia, 1908). For Germany, see J. Lessing, *Holzschnitzerlien des 15. und 16. Jahrhundert* (Berlin, 1882); for France, De Lostalot, *Les*

arts du bois (Paris, 1893); for Italy, Giulio Ferrari, *Il legno nell' arte italiana* (Milan, n d); for England, Francis Bond, *Wood Carving in English Churches* (2 vols., Oxford, 1910).

WOOD CHAT. An African shrike (*Lanius rufus*), frequently seen in southern Europe.

WOOD'CHUCK (corruption of *wejack, weejack*, from Cree Indian *otchock;* influenced by popular etymology with Eng. *wood*), or GROUNDHOG. A species of marmot (*Arctomys* or *Marmota monax*) inhabiting North America, from Hudson Bay to South Carolina and west to Nebraska. It is from 15 to 18 inches long, blackish or grizzled above, chestnut-red below; the form thick, the head broad and flat, the legs short and thick, the tail bushy. The hair is rather soft, the whiskers long and stout. This animal digs deep holes in fields, on the sides of hills, or under rocks in woods; its burrow slants upward, so that water may not enter, and within are several compartments. It passes the winter in the burrow, in a lethargic state, going to its hibernation in late September, and often coming out in March, before the snow and cold have ceased, when many starve or freeze to death. The food of the woodchuck is vegetable, and it is particularly destructive to crops of red clover and alfalfa, and to early garden crops It is easily tamed, and may be fed on bread, milk, and vegetables. Its flesh is usually well flavored and that of young individuals is very good The Eastern woodchuck is divided into several subspecies, and in Alaska and the West are four more species. Consult E. T. Seton, *Life Histories of Northern Animals* (New York, 1909), and Stone and Cram, *American Animals* (new ed., ib., 1914). See Plate of GOPHERS, ETC.

WOOD'COCK (AS. *wuducoc*, from *wudu*, wood + *coc*, cock). The popular name of certain birds closely related to the snipes (q.v.), but of more bulky form and having shorter and stronger legs. The common woodcock of the Old World (*Scolopax rusticola*), well known as a game bird in Great Britain, and highly esteemed as a table delicacy, is found also in all parts of Europe and the north of Asia, and in Japan. Its summer haunts are chiefly northern pine forests, and in winter it is found in moist woods and swamps, seeking for worms, snails, and slugs, boring with its long bill in the soft ground. The quantity of food which it devours is very great. The woodcock is about 13 inches in length; the upper parts varied with ruddy, yellowish, and ash color, finely intermingled, and marked by large black spots, the lower parts yellowish red with zigzag lines; the quill feathers striped with red and black on the edge; the tail feathers tipped with gray above and white below. The female is rather stouter and larger than the male, and sometimes attains a weight of 14 or 15 ounces. The woodcock makes its nest in warm, dry situations, on the ground, of dead leaves loosely laid together. It lays only three or four eggs of a pale-yellowish or reddish-brown color.

The American woodcock (*Philohela minor*) is a smaller bird than the woodcock of Europe, being only about 11 inches long, but is very similar in plumage and habits. Three transverse black bands mark the hinder part of the head. It is found in all parts of North America east of Colorado, and, though migratory in the north, is resident in the south. The eggs differ from those of the European species in being spotted. Its flesh is in high repute as food, so that in many parts of the country it has become very scarce. See Plate of BEACH BIRDS.

WOOD DISTILLATION. When wood is heated in the forest for the production of charcoal little account is taken of the volatile products, except the heavy tar, which is allowed to collect in a shallow pit under the stack, and is known as Stockholm tar. This is used for preserving cordage and as a calking compound.

This practice is highly uneconomic, since the more volatile substances can be utilized in producing valuable commercial products, i e., wood alcohol, acetic acid, acetone, creosote, and wood turpentine. Even the gases may be used as fuel during the process. For wood distillation either coniferous or deciduous trees are used; in the former wood turpentine is a distinctive product, but the yield of acid is less than with hard woods.

There is great similarity in the processes and apparatus, the main points being the use of air-dried material; as low a temperature as is consistent with the changes involved; and the prompt removal of the products from the retorts as soon as formed; this is accomplished by keeping the retort under low vacuum conditions. The commonest form of retort is a wrought-iron cylinder set horizontally or vertically in brickwork. Retorts are usually arranged in pairs and connected with water-cooled copper condensers. When the tar yield is large a separator is interposed between the retort and condenser. A pipe leading back from the cool end of the condenser conducts the gas to the furnace, where it is burned under the retorts.

Where vertical retorts are used they are detached from the condensing system at the close of the operation, lifted out of the furnace by tackle and allowed to cool unopened, while a freshly charged retort is at once lifted into the furnace.

The retort charge consists of air-dried wood in cord lengths, piled endwise. The use of sawdust and mill waste requires a different type of furnace.

On application of heat residual moisture is driven off and the temperature rises slowly to 160° C. (290° F.), when decomposition sets in. Up to 275° C. (527° F.) the distillate is a thin watery liquid known as pyroligneous acid; this is collected in vats and further refined. Above 160° C. (290° F.) gases are evolved, and between 350° and 450° C. (662° and 810° F.) both liquid and solid hydrocarbons are produced and charcoal remains in the retort.

On the basis of dry wood the yield is about 30 per cent of crude acid and 10 per cent of tar. Pyroligneous acid contains 10 per cent of acetic acid, 1 per cent of methylalcohol, and 0.1 per cent of acetone.

Treatment of the Pyroligneous Acid. After settling to separate tar the acid may be combined with scrap iron in the form known as pyrolignite of iron, or black iron liquor, much used as a mordant in dyeing and calico printing.

The crude acid is usually distilled to remove tar, which remains behind in the still while the vapors are passed through milk of lime which holds the acid as acetate of lime. The alcohol and acetone passing on are condensed as crude wood alcohol. By filtering and evaporating the lime solution gray acetate of lime is produced; if the crude acid is neutralized before distillation, the retort residue contaminated with tar is known as brown acetate of lime.

Commercial acetic acids are prepared from gray or calcined brown acetate of lime by treatment in copper stills with strong hydrochloric acid, always keeping the acetate in excess. The distillate contains 50 per cent of anhydrous acid, and may be further purified with potassium bichromate and by filtration through fresh charcoal. With dilute hydrochloric acid the distillate contains 30 per cent of acetic acid and is ready for use without further treatment

On neutralizing pyroligneous acid with soda ash and evaporating to dryness sodium acetate is formed, this is fused to destroy tarry matter, cooled and distilled with concentrated sulphuric acid, yielding glacial acetic acid crystallizing at 16.5° C. (62° F.), 99 per cent pure.

Among the acetates used in dyeing and colors are the mordants, aluminium acetate, or red liquor, chromium acetate, calcium acetate, ferrous and ferric acetates, and as pigment or color bases cupric and lead acetates.

Treatment of Wood Alcohol. On diluting the crude product with water the liquid becomes milky, owing to separation of hydrocarbons. On standing these settle into a distinct layer which is removed The watery layer is then distilled over lime and filtered through charcoal to remove color and odor, but this treatment does not remove acetone.

The acetone free product is made by combining rectified wood alcohol with calcium chloride, yielding a solid product stable at 100° C. (212° F.). On heating this body carefully the acetone is vaporized and may be condensed, while the calcium alcohol compound can be decomposed with hot water under pressure and pure methyl alcohol (q.v.) recovered by distillation. Methyl alcohol calcium chloride has been put on the market under the name of solid alcohol and employed for heating purposes.

Acetone (q.v.) is prepared on a large scale by heating dry calcium acetate and condensing the volatile product—$(C_2H_3O_2)_2Ca = CaCO_3 + (CH_3)_2CO$.

Wood tar is usually washed with water to remove acid, gently heated to expel excess of water, and distilled in iron stills provided with stirrers.

Distillates caught below 150° C. (302° F.) are called light oils and used as a substitute for turpentine.

The distillate between 150°–250° C. (302°–482° F.) is known as heavy oil, this contains cresols, toluene, etc. Heavy oil is washed with caustic soda and boiled to oxidize various ingredients, by acidifying with sulphuric acid crude creosote (q.v.) separates. This is again treated with alkali and acid, and distilled. The distillate caught between 200°–220° C. (392°–428° F.) is the nonpoisonous wood-tar creosote, an excellent antiseptic used in food preparations.

If distillation of the crude tar is stopped at 250° C. (482° F.) the thick brown liquid residue is used in making axle grease, shoemaker's wax, lampblack, etc.

WOOD DOVE. A rather indefinite name applied to many pigeons, as the European turtle dove or the American mourning dove.

WOOD DUCK, or SUMMER DUCK. An American fresh-water duck (*Aix sponsa*). It is of medium size, and the male is exceedingly handsome. The back is greenish brown, the head green with purplish reflections and marked with considerable white, the breast purplish chestnut spotted with white, the sides yellowish, finely barred with black, and the belly white The bill is pinkish and red, the feet orange. There is a crest on the head, and the upper tail coverts and some feathers of the back and sides are elongated to add to the beauty of his appearance. The female is more plainly attired, but is very handsome. In summer these ducks are scattered numerously all over the country, breeding along every stream or pond, and often a long distance from water. Unlike any other duck it nests in trees and walks about in the branches like ordinary perching birds The nest is made in a hollow stump or tree, often more than 50 feet above the ground, and the young sometimes jump down, and sometimes are carried in the bills or on the backs of the mother. See Colored Plate of DUCKS.

WOOD ENGRAVING (XYLOGRAPHY). The most important form of engraving in relief, that is to say, with the lines, the figures, or the pattern left in projection, while the background is cut away or lowered The ink by which the figure or pattern is printed off upon paper or other material is applied to these projecting lines and surfaces and taken thence by the paper, whereas in line engraving, etching, and the like the ink fills the incised lines and is cleared off from the polished surface, except as described in connection with the retroussage. (See DRY POINT; ENGRAVING; ETCHING; LINE ENGRAVING.) The process of engraving in relief is of peculiar importance in connection with printing from movable types, stereotype plates, and the like, because the ink is applied and transferred in exactly the same way. An engraved wood block, or the electrotype made from it, is of precisely the same character as a surface for the printer as is the surface of a page of type, or the stereotype or electrotype plate made from it. Woodcuts can be printed, therefore, with type, the whole page together; whereas when it is desired to print an impression from a line engraving or an etching on the same page with the letterpress, the sheet of paper must pass through two separate presses and undergo two operations.

Early Woodcuts. The origin of wood engraving is a matter of much controversy. Woodcuts, in various forms, were used to print or stamp in remotest antiquity: by the Babylonians and Egyptians to indent bricks; by the Romans to print letters and grotesques; during the Middle Ages to stamp monograms and to print color designs on linens, leathers, satins, and silks—a custom practiced in the Orient from time immemorial. But wood engraving, in the modern sense, postdates the introduction into Europe of paper during the twelfth century; for it was not practicable to print on papyrus, vellum, or the materials previously used. From most ancient times the Chinese printed both letters and illustrations from wooden blocks; but the hypothesis that wood engraving was introduced into Europe by the commerce of Venice with them lacks confirmation. In Europe it was of independent origin, having been probably practiced as early as the fourteenth century. At the beginning of the fifteenth prints from woodcuts were common in southern Germany, and perhaps in the Netherlands. They are the merest rude outlines, intended to be colored, and represent saints and similar subjects (whence the name *Helgen*), which were distributed by the clergy for purposes of religious instruction. The earliest dated ex-

ample is the well-known print of "Saint Christopher" (1423), the date assigned to the far finer "Madonna with the Child and Angels" (1413, Brussels Library) not being certain. Although playing cards were printed at this and even at an earlier date, there is not sufficient reason to find in them, as has been done, the origin of wood engraving

Both *Helgen* and playing cards antedated considerably the "block books," in which illustrations, with an appropriate printed text, were cut upon the same block of wood, before the invention of movable type. The origin of block books is a matter of dispute, being variously assigned to the Netherlands and to Germany Among the oldest surviving example the *Apocalypse* is of German origin, probably from Cologne Other celebrated works are the *Canticum Canticorum*, the *Biblia Pauperum* (q.v.), which survives in the most numerous examples, and the *Ars Moriendi*—all from the Netherlands, where, indeed, the most beautiful block books were made.

The invention of printing from movable types, which was perfected in 1454, gave a new impetus to wood engraving. Illustrations were required for the books which now became common, and the printing press furnished a better means of taking an impression than the former process of rubbing or printing from a roller. The first printed book from movable types with woodcut illustrations was a book of fables, *Liber Similitudinis*, printed by Pfister at Bamberg in 1461; a very superior artistic stage is represented in illustrations of the *Speculum Humanæ Vitæ*, a Netherlandish work often erroneously considered a block book. The centres of the art shifted to the cities of Germany, where printing presses were established—like Cologne, Nuremberg, Augsburg, and Basel. Very widely circulated and imitated were the illustrations of the *Cologne Bible* (1475), remarkable for their vigor and realism, and of the *Augsburg Bible* (1475). Of great importance, too, were the different city chronicles, the best of which was Schedel's *Liber Chronicarum* (Nuremberg, 1493). Its illustrations, designed by Wohlgemuth and Pleydenwurff, the Nuremberg artists, were remarkable as being the first in which the mere outlines were replaced by a system of light and shade. From Basel and Nuremberg wood engraving was introduced into Lyons, where the first engravings date from 1476. Somewhat later it was practiced in Paris, which city soon became famous for the *Livres des heures* of its celebrated printers, executed with great elegance in imitation of the illuminated manuscripts of the day The *manière criblée* (q.v.), in which we find a number of French fourteenth-century prints, was probably not a wood, but a metal process; a similar process of wood engraving is now used for astronomical illustrations.

Wood engraving was introduced into Italy by German printers, the earliest illustrated book being printed at Rome in 1467; but the centre of the art was Venice. Italian wood engraving speedily differentiated itself from the German, by a superior skill in the arts of design. Simplicity of line and idealism of form and conception are the chief characteristics; its spirit is manifest in such works as Æsop's *Fables* (Verona, 1481), and in the charming *Epistles of St. Jerome* (Ferrara, 1497). The delightful *Hypnerotomachia Poliphili* (Venice, 1499) embodies, as does no other illustrated work, the joyous youthful spirit of the Italian Renaissance Though variously assigned to Bellini, Raphael, and others, it is probably the work of Benedetto Montagna.

During the fifteenth century woodcuts had been for the most part outline drawings, relying upon tinting for the final effect They were cut with an instrument not unlike a penknife from the designs drawn upon blocks of apple or pear wood sawed lengthwise In the very earliest engravings designer and engraver were usually the same person; but as the art progressed artists of importance designed for woodcuts. Wood engraving was an essentially democratic art It occupied, in the early sixteenth century, a position analogous to that of the half-tone process in the nineteenth For this reason its products are of highest interest as embodying the thoughts of the teachers and entertainers of the common people.

Sixteenth Century. The last years of the fifteenth and the first half of the sixteenth century saw wood engraving attain its highest development in Germany, where the motive for its practice, the need for popular religious instruction, was most intense. Albrecht Dürer, the greatest master of ancient woodcut, transformed the art. By the skillful introduction of light and dark he replaced the old outlines with some of the effect of color, putting an end to the need of tinting, while his narrative power and the grandeur of his design excelled anything hitherto done. According to the best research he did not himself use the knife; but he was intimately associated with a number of highly trained engravers, whose work he minutely directed, chief among whom was Hieronymus Andreæ. His *Apocalypse* (1498), *Life of the Virgin* (1504–05), *Greater Passion* (1510–11), and *Lesser Passion* (1509–10) were all epoch-making in the art. An important factor in the development of wood engraving was the commissions given by the Emperor Maximilian: the *Triumphal Arch*, nearly ten feet in height and breadth, composed of 93 plates by Dürer and his pupils, the *Triumphal Procession* and *Weisskung*, by Hans Burckmair of Augsburg; and the *Adventures of Sir Theuerdank* by Hans Schäuffelein. Second only to Dürer as a designer for woodcuts, Holbein reveals his mastery of woodcut in the celebrated *Dance of Death*, and to some extent in his *Bible*, both published at Lyons (1538), though designed earlier. He had the good fortune to have as an engraver Hans Lützelburger, whose work represents the highest possible effects with the knife. The third great representative German designer for woodcut, Lucas Cranach (1472–1553), though inferior to the others in design, is important as the chief champion of the Reformation. The "Little Masters," who followed Dürer, were so called because of the small size of their designs. Among the best were Albrecht Altdorfer (1488–1538) of Ratisbon, Hans Sebald Beham of Nuremberg, and Heinrich Aldegrever at Soest; and especially, Hans Baldung at Strassburg. During the latter half of the sixteenth century wood engraving declined in Germany, partly owing to the competition of line engraving, which caused disastrous changes in the art. It was lost in the general decay of the arts, resulting upon the Thirty Years' War.

Outside of Germany there was important activity in the Netherlands, where Lucas van Leyden did especially good work, in rivalry with

Durer. The chief artists in the later sixteenth century were Hendrik Goltzius and Christopher Sichem, and in the seventeenth Christopher Jegher did some excellent work after Rubens. In France the chief masters of the sixteenth century were Jean Cousin, whose ascribed designs are in the true spirit of the Renaissance, and Bernard Salomon (c.1550), the leading designer of Lyons. In the seventeenth and eighteenth centuries the most important engravers belonged to the families Lesueur and Papillon. Jean Michel Papillon is an example of the careful minuteness of technique that characterized the declining art. He was the first to use the tougher boxwood in place of apple and pear, and wrote the first important *Treatise on Engraving* (1766). In Italy great masters of the Renaissance occasionally drew for woodcuts, as Titian, whose designs were engraved by Boldrini and others at Venice, and Leonardo, who illustrated Paccioli's *De Proportione Divina* (1509). But the art never became thoroughly acclimated, nor was there the same need for popular instruction by this means.

Chiaroscuro. A variety of wood engraving which achieved fine results was the so-called chiaroscuro, which is derived from two or more printings of identical blocks in different shades of the same grave color, such as sepia or a soft warm gray. It owes less to the engraver than to the printer, upon whose work it chiefly depends for its effects of light and shade and gradations of tint. The designing may be done with a pen or brush, and the effect resembles that of a wash drawing. Chiaroscuro engraving was probably invented at the beginning of the sixteenth century by Jost de Negker at Augsburg. Excellent work was done in Germany by Hans Baldung and other artists, and the art was introduced into Italy by Ugo da Carpi, who practiced at Venice, his first print being dated 1518. It was a favorite means for the reproduction of masterpieces in painting, and attained the highest proficiency in Italy. The chief master in the latter half of the sixteenth century was Andrea Andreani, whose masterpiece was Mantegna's "Triumph of Cæsar." The last good chiaroscurist in Italy was Coriolani in the seventeenth century. In France the art was practiced with success by Nicolas Lesueur (1691–1764), some of whose work is most admirable in delicacy of execution, and in England by John Baptist Jackson (1701–80), who did very effective work, especially after the great Venetian painters.

Modern Wood Engraving. The great difference between early and modern wood engravings is that the latter is done on the end of the grain on the wood, which is sawed crosswise, instead of the side of the wood sawed lengthwise. The surface being therefore much harder, it is done with a graver instead of a knife. Boxwood, the hardest variety of wood and most regular in grain, is generally used instead of the ancient pear or apple. It is not certain by whom these new methods were invented, but they were first used with greatest success in England by Thomas Bewick (1753–1828), who is the real founder of modern wood engraving. The most characteristic feature of his work, which is indeed the essential feature of modern engraving, is the uniform use of the white line—the design being formed of the part cut away from the block, instead of the part left standing, as formerly. This practice was made feasible by the substitution of the graver for the knife, and was not invented by Bewick, as is commonly supposed. He possessed, moreover, a very remarkable originality of design, and his works possess a pathetic intensity which renders them singularly attractive, quite aside from their high technical merit. His best productions are the illustrations to *British Quadrupeds* (1790), *British Birds* (1797), and a large engraving, the "Chillingham Bull." Contemporary with Bewick, William Blake produced an original and artistic set of illustrations, though defective in technique, for Thornton's edition of Vergil's *Pastorals* (1820).

In the hands of Bewick's pupils the woodcut became a serious rival of line engraving in the illustration of important literary works. Charlton Nesbit and Luke Clennell practiced it with great merit, the former excelling in line, the latter in artistic feeling. Robert Branston, on the other hand, founded a school which imitated copper engraving, relying upon the black line rather than the white. John Thompson engraved, though with independence, after the designs of the line engraver John Thurston, and in the works of Orrin Smith and William Harvey wood engraving lost its distinctive qualities. The illustrated newspapers and magazines, bringing the need of rapid production, caused a still further decline of the art. The engraver became a mere artisan. In vain did W. J. Linton endeavor to introduce the practice of rendering artists' drawings by lines conceived and arranged by the engraver himself. The influence of the American school (see below) failed to revive it, but finally led to a complete preference on the part of the public for the more accurate photographic processes.

The revival of wood engraving in Germany begins at the end of the eighteenth century with the two Ungers, father and son, professors in the Berlin Academy, whose work, however, was still done with the knife, and especially with their successors, Gubitz and Unzelmann. Of very great influence were the blocks designed by Adolf Menzel (1815–1905), illustrating different works on Frederick the Great, engraved by the brothers Vogel, Eduard Kretzschmar, and others. Other prominent wood engravers of the nineteenth century were Blasius Höfel in Vienna, Allgaier and Siegle, who engraved Kaulbach's *Reynard the Fox* (1863); Burkner and Gabner, the engravers of Ludwig Richter's designs; and especially Max Klinkicht in Freiburg. German wood engraving is precise and careful in execution, but rather harsh in color. The colored prints from woodcuts so extensively produced in Germany were not an artistic success.

The founders of the modern French school were Charles Thompson, a pupil of John Thompson, and the Frenchmen Best and Brevière. During the reign of Louis Philippe important masters designed for woodcuts, such as Grandville, Gavarni, and Tony Johannot, and of very great influence upon its development was Gustave Doré (q.v.), whose illustrations occupied a number of engravers, among the best of whom were Pannemaker (fils), Ligny, and Tricon. Representative engravers were Lepère, Baude, Jonnard, and Jules Huyot, not to mention Florian (died 1900), who achieved remarkable effects of tone. The chief master was probably Stéphen Pannemaker, whose style is as brilliant as it is grand and robust. Artistic dash, intelligent use of the graver, and the achievement of tone are

in fact the strongest points of the French school, which enjoys a higher perfection than any other in Europe.

American School. The earliest American work consisted almost entirely in the reproduction of English book illustrations for American reprints. The first artist of importance was Alexander Anderson (1775–1870), who engraved blocks after Holbein's *Dance of Death*, Bewick's *British Quadrupeds*, and other English works. He adopted the manner of Bewick, and his original blocks were the best engraved at that time outside of his master's immediate circle The best wood engraving of the first half of the nineteenth century was by Joseph Alexander Adams, whose original designs rank with the best English contemporaries The Civil War interfered for a time with the new magazines which now offered chief employment to the engravers. The best work of the period before 1870 is to be found in the refined, delicate cuts of A. V. R. Anthony, the detailed, careful illustrations of Henry Marsh, as in Harris's *Insects Harmful to Vegetation* (1862), and, especially, in the engravings of William James Linton (q.v). In his writings, as well as his masterly work, ranking with the best ever done, he was the champion of the methods of Bewick against the manipulative methods of the new school.

The last and most characteristic phase of the American development began in the years following 1870, in connection with the popular magazines, whose enormous circulation depended to a large extent upon their illustrations. The public demand being for the nearest possible reproduction of the originals, a school of engravers arose who accomplished this to a very remarkable extent—rendering the brush work and impasto of painting, the technical effects of etching, chalk drawing, and the like. This was rendered possible by photographing directly on the block the original, which was retained by the artist as a guide. The technical mastery acquired by the new school was soon employed in original work of a high order, especially in landscapes engraved from nature directly upon the block, and in portrait heads of great brilliancy and power. The perfection of photographic processes (see PHOTO-ENGRAVING) has, to some extent, removed the raison d'être of wood engraving of the new school, and the great American engravers have returned to a more legitimate practice of the art.

The head of the American school, and probably its most remarkable technician, was Timothy Cole. Other important exponents of modern methods were Henry Wolf (d.1916), and the late Frederick Juengling. Elbridge Kingsley is known for his fine landscapes directly from nature, while Gustav Kruell followed the methods of Linton. Other important names are W. B. Closson, who did good work from nature; F. S. King, Frank D. French, and Arthur Dow, known for his successful color printing.

The technical processes of wood engraving have in recent years been much improved both as regards the tools used in cutting the wood, such as the graver, chisels, etc., and the printing presses, the most perfect of which are in America. The process of electrotyping, by coating the woodcut with a thin film of metal, enables the printer to make an indefinite number of impressions, or by reproducing the block in metal to secure facsimiles for commercial purposes. For the important development of wood engraving and color printing in Japan, which lies outside of the sphere of the Western evolution, see JAPANESE ART.

Bibliography. The critical treatment of wood engraving began in the historical works of Heller (Bamberg, 1822); Ottley (London, 1846), and Chatto (ib, 1861). Among good modern histories are those of Delaborde (Paris, 1882); Woodbury (London, 1883), Wessely, in his *Geschichte der graphischen Kunste* (Leipzig, 1890), H M. Cundall (London, 1895), and especially W. J Linton, *Masters of Wood Engraving* (New Haven, 1882). For the old German school, consult Von Lutzow, *Geschichte des deutschen Kupferstichs und Holzschnitts* (Berlin, 1889); Muther, *Die deutsche Bücherillustration der Gothik und der Fruhrenaissance* (Munich, 1884), for the American school, Baker, *American Engravers and Their Work* (Philadelphia, 1875); Linton, *History of Wood Engraving in America* (ib, 1884), F. Weitenkampf, *American Graphic Art* (New York, 1912). Consult also Hering, *Anleitung zur Holzschneiderkunst* (Leipzig, 1873), and the treatises by Lippmann and Carrington and others cited in ENGRAVING.

WOODEN HORSE, THE. The treacherous device by which, according to the legend, the Greeks were introduced into Troy and captured the city.

WOOD'FALL, HENRY SAMPSON (1739–1805). An English journalist and printer, born in Little Britain, London, and educated at St. Paul's School. In 1758 he was made editor of the *Public Advertiser*, which the letters of Junius (q.v.), published in its columns between 1767 and 1772, brought into widespread notice. Woodfall declared that he had no personal acquaintance with the author of the letters and also, according to the statement of his son, that Sir Philip Francis was certainly not responsible for them. He published them in book form in 1772 and profited largely by their sale, although he was prosecuted by the crown for libel on account of them. In 1793 he sold the *Public Advertiser* and passed the rest of his days in Chelsea, where he died. His son, GEORGE (1767–1844), also a printer, was born in London and was trained by his father, whose partner he was till the latter's retirement. He then set up in business for himself, and in 1840 admitted his son, Henry Dick, as partner. He was regarded as one of the most eminent printers of his day, and published many works of great importance, the best known being the 1812 edition of *Junius's Letters*.

WOOD'FORD. A town in Essex, England, 8 miles northeast of St. Paul's, London (Map: London, C 9). It lies in the picturesque Epping Forest district. Pop., 1901, 13,806; 1911, 18,496.

WOODFORD, STEWART LYNDON (1835–1913). An American lawyer and diplomat, born in New York City. He graduated at Columbia College in 1854; was admitted to the bar in 1857; served in the Federal army from 1862 until 1865; was chief of staff for a time to Gen. Quincy A. Gillmore, in the Department of the South; and then was military commandant of Charleston and Savannah, and for his services received the brevet of brigadier general of volunteers. In 1868–70 he was Lieutenant Governor of New York; and in 1873–75 was a member of the National House of Representatives. From 1877 until 1883 he was United States District Attorney for the Southern District of New York; then engaged in private practice, and in 1897 was

sent as Minister to Spain. Upon the outbreak of the Spanish-American War (q.v.) in 1898 he returned to the United States and resumed law practice. In 1909 he was president of the commission that had in charge the Hudson-Fulton Celebration in New York.

WOOD GREEN. A municipal suburb of London, in Middlesex, 6½ miles north of St. Paul's Cathedral (Map: London, C 7). Pop., 1901, 34,183; 1911, 49,369.

WOOD GROUSE. See CAPERCAILLIE; GROUSE.

WOOD GUM. See GUMS.

WOOD HARE. See HARE.

WOODHEAD, GERMAN SIMS (1855–). An English pathologist, born at Huddersfield. He studied in Huddersfield College, Edinburgh University, and in Berlin and Vienna. In 1899 he was made professor of pathology in Cambridge University. At various times he was president of the Royal Medical Society, the Royal Microscopical Society, and temperance organizations. His works include: *Practical Pathology* (1883); *Pathological Mycology* (1885), with A. W. Hare; *Bacteria and Their Products* (1891); *Report to the Royal Commission on Tuberculosis* (1895).

WOOD HEN. The weka (q.v.).

WOOD HEWERS. See TREE CREEPERS.

WOODHOUSE, ROBERT (1773–1827). An English mathematician and astronomer, born at Norwich. He studied at Caius College, Cambridge, where he received a fellowship in 1798. He became Lucasian professor of mathematics in 1820, Plumian professor of astronomy and experimental philosophy in 1822, and director of the observatory in 1824. His chief service to mathematical teaching was in clarifying the Continental methods of the infinitesimal calculus, in advocating the use of its notation, and in showing its application to physical problems. Among his works are: *Plane and Spherical Trigonometry* (1809; 5th ed., 1827); *A Treatise on Isoperimetrical Problems and the Calculus of Variations* (1810); *A Treatise on Astronomy* (1812), *Physical Astronomy* (1818); and *Principles of Analytical Calculation* (1803).

WOODHULL, ALFRED ALEXANDER (1837–1921). An American army surgeon. Born in Princeton, N. J., he graduated from Princeton University in 1856 and, in medicine, from the University of Pennsylvania in 1859. He was commissioned a medical officer in the United States army in 1861 and served through the war, in 1864–65 being chief surgeon of the army of the James. With the rank of lieutenant colonel, he was chief surgeon of the Department of the Pacific (Philippines) in 1899. The next year he became colonel and assistant surgeon general, and in 1901 was retired. In 1885 he received the gold medal of the Military Service Institution and in 1907 the Seaman essay prize. Woodhull was the first to call to the attention of the service the necessity of cooperation between the medical staff and line officers in the promotion of military hygiene. From 1902 to 1907 he lectured at Princeton University on hygiene and sanitation. In 1904 he was promoted brigadier general retired.

WOODHULL, VICTORIA CLAFLIN. See MARTIN, VICTORIA C. W.

WOOD IBIS. See STORK.

WOODLAND. A city and the county seat of Yolo Co., Cal., 18 miles northwest of Sacramento, on the Southern Pacific Railroad (Map: California, D 4). The leading products are flour, dried fruit, wine, etc. The city has a Carnegie library, Woodland Sanitarium, and Holy Rosary Academy. Woodland has adopted the commission form of government. Pop., 1900, 2886; 1910, 3187.

WOOD LARK. See SKYLARK.

WOOD LOUSE. An isopod crustacean of the family Oniscidæ. The abdomen is very short, but is composed of six segments. Wood lice are terrestrial, and the respiratory organs are completely infolded by perforated plates. They feed on decaying animal and vegetable matter. They roll themselves up into a ball, so as to exhibit only the plates of the back. Other popular names are pill bug, sow bug, and armadillo. See ISOPODA.

WOODMEN OF AMERICA, FRATERNITY OF MODERN. A fraternal and insurance order formed at Lyons, Iowa, in 1883, and chartered under the laws of Illinois in 1884. Divisions of branches are known as camps. The membership has increased from 600 in 1884 to 921,879 in 1915, and 14,112 camps. The total disbursements to beneficiaries of deceased members to Dec. 31, 1915, were over $142,000,000.

WOODMEN OF THE WORLD, THE. A fraternal and insurance order founded in 1890 at Omaha, Neb. The governing body is the Sovereign Camp of the World, the branches being known as local camps. White men alone are eligible. There is a Woman's Circle, which is in affiliation with the order, but of which Woodmen may become members. Women's circles are governed by the Supreme Forest. The Woodmen pay old-age benefits and erect a monument at the graves of deceased members. The order has one sovereign camp, three head camps, and 11,823 subordinate camps. The total membership in 1915 was about 735,000. The benefits disbursed since its organization amount to over $70,000,000.

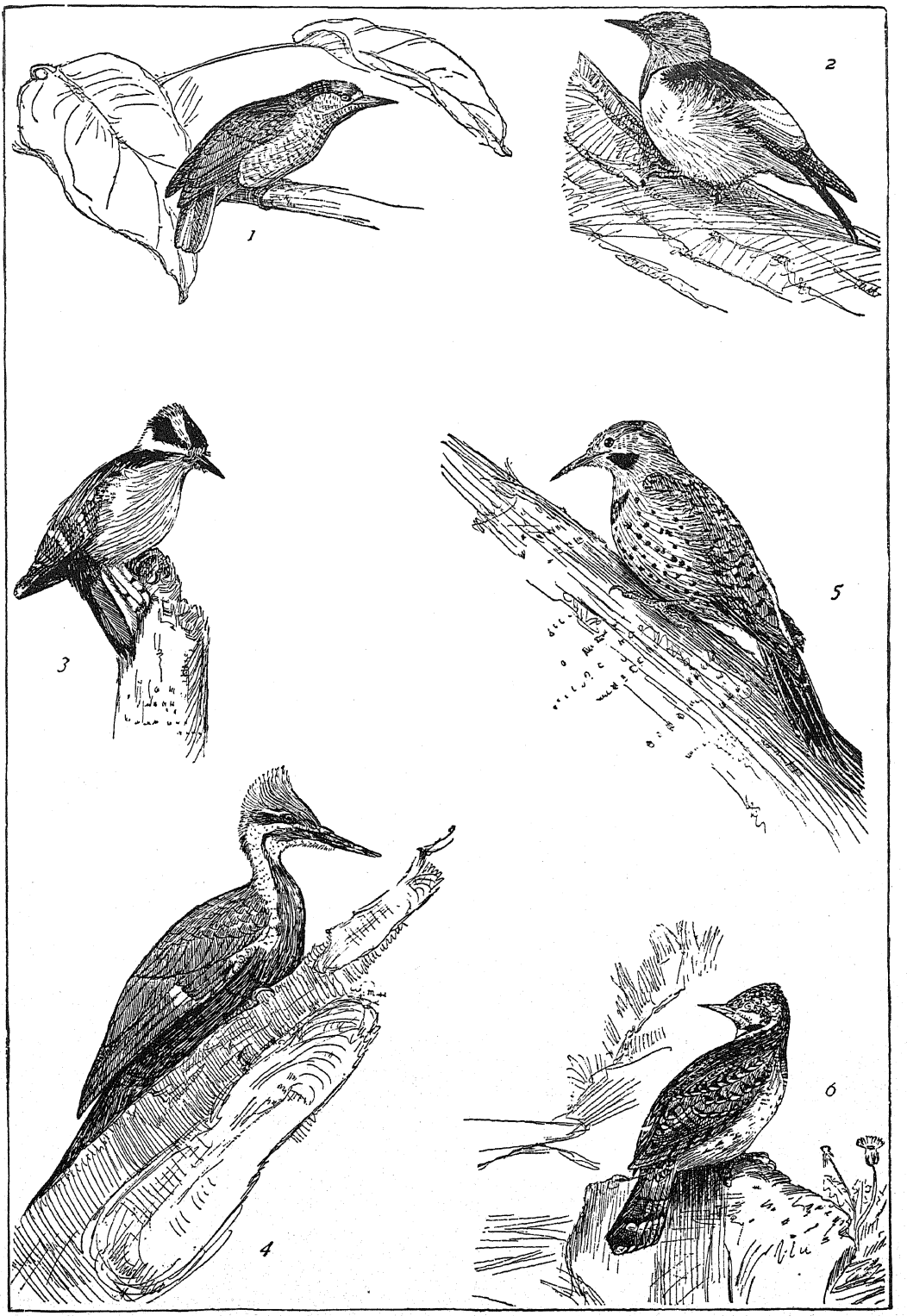
WOODMOTE. See FOREST LAWS.

WOOD MOUSE. See RED-BACKED MOUSE.

WOOD NYMPH. Any of several small, beautiful noctuid moths of the genus *Euthisanotia* (or *Eudryas*), common in various parts of the United States, and noted as enemies of the grapevine. The wood nymph (*Euthisanotia grata*) has creamy-white front wings, with a glassy surface and with a wide brownish-purple stripe along the outer margin. The moth, which appears during midsummer, lays its eggs upon the leaves of grape and Virginia creeper, upon which evidently two broods of pale-bluish caterpillars, striped with orange and black lines, feed from May to September. The insects hibernate as naked chrysalises. The pearly wood nymph (*Euthisanotia unio*) much resembles the former species, but is smaller and the outer border of the front wings is paler and tawny. It forms a simple earthen cocoon, or frequently bores into a piece of old wood, and changes to a chrysalis, in which stage it passes the winter. (See Colored Plate of MOTHS.) A California species (*Euthisanotia brevipennis*) is similar to both of the above in color and habits. Spraying the vines with an arsenical solution is recommended as a preventive of damage by these insects.

WOOD OIL TREE. A name applied to several species of Aleurites, especially to *Aleurites fordii* of China and *Aleurites cordata* of Japan. These trees are of comparatively rapid growth, with light, soft wood. They bear numerous

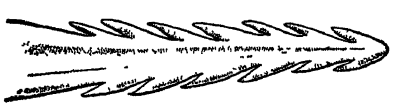
WOODPECKERS



1. BRAZILIAN PICULET (Picumnus lepidotus).
2. RED-HEADED WOODPECKER (Melanerpes erythrocephalus).
3. DOWNY WOODPECKER (Dryobates pubescens).
4. LOG-COCK (Phlœotomus pileatus).
5. FLICKER (Colaptes auratus).
6. WRYNECK (Jynx torquilla).

fruits about the size of a small apple, each containing 2 to 8 large, oily seeds. The oil is secured by expressing the ground nuts. It is a rapidly drying oil, about 5,000,000 gallons of which is annually exported, nine-tenths of this amount being obtained from *Aleurites fordii*. It is largely used in varnish making and has been found valuable as a waterproof priming for cement. *Aleurites fordii* has been successfully introduced in the Southern States, withstanding temperatures of 14° F. See GURJUN BALSAM.

WOOD'PECK'ER. A forest bird of the family Picidæ, adapted to clinging to the trunks of trees and digging holes in the wood with its beak. The toes are in pairs, two before and two behind, armed with sharp strong claws, in *Picoides* and some other genera one of the two hind toes is wanting, and these forms are therefore called three-toed woodpeckers. The bill is rather long, straight, and wedge-shaped, with a hard tip, the end and sides compressed, the tail is usually lengthened and rigid, and the shafts of the feathers terminate in hard spines, which the birds press against the surface upon which they rest, and so aid in supporting their weight. The last of the caudal vertebræ is very large, with a long ridgelike spinous process; the whole structure adapting these birds to run and climb with the greatest facility on the stems and branches of trees, and to seek their food, which consists chiefly of insects and their larvæ, by digging into the bark and wood of trees with their bill. While woodpeckers bore into living trees for boring-insect larvæ, we notice their work on dead trees far more. Various bark and wood-boring beetles, weevils, cocoons of the codling moth, the woolly aphis and other injurious insects form the bulk of the food of these



TONGUE OF WOODPECKER.

birds. The tongue is fitted to the work of removing the insects from the holes bored, as the branches of the hyoid bone are greatly elongated backward, and in front move as in a sheath; and muscles enable these birds to extend the tongue far beyond the bill. The tip of the tongue is horny and has barbed filaments, while its surface is covered with a glutinous saliva, secreted by two large glands. The keel of the breastbone is small, and the powers of flight are moderate.

Woodpeckers are diffused over almost all parts of the globe, but abound chiefly in warm countries. They are wanting in the Australian region and in Madagascar. The species are very numerous, probably 350 in all. They are mostly solitary in their habits, and live in forests. Some species feed in part on fruits and seeds, but much of their time is spent in pursuit of insects, and they may be heard at a long distance tapping the wood of trees with their bills, to discover the place where an insect is lodged, or getting at it when discovered by vigorous pickaxe-like strokes of the bill. They do more good by preventing the ravages of insects than harm by their pecking. They nest in a hole cut into the trunk of a tree for a short distance and then excavated downward six to 12 inches, according to the size of the bird, where it is somewhat enlarged. In the Southwest they often bore into cactus stems. No bedding is needed, the eggs, invariably glossy white, lying on the floor of the chamber. These holes are never used a second time, but old ones are frequently utilized by other birds.

The plumage of woodpeckers is generally of strongly contrasted colors, black and white, or green and yellow, with red marks about the head. There are several well-marked groups in the family, differing in form, plumage, habits, and geographic distribution.

The American species of woodpecker are numerous and well known. The finest of the race, the great ivory-bill (q.v.), is nearly extinct. Another very large species, the logcock (*Coephlœus* or *Phlœotomus pileatus*) is about 17 inches long, greenish black, with stripes from the eyes along the neck and sides, and the top of the head red. It is widely distributed, but stays in forests and is nowhere numerous. Common and familiar in orchards and along roadsides is a small black and white species, the downy woodpecker (*Dryobates pubescens*); and a larger counterpart, the hairy (*Dryobates villosus*), is often seen. Both peck holes in the bark of apple trees, maples, and the like, but these scars most often mark the work of the sapsucker (q.v.). Various species belong to Canada or to the Pacific slope.

The red-headed woodpecker (*Melanerpes erythrocephalus*) is common in most parts of North America west of the Alleghanies, and feeds much upon fruits and upon young heads of Indian corn, so that it is not an unmixed blessing. But its superb coloration (head crimson, back, wings, and tail glossy blue-black, secondaries and rump pure white) makes it a handsome ornament and atones in some degree for the mischief it does. It is 10 inches long. An extraordinary species of California (*Melanerpes formicivorus*), related to the redhead, is remarkable for its habit of storing acorns, each hammered into a hole in a tree trunk dug to receive it. The Eastern redhead also stores acorns irregularly in bark crevices. Lastly, the golden-winged woodpecker or flicker (q.v.) should be mentioned.

Of the European woodpeckers, the great black species (*Dryocopus martius*), much like the American logcock, is rare. The greater spotted and lesser spotted are closely related and similar to the downy and hairy woodpeckers. The most distinctive and numerous of British species is the green woodpecker (*Picus viridis*), also common on the continent of Europe. It is about 13 inches in length, and is mostly of a dark green color, picturesquely ornamented about the head with black and scarlet.

One group of foreign woodpeckers demands a few words because of the peculiar tail, which is not at all woodpecker-like. This is the subfamily Picumninæ, of which about 25 species are known, sometimes called piculets (q.v.).

Consult: United States Department of Agriculture, *Farmers' Bulletins*, Nos. 54, 513 (Washington, 1897, 1913); F. H. Eckstorm, *The Woodpeckers* (Boston, 1901); F. E. L. Beal, *Food of Woodpeckers* (new ed., Washington, 1911); E. H. Forbush, *Useful Birds and their Protection*, published by Massachusetts Board of Agriculture (Boston, 1913); also general references under BIRDS. See Plate of WOODPECKERS.

WOOD PEWEE. See PEWEE.

WOOD PRESERVING. Several processes have been employed for the purpose of preventing the decay of wood from dampness, atmospheric action, or the destructive operations of animals and parasitic plants. The principle in all has been the same, viz., the injection into the vessels of the wood of some antiseptic material, which, by combining with the woody tissue, prevents its decomposition, or gives it a poisonous character. The chief of the methods in use are: kyanizing with bichloride of mercury; creosoting, in which the preserving material is the creosote of coal tar; and burnettizing with zinc sulphate. While the tree is still growing the head of the tree is cut off, and the top of the bare stem is hollowed into the form of a bowl, which is then filled with the solution, which is afterward supplied as required. The liquid penetrates downward, killing the tree as it goes, but giving to the wood a most remarkable degree of durability. In creosoting the wood may be simply steeped in creosote oil. Melted naphthaline, too, has been employed as a preservative for timber.

WOOD-PULP YARN. A coarse yarn formed by twisting narrow strips of paper, made from wood pulp, in special machines. In this ingenious manner, cellulose fibres too short for ordinary spinning can be utilized. Wood-pulp yarns are used for twine or woven into various coarse fabrics suitable for floor and wall coverings, bagging and upholstery drapery. They are largely replacing jute on account of superior wearing qualities and lower cost, but have less tensile strength. When used with linen, cotton, jute, etc., a great variety of fabrics may be cheaply produced. Xylolin, textilose, silvalin, and lieella yarn are trade names for wood-pulp yarns.

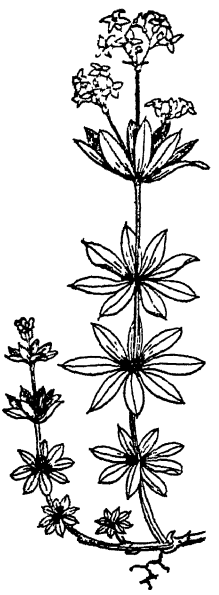
WOOD QUAIL. See ROULROUL.

WOOD RAT. A large American forest rat, several species of which form the group Neotominæ. Some have round, nearly naked tails, and others bushy tails. They are most numerous in the Southern and Western States, and are noted for the large houses they build of sticks, pieces of bark, leaves, etc., over the entrances of their extensive underground burrows. A well-known species is the bluish-gray *Neotoma floridana* of the South Atlantic and Gulf States. The yellowish brown bushy-tailed species widely distributed from Utah to the interior of British Columbia is *Neotoma cinerea*. Consult E. A. Goldman, "Revision of the Wood Rats of the genus Neotoma," in United States Bureau of Biological Survey, *North American Fauna, No. 31* (Washington, 1910).

WOOD RIVER. A river of Alaska, tributary to Nushugak Bay (q.v.). It is of importance to the United States government in connection with the adjacent spawning grounds for salmon. It was closed to commercial fishing by the Secretary of Commerce and Labor on Jan. 1, 1908.

WOOD ROBIN. A singing bird of forest-keeping habits. In the United States this name is sometimes applied to the wood thrush (q.v.), in Australia, to a warbler (*Erythrydryas rosea*), resembling the European robin redbreast.

WOOD'RUFF (AS. *wudurofe, wuderofe*, from *wudu, widu*, wood + **rofe*, of uncertain meaning, possibly ruff), *Asperula*. A genus of about 75 species of annual and perennial herbs of the family Rubiaceæ. The sweet woodruff (*Asperula odorata*) is common in shady woods in all parts of Europe. The plant when dried has an agreeable fragrance, similar to that of dried vernal grass. It forms an agreeable herb tea, and enters into the composition of the popular May drink of the Germans. Dyer's woodruff (*Asperula tinctoria*), a native of Europe and of Siberia is a perennial whose root is used in Dalmatia and elsewhere instead of madder, but is less productive. *Asperula galioides*, a European species, has been locally naturalized in the United States. See CUMARIN.



SWEET WOODRUFF.

WOODRUFF, CHARLES EDWARD (1860–1915). An American army surgeon and ethnologist, born in Philadelphia. He graduated (A B) from the Central High School of Philadelphia in 1879, then studied for four years at Annapolis, and graduated from Jefferson Medical College in 1886. In the latter year he joined the United States navy as assistant surgeon, and in 1887 was transferred to the army in the same capacity. He served in the Philippines in 1898, 1902–04, and 1909–10, rising to be lieutenant colonel and retiring in 1913. Afterward he served as chief health officer of New Rochelle. Besides helping to edit several medical journals, Woodruff wrote many monographs, and *The Effects of Tropical Light on White Men* (1905); *Expansion of Races* (1909); *Medical Ethnology* (1915). He advances the theory that blond persons can be of service to mankind and propagate only in cold and temperate zones, while brunets are fitted for life in tropical countries.

WOODRUFF, CLINTON ROGERS (1868–). An American municipal reformer, born in Philadelphia. He was educated at the University of Pennsylvania (Ph.B., 1889; LL.B., 1892). From 1891 to 1903 he served as counsel of the Philadelphia Municipal League, and in 1903–04 was special Indian commissioner to investigate charges of fraud. A member of the Pennsylvania Legislature for two terms, he was author of the "personal registration" amendment to the Pennsylvania Constitution, and after 1906 served as president of the Board of Personal Registration Commissioners for Philadelphia. Woodruff became secretary of the National Municipal League, and editor of the *National Municipal Review*. From 1894 to 1911 he edited the *Proceedings* of the National Conference for Good City Government. Besides contributions to reviews and various pamphlets, he published *City Government by Commission* (1911). In 1916, as editor in chief, he began the preparation of a new municipal encyclopædia.

WOODRUFF, WILFORD (1807–98). A president of the Mormon church. (See MORMONS.) He was born on March 1, 1807, in Avon, Hartford Co., Conn., joined the Mormon church in early manhood and was ordained a priest in 1833. He met the Prophet Joseph Smith, Jr., at Kirtland, Ohio, afterward removed to Clay Co., Mo., whence he made missionary trips to

the southwestern States, and later settled in Salt Lake City. In 1837 he became a member of the first quorum of Seventies and in 1839, one of the 12 apostles. In 1839, 1840, and 1844 he was a missionary in England, and in 1848 in the Eastern States. While at Nauvoo he asserted that he was opposed to the plural marriage system, but as one of the 12 apostles he refused to take the test oath against polygamy. In 1887, as newly elected president of the church, Woodruff issued a proclamation in which he said, in order to anticipate the provisions of the Cullom bill, "I publicly declare that my advice to the Latter Day Saints is to refrain from any marriage forbidden by the law of the land." He died Sept. 2, 1898.

WOOD RUSH. See LUZULA

WOODS, ALBERT FRED (1866–). An American plant physiologist, born at Belvidere, Ill In 1890 he graduated from the University of Nebraska, where he was an assistant botanist in 1890–93 In the United States Department of Agriculture he was connected with the Division of Vegetable Physiology and Pathology from 1893 to 1900, and served as pathologist and physiologist, and assistant chief of the Bureau of Plant Industry in 1900–10. In the latter year he became dean of the Minnesota State Agricultural College and director of the Minnesota Experiment Station. His publications consist largely of official reports and contributions to scientific journals.

WOODS, CHARLES ROBERT (1827–85). An American soldier, born at Newark, Ohio. He graduated at West Point in 1852, and became first lieutenant in the Ninth Infantry in October, 1855. Just before the Civil War began he commanded the troops on the steamer *Star of the West* in the unsuccessful attempt to reenforce Fort Sumter (q.v.). In October, 1861, he became colonel of the Seventy-sixth Ohio; fought under General Grant at Fort Donelson and Shiloh; commanded a brigade in the advance on Corinth, the land forces in the expedition to Milliken's Bend, a regiment in the Chickasaw Bluffs Expedition and the capture of Arkansas Post, and a brigade in the operations against Vicksburg, and was made a brigadier general of volunteers in August, 1863. He participated in the operations about Chattanooga; fought under Sherman in the advance on Atlanta and in the march to the sea; and in March, 1865, was brevetted major general of volunteers for services at the battle of Bentonville. He became lieutenant colonel of the Thirty-third Infantry in July, 1866; was promoted to be colonel of the Second Infantry in March, 1874; and retired in the following December.

WOODS, FREDERICK ADAMS (1873–). An American biologist, born in Boston and educated at the Massachusetts Institute of Technology and at Harvard Medical School (M.D., 1898), where for four years he taught histology and embryology. After 1903 he served as lecturer in biology at the Institute of Technology. He published, besides technical articles on heredity, *Mental and Moral Heredity in Royalty* (1906) and *The Influence of Monarchs* (1913).

WOODS, LEONARD (1774–1854). An American Congregational theologian. He was born at Princeton, Mass., graduated at Harvard College (1796), and became pastor at West Newbury, Mass. (1798). He was professor of theology at Andover from the opening of the seminary in 1808 till 1846, when he resigned, but continued to live in Andover till his death. He first came into notice by his controversial papers on the Hopkinsian side in the *Massachusetts Missionary Magazine* (see HOPKINS, SAMUEL), and later (1805) as joint editor of the *Panoplist.* He was prominent in the formation of the American Tract Society, American Education Society, American Temperance Society, and the American Board of Commissioners for Foreign Missions His collected works appeared in five volumes (Boston, 1849–50), and his *History of Andover Seminary* in 1885. One of his most useful services was his *Life of Mrs. Harriet Newell* (1814), which profoundly influenced the foreign missionary cause. He also published· *Letters to Unitarians* (1820); *Letters to Rev. N. W Taylor* (1830); *Lectures on Church Government* (1844); and *Theology of the Puritans* (1851). Consult Williston Walker, *Ten New England Leaders* (New York, 1901); F. H. Foster, *A Genetic History of New England Theology* (Chicago, 1907).

WOODS, LEONARD (1807–78). An American theologian and scholar, born in Newbury, Mass., the son of Leonard Woods (1774–1854). He graduated at Union College (1827) and at Andover Theological Seminary (1830) and edited in New York *The Literary and Theological Review* (1834–37). He was professor of sacred literature in Bangor Seminary (1836–39) and president of Bowdoin College (1839–66). His valuable investigations in the early history of Maine are contained in the *Proceedings* of the Maine Historical Society (1877). He translated, among other works, G. C. Knapp's *Christian Theology* (2 vols, 1831–33).

WOODS, MARGARET LOUISA (BRADLEY) (MRS. H. G. WOODS) (1856–). An English author, born at Rugby, a daughter of George Granville Bradley (q.v.). She was educated at home, and at school in Leamington. Among her publications are· *A Village Tragedy* (1887); *Lyrics and Ballads* (1889); *Esther Vanhomrigh* (1891); *The Vagabonds* (1894); *Wild Justice* (1896); *Sons of the Sword* (1901); *The King's Revoke* (1905); *Poems Old and New* (1907); *Pastels under the Southern Cross* (1911); *Collected Poems* (1914). Consult William Archer, *Poets of the Younger Generation* (New York, 1902).

WOODS, WILLIAM BURNHAM (1824–87). An American jurist and soldier, born in Newark, Licking Co., Ohio He graduated at Yale in 1845 and was admitted to the Ohio bar in 1847; was Mayor of Newark in 1856–57; then was elected to the Legislature and chosen Speaker. In September, 1861, he became lieutenant colonel of the Seventy-sixth Ohio Regiment, and served throughout the war under General Grant and General Sherman. He commanded a division in Sherman's march to the sea. At the close of the war he was brevetted major general of volunteers. In 1869 he was appointed judge of the Fifth United States Circuit Court; and in 1880 associate justice of the United States Supreme Court.

WOOD SAGE. See GERMANDER.

WOODSFIELD. A village and the county seat of Monroe Co., Ohio, 42 miles southwest of Bellaire, on the Ohio River and Western Railroad (Map: Ohio, H 6). There are machine shops and some small manufactories. Pop., 1900, 1801; 1910, 2502.

WOOD'S HALFPENCE. The name given to the halfpence issued for Ireland by William

Wood, an Ironmaster, in 1723-25. According to a well-established custom, George I in 1722 gave the Duchess of Kendall, his favorite mistress, a patent for coining copper halfpence and farthings for Ireland to the value of £108,000. She in turn sold this to Wood for £10,000, and Wood proceeded to pour the coin down the throats of the people. All classes in Ireland united in a most vehement opposition, which became so formidable that the government revoked the patent in 1725 and granted Wood a compensation for his loss.

WOODS HOLE. See FALMOUTH.

WOOD SHRIKE. An Oriental shrike of the subfamily Prionopinæ.

WOOD SLAVE. A familiar and active little skink-like lizard (*Habenia aquila*) of Jamaica.

WOOD'S METAL. See FUSIBLE METAL.

WOOD SNAKE, or SIPO. An arboreal colubrine snake (*Herpetodryas carinatus*) of the American region, often seven feet long, and remarkable for its beautiful colors. The upper parts are bright verditer or olive green, and the under parts greenish or bright yellow.

WOOD SNIPE. See CURLEW.

WOOD SPIRIT, or WOOD ALCOHOL. See METHYL ALCOHOL.

WOODSTOCK. A town in Oxfordshire, England, 8 miles northwest of Oxford (Map: England, E 5). It is celebrated as the former seat of the manor of Woodstock, or Old Woodstock, a residence of the early English kings, granted to the great Duke of Marlborough, whose magnificent residence, Blenheim Palace, built for him by the nation, is in the immediate vicinity. Edward, the Black Prince, was born here; Elizabeth was here held prisoner by her sister Mary, and Chaucer resided in the place for some time. Woodstock is also famous in connection with Fair Rosamond, the celebrated mistress of Henry II. Pop., 1911, 1594. Consult Marshall, *Early History of Woodstock Manor* (1873-74).

WOODSTOCK. A port and capital of Oxford County, Ontario, Canada, on the Grand Trunk and the Canadian Pacific railroads, 30 miles east-northeast of London (Map: Ontario, D 7). It is the seat of Woodstock College, in affiliation with McMaster University (Baptist), Toronto. It also possesses a public library, and a hospital. Pop., 1901, 8833; 1911, 9320.

WOODSTOCK. A town, port of entry, and the county seat of Carleton County, New Brunswick, Canada, on the St. John River and on the Canadian Pacific and the St. John Valley railways (Map: New Brunswick, C 4). It possesses the Fisher Memorial School, an agricultural college, a school of domestic science and a public library. Pop., 1901, 3644; 1911, 3856.

WOODSTOCK. A city and the county seat of McHenry Co., Ill., 51 miles northwest of Chicago, on the Chicago and Northwestern Railroad (Map: Illinois, H 1). It has the Todd Seminary for Boys, the Chicago Industrial Home for Children, the Old Folks Rest Home, and a fine courthouse, city hall, and armory. There are two large typewriter factories, pickle works, feed and planing mills, a foundry and machine shops, and a cheese and butter factory. Pop., 1900, 2502; 1910, 4331.

WOODSTOCK. A village and the county seat of Windsor Co., Vt., 30 miles east of Rutland, on the Ottauquechee River, and on the Woodstock Railroad (Map: Vermont, D 6). It has a public library. Woodstock has some popularity as a place of resort, being situated in a picturesque region. There are lumber and flour interests. Pop., 1900, 2557; 1910, 2545.

WOODSTOCK. A novel by Walter Scott (1826). The scene of the story is laid in the royal lodge of Woodstock in 1651.

WOOD TAR. See NAVAL STORES, TAR.

WOOD THRUSH, WOOD ROBIN or SONG THRUSH. Names of one of the most familiar, beautiful, and melodious of North American thrushes (*Turdus mustelinus* or more correctly, *Hylocichla mustelina*). See THRUSH.

WOOD TIN. See CASSITERITE.

WOOD TORTOISE. An American terrestrial turtle (*Clemmys insculptus*) to be recognized by the concentric markings or striæ on each plate of the carapace. It occurs in the United States east of Ohio, and is common in many localities. See TURTLE.

WOOD TURPENTINE. See TURPENTINE.

WOODVILLE, RICHARD. See RIVERS.

WOOD WARBLER. A book name for the American warblers of the family Mniotiltidæ. See WARBLER.

WOODWARD. A city and the county seat of Woodward Co., Okla., 150 miles northwest of Oklahoma City, on the North Canadian River, and on the Atchison, Topeka, and Santa Fe and the Wichita Falls and Northwestern railroads (Map: Oklahoma, B 2). It has the Woodward Hospital, a government agricultural station, a Carnegie library, and fine school, courthouse and Federal buildings. Woodward carries on a large trade in wheat, corn, live-stock and poultry. Pop., 1900, 2018; 1910, 2696.

WOODWARD, wud'wĕrd, ARTHUR SMITH (1864–). An English paleontologist. He was born at Macclesfield, and studied at Owens College, Manchester. In 1882 he entered the British Museum, where he became assistant keeper, and later, keeper of geology. His researches deal mainly with extinct vertebrata, especially extinct fishes. He made trips to South America in 1896 and 1907, made excavations in Greece in 1901, and with Charles Dawson discovered and interpreted (1912-14) the Piltdown skull. (See MAN, SCIENCE OF, *Ancient Types.*) In 1901 he was elected a fellow of the Royal Society. He received the Wollaston grant in 1889 and the Lyell medal in 1896 from the Geological Society of London, and the Clarke medal from the Royal Society of New South Wales in 1914. Of the Geological Society he was president in 1914. Besides numerous memoirs and papers, his publications include. *Catalogue of Fossil Fishes in the British Museum* (4 vols., 1889-1901); *Outlines of Vertebrate Palæontology* (1898); *The Fossil Fishes of the English Chalk* (7 parts, 1902-12).

WOODWARD, CALVIN MILTON (1837–). An American technical educator, born at Fitchburg, Mass. He graduated from Harvard in 1860, and served as captain in the Forty-eighth Massachusetts Volunteers in 1862-63. At Washington University he was professor of descriptive geometry (1870-71) and of mathematics and applied mechanics (1871-1910), and dean of the School of Engineering (1871-96) and of the School of Engineering and Architecture (1901-10). Of the St. Louis Manual Training School, which he originated in 1879, he was thereafter director, and he served also as a member of the St. Louis Board of Education in 1877-79 and after 1897. Woodward held the presidency of the American Association for the Advancement of Science (1905-06), and of

the North Central Association of Colleges and Secondary Schools He published *History of St. Louis Bridge* (1881), *The Manual Training School* (1887), *Manual Training in Education* (1890); *Rational and Applied Mechanics* (1912)

WOODWARD, HENRY (1832–). An English geologist, born at Norwich, and educated at the Royal Agricultural College at Cirencester. Several other members of his family have been known as geologists—his father, Samuel Woodward (1790–1838), his brother, Samuel Pickworth Woodward (1821–65), and his nephew, Horace Bolingbroke Woodward (q.v.) His brother, Bernard Bolingbroke Woodward (1816–69), was librarian at Windsor Castle and a writer. He was keeper of the geological department of the British Museum from 1880 till 1901 He was president of the Palæontographical Society from 1896, was at various times president of the Royal Microscopical and Geological societies and of the Malacological Society and in 1906 received the Wollaston medal. His works include monographs on the *British Fossil Crustacea Belonging to the Merostomata* (1866–78); on the *Carboniferous Trilobites* (1883–84); on the *British Palæozoic Phyllopoda* (1888–99).

WOODWARD, HORACE BOLINGBROKE (1848–1914). An English geologist, nephew of Henry Woodward (q.v.). His father, Samuel Pickworth Woodward, had also been a geologist. He was born in London, became an assistant in the Library and Museum of the Geological Society in 1863, and in 1867 joined the Geological Survey of England and Wales, of which he later became assistant director In 1893–94 Woodward was president of the Geologists' Association. He was elected a fellow of the Royal Society. His publications include: *Geology of England and Wales* (1876; 2d ed., 1887); *Jurassic Rocks* (1893–95); *Soils and Subsoils* (1897; 2d ed., 1906); *Geological Atlas of Great Britain* (1904; 3d ed., enl., 1913); *The History of the Geological Society of London* (1907); *The Geology of Water Supply* (1910); *History of Geology* (1911); *Geology of Soils and Substrata* (1912).

WOODWARD, JOHN (1665–1728). An English geologist, born in Derbyshire. He became professor of physic at Gresham College in 1692, was elected F.R.S. in 1693, and received the degree of M.D. from Cambridge in 1695. Much of his work was ahead of his time; indeed, he showed that the shells found in rock strata had originally lain in sea sand, and called attention to the strata themselves. He prepared a great *Catalogue* and published also: *An Essay towards a Natural History of the Earth* (1695; 3d ed., 1723); *Brief Instructions for Making Observations* (1696); *An Account of Some Roman Urns* (1713; 3d ed., 1723); *An Attempt towards a Natural History of the Fossils of England* (2 vols., 1728–29). His collection of English fossils formed the nucleus of the Woodwardian Museum at Cambridge, and his will provided for the Woodward professorship of geology.

WOODWARD, JOSEPH JANVIER (1833–84). An American surgeon, born in Philadelphia. He graduated from the medical school of the University of Pennsylvania in 1853, and practiced in Philadelphia and taught in the University of Pennsylvania until 1861. He then became assistant surgeon in the United States army, and served throughout the war, receiving the brevets of captain, major, and lieutenant colonel. In July, 1866, he was commissioned captain and assistant surgeon in the regular army, and in 1876 was promoted surgeon with the rank of major. He did much to develop medical microscopy His inventions include an instrument for detecting myopia or other abnormal conditions of the eye In 1882 he was president of the American Medical Association. He published works on photographic micrometry and *Outline of the Chief Camp Diseases of the United States Armies* (1863), but his great work was a collection of case histories, the two medical volumes (1870–79) of *The Medical and Surgical History of the War of the Rebellion*, of which G. A. Otis was co-author

WOODWARD, ROBERT SIMPSON (1849–1924). An American physicist and mathematician, born at Rochester, Mich. He graduated C.E. at the University of Michigan in 1872 and was appointed assistant engineer on the United States Lake Survey. In 1882 he became assistant astronomer to the United States Transit of Venus Commission. In 1884 he became astronomer to the United States Geological Survey, serving until 1890, when he became assistant in the United States Coast and Geodetic Survey. In 1893 he was called to Columbia as professor of mechanics and subsequently became professor of mathematical physics as well. He was dean of the faculty of pure science at Columbia from 1895 to 1905, when he became president of the Carnegie Institution (q.v.) of Washington, whose reputation and usefulness as a means of furthering scientific research was widely extended under his direction He was elected to the National Academy of Sciences in 1896 In 1898–1900 he was president of the American Mathematical Society, and in 1900 president of the American Association for the Advancement of Science. In 1915 he was appointed to the Naval Consulting Board. Woodward carried on researches and published papers in many departments of astronomy, geodesy, and mechanics. In the course of his work with the United States Coast and Geodetic Survey he devised and constructed the "iced bar and long tape base apparatus," which enables a base line to be measured with greater accuracy and with less expense than by methods previously employed. His work on the composition and structure of the earth and the variation of latitude found expression in a number of valuable papers. He published *Smithsonian Geographical Tables* (1897; 3d ed., 1906), and *Probability and Theory of Errors* (1906).

WOOD-WORKING MACHINERY. The various machines by means of which lumber as cut in the forest is reduced to standard dimensions and then made into pieces ready for immediate use, as boards, trim, doors, sashes, boxes, etc. As the lumber advances through consecutive operations the machinery becomes more and more specialized, and many ingenious and involved machines, as those for making barrels, wheels, chairs, etc., are required. A general division of wood-working tools may be made into those operating (*a*) by scission or cleaving, such as saws; (*b*) by paring, as the planers, surfacers, matchers; (*c*) by combining the two foregoing principles, as in the case of lathes, boring machines, mortisers, and gaining machines; (*d*) by abrading or grinding, as sandpapering and similar finishing machines.

The saws are discussed under that head, but may briefly be considered here Rather than have the forest lumber cut by the log saws, it is preferable, for economy, to have it squared and then resawed at the mill. Vertical reciprocating saws, circular resaws, and band resaws are employed. The latter saws are finer than the log saws and consequently avoid unnecessary waste. They cut the lumber into large planks or boards To reduce the lumber to the desired dimensions circular, ripping, and cross-cut saws are used. The former have fewer and larger teeth, which cut upon their front edges, while the latter cut upon their sides. In using the ripping saw the boards have to be fed to the saw, but with the cross-cut saw it is possible to move the saw to the work. Many forms of circular saws are devised by varying the arrangement of the carriage, and shingles, clapboards, etc, more or less irregular, can be prepared. For curved and scroll sawing a narrow bandsaw is employed, though there are reciprocating jig saws suitable for this purpose.

The wood must next be surfaced, or smoothed and planed, to the required dimensions. In the surfacer this is done by a series of revolving cutters, which pare off shavings, leaving the board or beam smooth. In many surfacers all four sides of the board are operated on at once, in some cases the tongue and groove being cut in the edges The number of knives in each cutter may vary from three to nine, and the machines are fitted for handling various sizes of stock. Instead of plane surfacers machines may be devised for cutting curved surfaces to a given pattern, as in the case of moldings, while there are numerous cutting machines which carry cutting tools on a vertical spindle, for scrollwork, carving, paneling, etc. Of considerable importance are the dovetailing machines, which may consist of either a gang of chisels or of a cutter similar to that of the carving machine, which cuts out the tongues and spaces, automatically spacing them, assuring an exact fit.

Lathes are important and much-used tools. In them a piece of wood is rapidly revolved while a chisel or other tool is held against it, so that the wood is removed by a combined action which involves both the severing of the fibres and paring. Many forms of simple wood-turning lathe exist, and this, operated by a skillful mechanic, is capable of a wide range of work. By using various automatic attachments the output of the lathe can be greatly increased, especially where a number of similar pieces are to be constructed. In the simplest of these processes the cutting tool follows a pattern, which regulates the depth of cut and consequently the radius of the turned object. Then there are lathes where the blank and a pattern are revolved and rotary cutters carve out of the former an exact facsimile.

There are also tenoning machines to make tenon joints, and gaining machines, which cut grooves across the surface of timber, while to make mortises to receive the tenons there are machines, some of which have rotary cutters and others reciprocating chisels. Of boring machines there are numerous designs, arranged specifically for a given class of work. Abrasive machines include sandpapering machines, where an endless belt, on which sand or emery has been fixed, is in contact with the work, and drum machines, where the work is a large flat surface.

With such tools many varieties of work can be performed, and where a large number of pieces of a particular class of work are desired, a special machine is constructed which turns them out more or less automatically. It is in this direction that the greatest improvements in wood-working machines are being made Their efficiency, as well as their capability for rapid work, is also being constantly augmented. See BORING TOOLS AND MACHINERY; BUILDING: SAW, SAW MILL

WOODWORTH, wud'würth, ROBERT SESSIONS (1869–). An American psychologist and physiologist, born at Belchertown, Mass. He graduated at Amherst in 1891, and studied at Harvard (A.M., 1897), at Columbia (Ph.D, 1899), and at the universities of Edinburgh, Liverpool, and Bonn He was an assistant in physiology at the Harvard Medical School (1897–98), an instructor in physiology at the University and Bellevue Hospital Medical College, New York (1899–1902), and demonstrator in physiology at the University of Liverpool (1902–03). Thenceforth a member of the faculty of Columbia University, he rose to be professor of psychology in 1909. In 1914 he was president of the American Psychological Association Woodworth became editor of the *Archives of Psychology*. His publications include: *The Accuracy of Voluntary Movement* (1899); *Elements of Physiological Psychology* (1911), with G T Ladd, *The Care of the Body* (1912).

WOODWORTH, SAMUEL (1785–1842). An American journalist and poet, born at Scituate, Mass. After an apprenticeship in a printing office, he edited and printed a paper at New Haven, Conn., in 1807, and in 1809 removed to New York, where he conducted *The War* (1813–14), a weekly paper, during the War of 1812. He aided George P. Morris in 1823 in founding the New York *Mirror*. During his life he published a good deal of verse, as well as operettas and a curious romance of the War of 1812, *Champions of Freedom* (1816). His complete poetical works were edited (2 vols., 1861), by his son, with a *Memoir* by George P. Morris. He is remembered almost wholly for his song "The Old Oaken Bucket" (1817).

WOODY NIGHTSHADE. See BITTERSWEET.

WOOL (AS. *wull, wul,* Goth. *wulla,* OHG. *wolla,* Ger. *Wolle,* wool; connected with Lat. *villus, vellus,* OChurch Slav *vlŭna,* Lith. *vilna,* Skt. *ūrnā,* wool, from *var,* to cover). The soft hairy covering of sheep and several allied animals, next to cotton the most extensively used of all fibres. Its history dates back to the earliest times of which we have any record, and as civilization has progressed its uses and applications have steadily increased

Wool Production and Consumption. The chief wool-producing countries of the world are: Argentina, Uruguay, and other South American countries; Australia and New Zealand; the United States; Russia, Great Britain and Ireland, France, Spain, South Africa, and India. The world's clip for 1915 was estimated by the National Association of Wool Manufacturers at 2,872,000,000 pounds. The consumption of wool in the United States has always been relatively large. Prior to the beginning of the factory era it did not average more than three pounds per capita of population annually, and in the middle of the last century it amounted to four pounds, but as wealth increased and the uses of wool enlarged, the consumption increased to about eight

pounds per capita in 1900. In 1915 the wool clip of the United States was estimated at 290,192,000 pounds, the product of about 50,000,000 sheep. About two-thirds of the wool used by American mills is supplied by domestic flocks The imported wools largely used for blankets and carpets are mostly of lower quality. The principal wool-producing States are Montana, Wyoming, New Mexico, Idaho, Oregon, Ohio, Utah, California, Texas, Colorado, and Michigan, in the order named.

Sheep raising has preceded civilization in nearly all parts of the world. Before agriculture was practiced to any extent, it was almost universal. With the progress of civilization, the use of wool for making cloth led to the improvement of the fleece by selection and breeding. The Romans greatly increased the fineness of the fleece, and after the Roman conquest of the Iberian Peninsula Roman sheep were introduced into Spain, where they so greatly improved the native flocks that even during Roman supremacy Spanish wool led in the world's markets, a prestige held for many centuries. Through judicious crossing of the fine-wooled Merino with high-grade long-wooled breeds, the highest type of wool fibre has been developed, combining suppleness, fineness, and other desirable qualities with lustre and length of staple. It is suitable for combing as well as carding.

Wool may be considered a product of cultivation, or domestication, as no wild animals are known which resemble the wool-bearing sheep; and few natural products have been more modified and diversified by man to meet his various needs. This is very strikingly shown by a comparison of the coarse heavy covering of the argali or musmon (the supposed progenitors of the sheep), with the fine wool of the Merino or the long, lustrous fleece of the Leicester. These animals in the natural state were covered with coarse hair or fur, among which close to the skin is a softer hair or wool. Under the influence of good care and feed, and protection from the inclemencies of the weather, the longer coarse hair largely disappeared, and only the softer, shorter hair or wool remained, a phenomenon said to be observed when the argali is brought under domestication.

Characteristics and Properties. Wool is a living appendage of the skin, produced by increased epidermal cells. The difference between wool and hair is one of degree rather than of kind, because all wool-bearing animals have the tendency when neglected to produce hair rather than wool, and because numerous intermediate structural stages exist between the two extremes. While wool is commonly characterized by its fine, soft, curly nature, the true distinction between it and hair lies in its covering of pointed scales or plates, attached to the filament at their bases and overlapping much like fish scales. This structure, which is readily seen with a microscope, is perceptible to the touch by its harsh, rough feeling when the fibre is drawn through the fingers from the tip to the root. The number of these scales bears a fairly direct relation to fineness of the fibre. The curliness of wool is due to a spiral structure of the filaments, and although all wool is not curly or wavy, curliness is one of its recognized and important characteristics. There also appears to be a relation between fineness and curliness. Owing to the relation which these three characteristics bear to each other, curliness, or the number of waves to the inch, which can be seen with the naked eye, is one of the factors noted in judging wool The waviness and scaliness are utilized in making felt (q.v.) and also in thread making. A pound of the finest wool will yield nearly 100 miles of thread In spinning, the filaments interlock by their scales, and the curl of the fibre prevents the threads untwisting and helps to hold them together These valuable qualities vary greatly in different wools, some being adapted to carding for cloth, and others to combing for worsteds It is upon minute points of difference that the value of various grades of wool chiefly depends. The lustre also differs greatly and to a certain extent is a breed characteristic, the wool of the Lincoln and the best Leicester sheep being much more lustrous than that of the shorter wools or the fine Merino fleece. The length of staple, which is made a basis of general classification, is largely a constitutional or breed characteristic, the staple being from 1 to 2 inches long in the finest Merinos, 8 inches or more in the Lincolns, and reaching 12 and even 15 inches in some combing wools, the length of staple suggesting the grouping of sheep into short-wools, middle-wools, and long-wools. The fine felting wools have a short staple, as a rule, and are used for carding or yarn purposes. while the longer, more lustrous, and less wavy ones are better suited to combing and worsteds.

Another valuable characteristic of wool is its elasticity, which gives it a softness to the touch which is retained in the manufactured goods Closely related to this is the strength of fibre; a dead or inferior wool will break instead of stretching when strained. Delicate machines have been constructed for testing the strength and elasticity of fibre, for both practical and scientific purposes. Bowman found that wool fibre is fully one-fourth stronger than cotton, the strength being proportional to the diameter. Great variation, however, exists in the strength of fibres from different wools of the same class of sheep.

All wool in its natural state contains fatty or greasy matter called yolk or suint, secreted by the skin and covering the individual hairs This serves to lubricate the fibres and prevent their matting together, and also protects the fleece from injury. It differs in quantity and exact character with various breeds and is believed to render the wool soft and pliable. The fats and the potash salts which the yolk contains form a sort of natural soap. In manufacturing wool, the yolk, which is partly soluble in water, must be removed so as to increase the felting tendency and the ability of the wool to take dye. White is the most common color of cleaned sheep wool and is generally preferred for manufacturing; but the black, fawn, cream, and gray shades produced by various breeds are utilized in their natural colors for certain kinds of clothing. Wool is soluble in a hot solution of caustic soda, while cotton is not. This fact is taken advantage of in testing woolen goods for adulteration with cotton, as when a sample of the goods is boiled with the reagent any cotton present will remain undissolved.

Variation in Properties. The wool from different parts of the same animal differs greatly in length of fibre, fineness, and structure. As a rule, the best is obtained from the shoulders and sides. That from the fore part is irregular and likely to be filled with burrs, while the loin wool is shorter and coarser, that on the hind

quarters still more, and coat from the underside of the breast and the belly is likely to be short, worn, and dirty. As the wool is finer on the shoulders, it is likewise superior in soundness of fibre, softness, curl, and evenness of length. Purity of blood, good general management, and uniformity of feeding tend towards greater uniformity of the fibre growth on different parts of the body, whereas a period of insufficient feeding or of ill health leaves a weaker and less healthy fibre at the point represented by it. Such wool is usually noticeably deficient in yolk. The importance of breeding, climate, and feeding is evidenced by the changes which occur in the wool when sheep of a given breed are removed from one region or district to another quite different. Coleman states that wool in certain districts of Yorkshire brings a higher price than that of other localities, the advantage being probably due to favorable conditions of soil and climate. On the other hand, the ability of man to counteract unfavorable conditions of a particular section is testified to by Lastereye (as quoted by Darwin), who cites the preservation of the Spanish Merino sheep in their utmost purity under such varying conditions as are found at the Cape of Good Hope, in the marshes of Holland, and under the rigorous climate of Sweden, and contends that "fine-wool sheep may be kept wherever industrious men and intelligent breeders exist."

Kinds and Grades. The wool clipped from lambs, called in England "hog wool," differs from the wether wool, or subsequent clippings, in the staple being somewhat pointed, softer, and more wavy or curly. Lamb's wool is more valuable than wether's wool, and can be used for purposes to which the later clippings are not suited. Fleece wool, or that clipped from the live animals, is marketed as (1) unwashed, or in the grease, i.e., as shorn from the sheep with the yolk and dirt adhering to it; (2) washed, i.e., washed on the sheep in cold water, which removes a part of the yolk and dirt, and (3) scoured, or cleaned, ready for manufacture. By far the larger part of the wool produced in the United States, and especially west of the Mississippi River, is marketed unwashed, which is generally preferred by wool buyers. Skirted is a term applied to fleeces from which the head, belly, and breech wool (the inferior parts) have been removed. Pulled wool, also called skin wool, generally an inferior grade, comes from the pelts of sheep which have been slaughtered or have died from disease or exposure. The wool is loosened by application of a thin lime paste to the back of the skin, or by sweating the wet skins in piles. Shoddy is wool which has been previously manufactured, torn apart, and prepared for use again.

The value of wool and the use to which it is put is influenced by the length and the fineness of the fibre. The three main classes of wool on the basis of the staple are (1) carding or clothing wools, or those of the Merino type, in which felting qualities are desired; (2) combing wools, in which length of staple is required and felting qualities not desired, used for hard-spun non-felting worsteds; and (3) miscellaneous, sometimes called carpet or blanket wools, long, strong, coarse wools, used for carpets, blankets, and coarse clothing. The combing wools bring several cents a pound more than the carding or clothing wools. Wool is graded according to fineness, as judged by the feel, which is highly developed in the graders. The clothing wools are commonly classified as XX, X, the X quality being supposedly the wool from sheep containing three fourths Merino blood. Formerly, two higher grades, Picklock and XXX, were recognized, derived from Silesian Merinos or their crosses. The combing wools, often called Delaines, were formerly derived from the English mutton breeds, but machinery has been adapted for combing the Merino carding or felting wools, which have been lengthened by breeding and selection. The clothing wool used in the United States, aside from home production, is derived mainly from Australia, South America, and South Africa. The imported combing wool comes mainly from Great Britain, although much comes from New Zealand, Argentina, and Canada. The coarse carpet wools are the product of neglected flocks and unskilled breeding throughout the world.

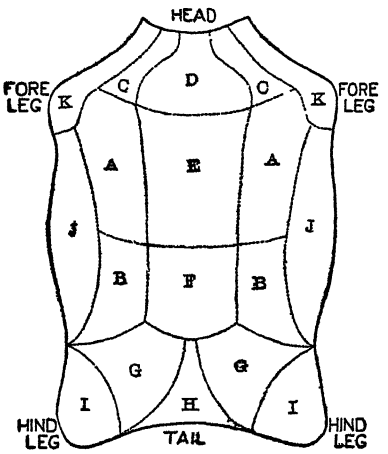
In judging wool on the sheep's back, account is taken of strength of fibre, fineness, curl, thickness, and closure of the fleece. When the yolk is deficient the fibres become dry and brittle, and the fleece is likely to be injured otherwise. The waves of the curl should be uniform and numerous throughout the length of the fibre. The thickness of the fleece, depending upon the closeness of the fibres upon the skin, varies greatly with the breed, and also with the individual to some extent. A fairly thick and well-closed fleece is desirable. The closure is caused by the matting together of the ends of the fibres by the yolk. This gathers dust and forms a dirty coating, rendering the fleece impervious to dust and dirt, which would be injurious.

As a result of the tendency towards combing wools, both fine and coarse, Merino and English worsted wools now largely predominate in the domestic supply. Since all the improved breeds of the world have been introduced and acclimated in the United States, the range of grades of wool which have been successfully produced is very great. Breeding, care, and feeding have more than doubled the average weight of the fleece, the present average for all classes being between six and seven pounds. Among well-tended flocks of mutton breeds, which produce a heavier fleece than the fine-wooled breeds, the yield amounts to 8, 10, and more pounds per head, in individual cases reaching 15 or even 20 pounds. In most parts of the United States shearing is done in the spring; in Texas, New Mexico, Arizona, and southern California, where climatic conditions interfere to prevent evenness of fibre, it is done twice, the winter fleece being stronger and of greater value than that grown in summer. Since these clips do not work well together, their mixture reduces both qualities to a low level.

Defects. The most common defect of wool is break, which is due to exposure, insufficient feeding, etc. In this the fibre contains weak spots which cause it to break when stretched. It destroys the value of wool for combing purposes. Stripy wool is inelastic, harsh, and lacking in curl, and is used only to make inferior goods. It affects the fleece in the most valuable part—the sides and shoulders. Toppiness is a sort of uneven felting of the fibres at the top of the fleece, so that the closure is not perfect. It is usually the result of uneven growth and causes waste in carding. Felted wool is deficient in yolk, and as a result becomes matted together in bunches, causing loss in combing and carding. It is attributed usually to poor health. Broad-topped wool is a serious defect, in which

the fibres split down from the top, interlace and mat so as to appear even on the surface, which is divided into broad masses called tops. These cannot be parted without tearing Hemp, or kemp, consists of a mixture of short, coarse white hairs and wool fibres, occurring chiefly on the parts where the wool is lightest and shortest, but may occur all through the fleece if the sheep has a tendency to produce hemp Since the hairs do not take dye and cannot be sorted out, they lessen the value of the fleece fully one-half for the manufacture of fine grades of goods. In cloudy wool the fibres adhere throughout their length, but not so much as to be felty. This injures the wool for combing, causing waste, but is not so objectionable in carding wools

Wool Sorting. The differences in the quality of wool, and especially that from different parts of the fleece, render sorting a necessity. In shearing, the fleece from each sheep sticks together as a mat, and is tied up separately. In sorting, the different parts of the fleece representing separate qualities are torn off by hand An idea of the location of the various qualities of wool is given by the accompanying diagram of a Leicester lamb's fleece, taken from Bowman's *Structure of the Wool Fibre*. The same relative positions hold good in all kinds of fleeces.



FLEECE OF LEICESTER WOOL.

The finest and most even growth of wool is found at *A*, on the shoulders. In some fleeces this quality extends farther up the back (*E*) and towards the tail (*B* and *F*) than in others, and the quality of the wool at *B* is not very much inferior, although rather shorter and coarser. These two qualities would be graded in the woolen trade as picklock and prime or choice, while the wool from the portion indicated by *C* is frequently finer but shorter than *A* or *B* and apt to contain more irregular or colored hairs. When free from these defects *C* is graded as super in quality. The portions *D* and *E* shade into those on each side of them, and as they form the top of the neck and shoulder, the fibre is not as deep or close as at *A* or *C*. The portion over the loin (*F*) resembles *B*, into which it shades, and for many purposes, especially for spinning down, *A*, *B*, *E*, and *F* are frequently used together as one quality. Back of *F*, on the flanks, the wool becomes long and coarse, the best being found in the portions marked *G*. The wool at *H* and *I* is the coarsest part of the fleece, growing in large locks with long coarse hairs. It is often termed breach wool and can only be used for very coarse yarns spinning low numbers Beyond the extremities of *I* there is often a still lower quality called tail or cowtail, which is coarse and hairy, and can only be used for the very lowest numbers The differences in quality of fibre from the same fleece are so great that a large number of sortings can be made, depending upon the character of the fleece and the purposes for which the wool is to be used. The names applied to the different qualities of wool vary in different localities, and even among different manufacturers, and this lack of uniform nomenclature is a source of no little confusion.

ESTIMATE OF PRODUCTION OF WOOL IN THE UNITED STATES FOR 1915

(United States Department of Agriculture)

Weight given in thousands of pounds

Wyoming	29,040
Montana	28,682
New Mexico.	18,620
Oregon	15,600
Idaho	15,286
Ohio	14,350
Utah	13,320
California	11,590
Texas	9,280
Michigan	8,073
Colorado	7,500
Missouri	7,035
Arizona	5,985
Nevada	5,890
Iowa	5,400
Indiana	4,920
Pennsylvania	4,030
Illinois	3,975
Wisconsin	3,960
Washington	3,818
Kentucky	3,552
South Dakota..	3,500
New York	3,478
West Virginia	3,405
Other States	58,488
Total .	288,777

Other Wools. Although the typical wool is produced by sheep, and it is from that animal that much the larger part of the wool supply is obtained, there are several other animals which produce so-called wool for industrial purposes. Among these are several species of goats whose hair can be greatly improved by breeding and management, furnishing a long, fine, silky material from which beautiful textile fabrics are made. No cultivation, however, has yet prevented the growth of the outer hair on goats, as has been done in the case of sheep, or changed the undergrowth of fine hair into true wool The alpaca, closely related to or a variety of the llama of South America, yields a fibre known as alpaca (q.v.). The Angora goat (see GOAT), which yields mohair (q.v.), marks a distinct step towards true wool. The scales are less numerous than in the alpaca, but are more decided and exhibit a more definite edge. The fibres are very fine and wavy, lustrous, pure transparent white, and often 12 inches long, in some cases 18 or 20 inches. The diameter varies from $\frac{1}{850}$ to $\frac{1}{1500}$ of an inch. The annual product of mohair in the United States had reached nearly 4,000,000 pounds in 1910. Closely allied to mohair is the fine cashmere wool of India, which is the product of the Cashmere goat, common in the Himalayan mountains about Tibet. The hair is even longer than that of the Angora goat, but is not as curly. The surface of the fibres is not as brilliant as mohair, and the scales are more numerous but less distinct. Only the finest parts of the fleece are used, the yield from a single goat being

rarely more than 3 or 4 ounces. Cashmere wool is said to be the most costly of all the wools. The fine soft hair of the camel approximates true wool in its structure, and should be mentioned in this connection.

Consult Bowman, *Structure of the Wool Fibre and its Relation to the Use of Wool for Technical Purposes* (London, 1908), Coffey, *Grading and Marketing Wool* (Ill. Expt Station Circ 161); Dodge, *Sheep and Wool*, *A Review of the Progress of American Sheep Husbandry*, United States Department of Agriculture, Report No. 66 (1900), Report of Bureau of Animal Industry, 1889–90, Marshall, *The Woolgrower and the Wool Trade* (U S Dept of Agriculture, Bull 206); Rushworth, *The Sheep* (Buffalo, 1899), Ford, *Wool and Manufacture of Wool* (1894); Wool Manufacture, Census Bulletin 236; Stewart, *Domestic Sheep: Its Culture and General Management* (Chicago, 1898). See articles SHEEP, SHODDY, and bibliography thereunder. See also WOOL AND WORSTED MANUFACTURES.

WOOL, JOHN ELLIS (1788–1869). An American soldier, born at Newburgh, N. Y. He began the study of law, but on the outbreak of the War of 1812 entered the United States Army, and in April, 1812, became captain in the Thirteenth United States Infantry. He was badly wounded in the battle of Queenstown Heights, and as a reward for his gallantry was in April, 1813, promoted major of the Twenty-ninth Infantry. At Plattsburgh in September, 1814, he again distinguished himself, and in December was promoted to the rank of lieutenant colonel. In 1821 he became inspector general of the army with the rank of colonel. In 1841 he became a brigadier general. When the Mexican War began he prepared troops for the field and sent thither about 12,000. He led the Army of the Centre into Chihuahua, then joined General Taylor, and at Buena Vista, as second in command, selected the American position. For his services he was brevetted major general. By his timely measures he secured Fortress Monroe, and as commander of the Department of Virginia, he occupied Norfolk and Portsmouth in May, 1862. In the same month he was made a major general in the Regular Army, and retired in August of the following year.

WOOL, MINERAL; MINERAL COTTON; SILICATE COTTON; or SLAG WOOL. A mechanical variation of slag. It was originally formed accidentally and, for a long time, as a by-product in smelting operations. Its value as a heat insulator, however, became apparent, and now means are taken to manufacture it on a large scale. It is essentially a fibrous form of blast-furnace slag, usually the product of iron-smelting operations. Its chemical composition is variable, according to the conditions under which the iron is melted, but is not important as affecting its qualities. It is said to have been first made in Wales in 1840, but its injurious effect upon workmen—cutting the lungs of those who breathed the fine particles—stopped its manufacture. Its manufacture was later taken up in Germany and other countries, but under safer conditions, by means of which the thread slag is not allowed to escape into the air, but is confined in long flues and settling chambers. As now manufactured, a jet of steam or hot air is turned upon the flowing slag, resulting in a scattering of the slag and a drawing out into threads or fibres. The material is caught in chambers especially prepared to settle it. The product may be white, or colored, depending on the composition of the slag. Its fire-resisting properties, together with its value as a heat and sound insulator, make it useful to architects in all kinds of buildings.

WOOL AND WORSTED MANUFACTURES. The development of the art of spinning and weaving took place so early in the history of civilization that no records of its beginning are preserved, and which of the textile fibres was used first for this purpose is unknown. But certainly the art of producing woven woolen fabrics was practiced by many different peoples at a very early period. At the time of Alexander's expedition to India the natives of that region wore shawls of great beauty. The Greeks learned many processes of woolen manufacture from the Egyptians; the Romans from the Greeks; and from the Romans the knowledge generally passed to the Occidental world. Among the ancients, the method of manufacture was, after thoroughly cleansing the wool, to sort, card, and spin the material by hand. The loom for the weaving was remarkably simple, even crude, but under the delicate manipulation of dexterous fingers, skilled operators produced fabrics that have never been excelled in fineness of texture or delicacy of construction, even at this later day. (See WEAVING and LOOM.) Woolen garments were worn by the Romans at a very early period. It is probable that the early lessons the ancient Britons received in the art were derived immediately after the Roman conquest, and woolen manufacture as carried on in England was at the outset but a repetition, and afterward an elaboration and improvement on the methods previously known. It is generally supposed that certain Flemish weavers went to England in the time of William the Conqueror, and obtaining the royal patronage, established the first manufactories of woolen goods. At various periods in the reigns of succeeding monarchs, other Flemish weavers were imported, and established at different points in the kingdom. Henry II established guilds of weavers in his reign, and the exclusive privilege of exporting woolen cloth was by him granted to the city of London. In the thirteenth century Spain produced her own cloth, and the beauty of her fabrics was celebrated far and wide. Italy followed, and for a time employed processes apparently superior to any others in use.

For many centuries the manufacture of wool was carried on as a household industry, although in occasional instances a large number of looms were gathered together under one roof and their products controlled by a single individual, as in the modern factory. The fulling of the woven fabrics was at an early date developed into a separate business, and here and there on convenient water powers fulling mills sprang up. The use of the teasel burr for raising the nap on the fulled fabric was of early origin. The distinction between ordinary woolen fabrics and worsteds made from combed wool is mentioned in the earliest records of European wool manufacture. The combing of the wool was done by hand till well into the nineteenth century and the wool combers formed an important industrial class, but it was not till the latter half of the nineteenth century that all the processes connected with the production of a woolen or worsted thread were grouped together in one establishment.

History of the Wool Industry in the

United States. In the United States, as in Europe, the development of the textile mill began with the introduction of the neighborhood fulling mill Next came the public carding mill, where the wool was converted into rolls ready for the spinning wheel. Previous to its introduction carding had been done by a couple of hand cards, which were small, oblong boards, covered with leather filled with points of fine wire By manipulating the wool between these teeth the fibre was opened up. (See CARDING.) The first wool-carding machine was put in operation in Pittsfield, Mass., in 1790. The same year, at Newbury, Mass., the first successful woolen mill was put in operation. By 1810 several woolen mills were in operation and the amount of homespun was appreciably lessening, and the value of woolen cloth annually produced as a household industry declined so rapidly that not enough cloth was produced in the factories to make up the deficiency, and large quantities were imported The value of the factory output from 1820 to 1850 was as follows: In 1820, $4,413,068, in 1830, $14,528,166, in 1840, $20,696,999; in 1850, $49,636,881 The value of imported woolen goods was: In 1821, $7,238,954, in 1831, $13,197,364; in 1840, $10,808,485; in 1850, $19,620,619. By the close of the first half of the nineteenth century all the great improvements which had been invented in textile machinery had been adapted to the woolen industry, and during the last half of the century the development of the industry, except as disturbed by war or other political condition, was more steady and natural. The invention of the Crompton loom in 1837 and its successive improvements were of immense importance to the woolen industry. In 1873 the open shed fancy cassimere loom of L. J. Knowles enlarged still more the field of weaving possibilities and facilitated the manufacture of many refractory patterns Since 1865 automatic wool-scouring machines have been introduced, taking the place of hand washing, and during the same period the carbonizing process of freeing wool from vegetable fibre, such as cotton, to procure a grade of shoddy, has come into use. The art of dyeing also advanced. In the United States the woolen industry has been subject to great fluctuations, due to political events, such as the Civil War, which suddenly created an enormous demand for a certain class of woolen goods, and to tariff legislation. Statistics showing the present status of the industry are given at the close of the article.

Structure of the Wool Fibre. The wool of the sheep differs from all other fibres, animal or vegetable, on account of its great felting power. (See WOOL.) This is due to its overlapping epidermal scales, which make the individual hairs, when brought in contact at an angle, tend to mat together. Another striking characteristic of wool is the curliness of the fibre. The transformation of wool into cloth is divided into two distinct branches: the manufacture of woolens and the manufacture of worsteds. In making woolen fabrics or cloths the natural characteristics of the fibre—its curliness and felting power—are developed by the manufacturing processes and produce a soft cloth with a nap and with the fibres so matted together that the weave is but slightly visible. In worsted manufacture the aim is to produce a smooth, wiry yarn, more like that of the other textile fibres, and to this end the fibres are straightened, twisted hard, and the shorter projecting ones which would form a nap combed out. This produces a cloth in which the weave is evident and great variety of design in weaving is possible.

After being sorted, the wool is subjected to a process of beating, not only for the purpose of eliminating the dust and other impurities, but the procedure has the effect of disposing the staple to open and thus render the material softer and less resisting when washed and worked over in the various machines. The wool must be thoroughly dry, else many difficulties will be encountered. If the beating process be well carried out, it will not only dispose of many impurities, but will invariably treble and quadruple the volume of the fibre.

Scouring. The washing received by the live sheep before the removal of the fleece is not enough for the purposes of the manufacturer. There is a subsequent cleansing which could by no possibility be given while the material was a part of the animal. The necessity of thorough scouring is due not only to the dirt adhering to the wool, but also to the natural secretion of the oil and sweat glands, called yolk or suint, which is in the wool. This oily substance is usually reclaimed from the wash water and sold under the commercial name of degras. From it lanolin and potassium salts are extracted. Soft water is required for washing, because the insoluble lime soap formed in dissolving soap in hard water is deposited on the wool fibre and becomes inextricably entangled. Wool washed with hard water is always harsh to the touch; it takes dyes unevenly and is not readily cleansed. Wool is scoured with a dilute soap solution, with or without soda or potash according to the kind of wool, and heated not above 120° F The wool is passed by machinery from one tub to another, in each of which the cleansing operation is carried a step further until it emerges from the last tub, clean. It is dried in automatic driers, having been first dyed or bleached.

The wool having been dried is still found to retain many objectionable features that are not disposed of in the previous manipulations. These are bunches, matted locks, dust, sand, and other impurities, all of which must be removed before the article can go towards final manufacture. The process of removing these objectionable features is termed willowing or willeying (the latter term being given in honor of the inventor, Willey). It is accomplished by a machine consisting of a large drum and three small cylinders mounted on an inclosed frame. Powerful hooked teeth are geared on a drum which rotates with great rapidity, and the matted sections of wool, being fed into the drum, pass on to the spikes of the lesser cylinders; the matted locks are gently torn asunder, and the whole wool is delivered in a light, free, and disentangled condition. In various of the South American products there is a difficulty which requires additional care. There are little burrs and small adherent seeds which insist on remaining in the wool, no matter what the processes previously described may have accomplished. One method of eliminating them is chemical; another mechanical. In the chemical process, technically known as carbonization, the organic matter in the wool is decomposed by the use of chloride of aluminium, chloride of magnesium, weak sulphuric acid, or acid vapor, after which it is subjected to a baking process. The wool is now cooled and the carbon dusted out. Finally it is washed in a strong soda solution to remove the acids. This process is now

used not only to remove the vegetable matter from new wool but also the cotton from the mixed goods. The operation of burring is sometimes performed by mechanical burr pickers, which crush the burrs under powerful, closely set rollers, without injury to the more elastic and flexible wool. The pieces are then shaken out.

Mixing. This is an operation of great importance designed to secure uniform quality of yarn. It is accomplished by spreading the wool from different lots or from two or more qualities or colors into as many thin layers as possible, one on top of another. The greater the amount of wool mixed and the more thorough the mixing, the better will be the quality of the cloth produced. If other materials are to be added to the wool, as silk, cotton, or shoddy, the blending of these with the wool is performed at this stage.

Oiling. The wool having been thoroughly cleansed is more or less harsh and wiry to the touch, owing to the removal of its natural lubricant, the yolk. To restore its natural pliancy it is, while being mixed, slightly oiled, either by hand or machine. Oiling also imparts a certain adhesiveness to the fibres, useful in the subsequent operations. The lubricant usually employed is olive oil or emulsions of mineral oil.

Difference between Woolen and Worsted Process. The preliminary operations thus far described are common to both woolen and worsted manufacture. But at this point the two branches separate. In making woolen yarn the wool is simply carded and loosely spun; in making worsted thread the wool is combed and the thread is twisted until it becomes very hard. The aim in making a woolen thread is to criss-cross the fibres; in a worsted thread, to lay them parallel. In making woolen goods a short-stapled wool may be used and a fibre having good felting qualities is preferred. The opposite characteristics are sought in wool to be used in the manufacture of worsted. During the process of combing, described later on, the short fibres, known as *noils*, are pulled out and cast aside to be utilized in the woolen mill.

Returning to the process of woolen as distinguished from worsted manufacture, the wool, now oiled and thoroughly mixed, is next passed through a wool picker, the object of which is to loosen up the fibres. The wool is then passed through a series of carding machines similar to those used in the manufacture of cotton. See COTTON and SPINNING.

Carding. This process produces a thread whose fibres lie loosely projecting from the main thread in little ends which form the nap of the finished cloth. The condensing machine is attached to the cards, and its object, as the name implies, is to condense or reduce into compact slivers the sheet of fibres delivered by the last main cylinder of the carding engine. The condensed fibre is simultaneously wound on spools, and is ready to be passed on to the spinning department, where it is converted into a finished thread ready to be woven into cloth. See SPINNING.

Worsted Manufacture. In making a worsted thread, if a comparatively short or medium staple fibre is used, the wool is first carded as in woolen manufacture. But if a very long staple wool is used, having a fibre 5 inches or more long, the wool is not carded at all, because the fibre would be broken by the cylinder engaging it before it was released from the preceding cylinder. There is still a third class of worsted yarns, such as are required for carpet weaving, where a soft open thread is desired, which are not combed at all, but are carded, drawn and spun. With the exception of this third class of worsted yarns, the first distinctive operation, after the wool has received the preliminary treatment already described, is gilling. The object of gilling is to level the fibres and make them parallel. The machine by which this is accomplished consists of a pair of rollers which catch the wool, and of a second pair of rollers which draw it forward over heavy steel bars, called fallers, covered with projecting steel pins. The machines are generally used in sets, each successive machine having the pins on the rollers finer and more closely set than the preceding. The wool is fed to the rollers, it is caught by the rows of steel pins which rise in close and constant succession and penetrate the wool presented to them, traveling forward with it to the second pair of rollers, which in their turn catch the fibre and draw it away. The fallers are so called because when they accomplish their journey, they, through the agency of an endless screw mechanism, fall down, and by the action of other endless screws are returned to their original position. There is thus a continuous line of fallers traveling between the feed rollers and the back rollers, and there is a steady and constant drawing of wool away from the front rollers and through the teeth of the fallers. Five or six of these machines usually constitute a set. They are all constructed on the same principle, but with the pins finer and more closely studded as the fibre travels onward. In the first three machines it is usual to have the wool delivered in the form of a broad lap, but in the later machines, or gill boxes, as they are called, the product is condensed into a sliver and is received in large cylindrical cans. Six of these cans are brought to the front of the next gilling machine, and the six slivers are fed in, and passing through are drawn into and delivered as one. The operation is repeated three or four times, and the fibres are brought even with each other and a very level and uniform thread produced. It is usual to interpose a combing machine between the preparatory and the final gilling.

After the worsted has been gilled and combed it is put through drawing machines, much like those used in cotton spinning. It is then spun, the worsted thread being twisted much harder in spinning than woolen thread. The spun yarn is now reeled, warped, beamed, sized, and otherwise prepared for weaving.

For the process of weaving, the articles on WEAVING and LOOM should be consulted. The woven fabric requires several supplementary operations. The character and appearance of woolen fabrics are more altered by these finishing operations than any other material. Indeed, different fabrics may owe their distinctive peculiarities wholly to their finish, the processes of manipulation up to this point being exactly identical. In woolen goods, owing to the nap and its felting power, patterning is much less effective than in the weaving of worsted, but a greater variety of effects due to the character of the finish is possible. Among the principal varieties of finish of woolen goods are the dress-faced or doeskin finish, the velvet or erect pile finish, the Scotch or Melton finish, and the bare-faced finish. In the dress-face finish the nap

is raised and spread in one direction over the face of the cloth so as to hide completely the warp and weft threads. To this class belong broadcloths, beavers, and the other woolen fabrics having a nap. The velvet finish is another form of finish with a heavy nap In overcoatings and similar materials the nap is formed in little curls on the outer surface of the goods In other goods it is left standing out like velvet.

to give them solidity and strength. Tweeds have still less. The proper stage of beating or rolling having been reached, the soapsuds is gradually supplanted with pure water, tepid at first, but each new supply being cooler, until the fabric is finally worked in thoroughly pure and cold water.

On being taken from the machine the cloth is stretched uniformly in all directions by hooks

WOOL PRODUCED AND IMPORTED, DOMESTIC EXPORTS AND ANNUAL SUPPLY OF THE UNITED STATES, 1906 to 1915 *

YEARS	Domestic production, pounds	Imports, pounds	Total production and imports, pounds	Domestic and foreign exports, pounds	Net supply, pounds	Per cent of imports to supply
1906–07	298,715,130	203,847,545	502,562,675	3,446,748	499,115,927	40 8
1907–08	298,294,750	125,980,524	424,275,274	5,626,463	418,648,811	30 0
1908–09	311,138,321	266,409,304	577,547,625	3,523,975	574,023,650	46 4
1909–10	328,110,749	263,939,584	592,050,333	3,926,992	588,123,341	44 8
1910–11	321,362,750	137,647,641	459,010,391	8,205,699	450,804,692	30 5
1911–12	318,547,900	193,400,713	511,948,613	1,719,870	510,228,743	37 9
1912–13	304,043,400	195,293,255	499,336,655	4,423,161	494,913,494	39 4
1913–14	296,175,350	247,648,869	543,824,219	1,141,874	542,682,345	45 6
1914–15	290,192,000	308,083,429	598,275,429	15,418,234	528,405,985	58 3

* Estimate of the National Association of Wool Manufacturers

In the bare-face finish the nap is sheared off completely. While the process of finishing the woven fabric differs according to the character of the desired finish, the general method is the same The first step is known as fulling or milling. The operation of fulling or milling is to saturate the cloth with hot soap and water, when it is worked either by the fulling stocks or the fulling machine, or pressed and rubbed between rollers in the more modern milling machine. The more the cloth is soaked and beaten, the more it will shrink, and the operation can

on a frame, that it may dry without wrinkle or curl. At this stage the operation of gigging or teasling is entered upon. This is the raising of the pile or nap by the agency of the cone-like spikehead of the teasel, a plant of the genus *Dipsacus*. The head is covered with imbricated scales which end in sharp recurved hooks of great elasticity, but stiff enough to do the work required. The work was formerly done by hand manipulation, but is now accomplished by the gigging machine, or gig mill, where the teasels are arranged on the face of revolving

THE WORLD'S PRODUCTION OF WOOL *

COUNTRIES	Pounds	COUNTRIES	Pounds	COUNTRIES	Pounds
North America		Europe		Africa:	
United States	290,192,000	United Kingdom	125,122,063	Algeria	33,184,000
British Provinces	11,210,000	Austria-Hungary	41,600,000	British Africa	157,761,470
Mexico	7,000,000	France	79,500,000	Tunis	3,735,000
Central America and West Indies	1,000,000	Germany	25,600,000	All other Africa reported	13,000,000
		Spain	52,000,000		
Total	309,402,000	Portugal	10,000,000	Total.	207,680,470
		Greece	16,000,000		
		Italy	21,500,000		
		Russia (Europe)	320,000,000		
		Turkey and Balkan States.	90,500,000	Oceania·	
South America:		All other Europe	18,000,000	Australia (exports)	632,296,878
Argentina	264,500,000			New Zealand	194,627,789
Brazil	1,130,000	Total	799,822,063		
Chile	27,745,080			Australasia..	826,924,667
Peru	9,420,707			All other Oceania reported	100,000
Falkland Islands	4,324,000	Asia			
Uruguay	143,293,000	British India	60,000,000		
All other South America reported.	5,000,000	China	50,000,000	Total....	827,024,667
		Russia (Asiatic)	60,000,000		
Total	455,412,787	Turkey (Asiatic)	90,000,000	Total world.	2,872,487,987
		Persia	12,146,000		
		All other Asia reported	1,000,000		
		Total..	273,146,000		

* Given in the 1915 Bulletin of the National Association of Wool Manufacturers as the latest available figures.

be carried on till the cloth is reduced to half its original length and breadth. The degree of fulling is a distinctive feature of many varieties of goods. In broadcloths, and all kinds of nap-finished goods, the milling is carried on until the fibres become densely matted, and the appearance of weaving is entirely obliterated. Venetian cloths and diagonals, to which no pile finish is given, are fulled or milled only enough

cylinders before which the fabric is made to pass. By this operation the loose ends of the wool are drawn to the surface, thereby forming the nap. Wire teasels are sometimes used, but nature's creation of the vegetable teasel is regarded as having never been improved upon.

The pile is now trimmed to produce uniform surface. Formerly the work was done by hand with huge shears, but now a machine containing

a cylinder armed with a series of helical knives, and made to revolve with great rapidity, is employed. The machine was invented by Leonardo da Vinci, but not brought into practical use until 100 years later.

The final process is the brushing of the cloth, winding it tightly around a huge drum, and immersing it in hot water. It remains in that condition for three or four hours, when it is unwound, the ends reversed and rewound, and again the cloth is subjected to the hot-water process. The closing act in its manufacture is the pressing in a hydraulic press, during which time steam is forced through it, this last proceeding adding to the solidity and smoothness of the cloth, and developing the lustre characteristic of a well-finished fabric.

ing factories for hosiery and knit goods, shoddy mills, and wool-scouring establishments, the number of woolen mills in 1910 was 1397, as against 1675 in 1850. These figures, however, simply show to what extent the industry has been concentrated in large establishments, for the capital invested in the woolen industry and the carpet and rug industry combined in 1910 was $506,205,584, and in 1850 only $31,971,631, and the value of products in 1910 was $507,166,710, and in 1850 only $48,608,779

The unit of calculation for the productive capacity of a woolen mill is the set of carding machines necessary to prepare the wool for spinning. The corresponding unit for a worsted mill is the combing machine, which, in its productive capacity, is taken to be equivalent to

THE WORLD'S WOOL SUPPLY SINCE 1870

COUNTRIES	1870	1880	1890	1900	1915 *
	Pounds	Pounds	Pounds	Pounds	Pounds
United Kingdom	150,000,000	149,000,000	†138,392,215	†140,232,392	125,122,063
Continent of Europe	485,000,000	450,000,000	805,761,000	805,761,000	674,700,000
North America	176,000,000	270,000,000	289,191,330	305,636,621	309,402,000
Australasia	175,000,000	308,000,000	520,000,000	510,000,000	826,924,667
Cape of Good Hope	43,000,000	60,000,000	105,000,000	100,000,000	‡157,761,470
River Plate	197,000,000	256,000,000	460,000,000	466,000,000	407,793,000
Other countries	69,000,000	133,000,000	363,475,000	357,475,000	370,784,787
Grand totals	1,295,000,000	1,626,000,000	2,681,819,545	2,685,105,013	2,872,487,987

* Estimate of the National Association of Wool Manufacturers.

† Returns of the United Kingdom are for the preceding year. ‡ Total for British Africa.

Utilization of Wastes. Shoddy is wool recovered from woolen fabrics that are not heavily felted or milled. Mungo is made from fragments of felted or milled cloth, and the fibre is therefore shorter These two terms, however, are often used with different meanings and are sometimes interchangeable. (See SHODDY.) Extract wool is wool produced from goods which are part wool and part cotton, the wool being extracted by the process of carbonization already described. In 1900 71,496,508 pounds of shoddy were used in wool manufacture in the United States. In other words, of the total raw material 76.9 per cent was new wool and 23.1 per cent shoddy. These second-hand or recovered wools are reduced to fibre in grinding machines, from which they emerge in a flossy wool-like state.

Flocks are soft fluffy fibres which are cast out of the machines during the various processes of cloth manufacture. Noils are simply the shorter and more curly fibres which are pulled out during the process of wool combing for worsted manufacture. Both of these wastes are used in woolen manufactures.

Sophistication. The practice of weighting woolen and worsted fabrics prevails, as does the sophistication of silk. The goods are soaked in mineral salts, such as sulphates of alum, lead, zinc, and magnesium, which increases their weight from 15 per cent up.

Statistics. According to the Thirteenth Census of the United States there were in 1910 2887 establishments in the country devoted to various branches of wool manufacture, which put forth an annual product of $765,910,476. Of the 2887 establishments, 587 were woolen mills, 324 worsted mills, 139 carpet factories, 43 felt goods factories, 31 wool hat mills, 1374 hosiery and knit goods factories, 273 fur hat factories, 88 shoddy mills, 28 wool-scouring plants. Deduct-

2½ sets of cards for the same fineness and quality of work.

Consult: Beaumont, *Woolen and Worsted Cloth Manufacture* (London, 1890); Posselt, *Textile Fibres and Fabrics* (Philadelphia, 1891), Losters, *Manufacture of Wool and Worsted* (London, 1900); Sadtler, *Industrial Organic Chemistry* (Philadelphia, 1900); Vickerman, *Woolen Spinning* (London, 1894); Barker, *Textiles* (New York, 1910); Woolman and McGowan, *Textiles* (ib., 1914).

WOOL BLEACHING AND SCOURING. See BLEACHING.

WOOLD. See WELD.

WOOLLETT, wul'ĕt, WILLIAM (1735–85). An English draftsman and line engraver. He was born at Maidstone, and studied under John Tinney at London and in St. Martin's Lane Academy. His earlier plates were topographical, but with his "Temple of Apollo" (1760), after Claude Lorraine, and his "Niobe," after Richard Wilson, he attained the rank of principal engraver in England. He engraved other landscapes after Wilson before attempting his most celebrated work, the "Death of General Wolfe" (1776), after Benjamin West, which brought him the title of "Historical Engraver to His Majesty"; it was followed by the "Battle of La Hogue" (1781), also after West, of almost equal celebrity. His plates aggregate about 100. In landscape he made great advance upon his predecessors in perspective, light, and atmosphere, and his figure subjects are especially good in line.

WOOLLEY, wul'ĭ, JOHN GRANVILLE (1850–1922). An American prohibitionist. He was born at Collinsville, Ohio; graduated at Ohio Wesleyan University in 1871; was city attorney of Paris, Ill., in 1875, and was prosecuting attorney in Minneapolis in 1881. After about 1890 he devoted himself largely to writing

and lecturing, abroad as well as in the United States, against intemperance, to which he himself had formerly been addicted. In August, 1899, he became editor of *The New Voice*, and in 1900 was the candidate of the Prohibition party for President of the United States, receiving a popular vote of 208,914 Unlike some of his confrères, he worked in harmony with the Anti-Saloon League (q.v.). His writings include: *The Christian Citizen* (2 vols., 1897–98); *A Lion Hunter* (1900), *Temperance Progress in the Nineteenth Century* (1903); *South Sea Letters* (1905).

WOOLLEY, MARY EMMA (1863–). An American college president. Born at South Norwalk, Conn., she taught in Wheaton Seminary at Norton, Mass., from 1886 to 1891, graduated from Brown University in 1894, and from 1895 to 1900 taught biblical history at Wellesley College, for the last two years as professor. Thenceforth Miss Woolley was president of Mount Holyoke College, with the development of which her name became closely identified. Her interests, however, were many and varied. She served as a member of the executive board of the National Education Association, and of the national board of the Y. W. C. A., as vice president of the American Peace Society and honorary vice president of the National Consumers' League, as a senator of the United Chapters of Phi Beta Kappa, and in many other offices of responsibility She received honorary degrees from Brown, Amherst, and Smith. In 1911 she edited a volume on *Education*.

WOOLLY APHIS, or PLANT LOUSE. The woolly root louse of the apple (*Schizoneura lanigera*), which, like many other aphides, secretes a greater or less quantity of wax in the form of wool-like fibres. This is a cosmopolitan species, probably of American origin, known in the English colonies as American blight and in Germany as Blutlaus. It is a small plant louse which has an abundant secretion of waxy fibres, and occurs both upon the roots of the apple under ground and upon the rough portions of the stems as well as about the young shoots and water sprouts coming from the lower part of the trunk. The attacks of the subterranean form on the roots produce galls or swellings, and in the cracks of these galls the insects occur in great numbers. The vitality of the plant is greatly reduced and young trees soon die. In general, the life history resembles that of other plant lice and the methods of control are similar. See APHID. Consult Marlatt, *The Woolly Aphis of the Apple* (United States Department of Agriculture, Washington, 1897).

WOOLLY BEAR CATERPILLAR. See HOP INSECTS.

WOOLMAN, wụl'man, JOHN (1720–72). A Quaker preacher and social reformer, born in Northampton, N. J. His early years were spent on a farm, as store clerk and as teacher of poor children. About 1741 he began to speak at meetings of the Friends. In 1746 he set out with a companion to visit Friends in the backwoods of Virginia, and afterward spent most of his life on similar journeys, supporting himself by work as a tailor. Woolman strongly influenced the Quakers of his time against the keeping of slaves, and one of his disciples, Benjamin Lundy, inspired William Lloyd Garrison to devote his life to the cause of abolition. He died at York, England. His writings include: a *Journal of John Woolman's Life and Travel in the Service of the Gospel* (1775; reëdited by John G. Whittier, 1871); *Some Considerations on the Keeping of Negroes* (1753–1762); *Considerations on Pure Wisdom and Human Policy, on Labor, on Schools, and on the Right Use of the Lord's Outward Gifts* (1768). *Serious Considerations with Some of His Dying Expressions* was published posthumously (1773), as were his *Works*, including some unpublished manuscripts, in 1774–75. His *Journal* still deserves to be read, and it ranks as a minor classic. Consult W. T. Shore, *John Woolman: His Life and Our Times* (New York, 1914).

WOOLNER, wụl'nẽr, THOMAS (1825–92). An English sculptor and poet He was born at Hadleigh, Suffolk, and studied for four years in London with William Behnes and afterward at the Royal Academy In 1843 he exhibited his first work, "Eleanor Sucking the Poison from the Arm of Prince Edward." From 1848 to 1852 he devoted himself to making portrait medallions; in 1848 he made the acquaintance of Rossetti; and in 1850 he was one of the "Pre-Raphaelite Brotherhood" which published the short-lived *Germ*, contributing the opening poem, "My Lady Beautiful" He became a member of the Royal Academy in 1874. From 1852 to 1854 he was in Australia. Woolner's statues are characterized by dignity, and his portrait busts and medallions are faithful likenesses. Among his important works are busts of Tennyson (1857 and 1873, Cambridge), Darwin, Newman, Maurice, Carlyle, Gladstone, Dickens, Kingsley, Temple, Huxley, Rajah Brooke, and Archdeacon Hare; statues of Lord Macaulay (1866), of Dr. Whewell (1873), of John Stuart Mill (1878, Thames Embankment), the colossal "Captain Cook" (Sydney, Australia); and "Bishop Fraser" (1888). His ideal figures, as "Guinevere" and "Godiva," display graceful and poetic feeling. He published several volumes of verse.

WOOLRYCH, wul'rĭch, HUMPHRY WILLIAM (1795–1871). An English legal writer, born at Southgate, Middlesex. He was educated at Eton College, St Edmund Hall, Oxford, and Lincoln's Inn, whence he was called to the bar in 1821. He wrote many legal volumes, the more important of which are: *Rights of Common* (1824); *Law of Certificates* (1826), *Law of Ways* (1829); *Commercial and Mercantile Law of England* (1829); *Law of Waters and Sewers* (1830); and *Treatise on Misdemeanours* (1842).

WOOLSACK. The name given to the seat of the Lord Chancellor of England in the House of Lords. It is composed of a large square bag of wool without either back or arms, and covered with red cloth. The woolsack was introduced in the House of Lords as the Chancellor's seat during the reign of Queen Elizabeth, as a memento of an act which was passed against the exportation of wool, then one of the main sources of the national wealth of England.

WOOLSEY, wụl'sĭ, SARAH CHAUNCEY (1835–1905). An American writer for young people, known by her pseudonym, Susan Coolidge. She was born in Cleveland, Ohio, and subsequently lived in Newport, R. I. Her books include: *The New Year's Bargain* (1871); *What Katy Did* (1872), the beginning of a series of stories for young girls; *Verses* (1880); *A Guernsey Lily* (1881); *A Little Country Girl* (1885); *Clover* (1888); *Curly Locks* (1899); and many other juvenile tales; and *A Short History of the City of Philadelphia* (1887). She edited *The*

Autobiography and Correspondence of Mrs Delany (1879), and *The Diary and Letters of Frances Burney* (1880)

WOOLSEY, THEODORE DWIGHT (1801-89). An American scholar and educator, nephew of Theodore Dwight. He was born in New York City, graduated at Yale in 1820 and spent a year in legal study at Philadelphia, and two years in theological study at Princeton. Returning to New Haven he afterward became a tutor in Yale, and went abroad to pursue the study of Greek in Leipzig, Bonn, and Berlin. From 1831 to 1846 he was professor of Greek at Yale, of which college he was chosen president in 1846, and, in accordance with precedent, was ordained to the Congregational ministry. Leaving Greek to younger men, he devoted himself to instruction in history, political economy, and political science, and especially international law. He was a frequent preacher in the college pulpit, and an influential, though not a conspicuous, leader of public opinion during the stirring events which led up to the Civil War. In 1871 he resigned the presidency, continuing for a time to lecture on international law. During his administration Yale advanced in wealth and influence and two new departments, the Scientific School and the School of the Fine Arts, were begun. Woolsey was one of the founders of the *New Englander*, and a frequent contributor to its pages, chairman of the American commission for the revision of the Authorized Version of the Bible, president of the World's Evangelical Alliance at its international meeting in New York, a lifelong member and at one time president of the American Oriental Society, and a regent of the Smithsonian Institution. Woolsey Hall at Yale is named in his memory His principal publications include: Editions of the *Alcestis* of Euripides (1834), of the *Antigone* of Sophocles (1835), of the *Prometheus* of Æschylus (1837), of the *Electra* of Sophocles (1837), and of the *Gorgias* of Plato (1843); an edition of Lieber's *Civil Liberty and Self Government* (1871), and *Manual of Political Ethics* (1871); an *Introduction to the Study of International Law* (1860; many times republished); *Essays on Divorce and Divorce Legislation* (1869); *Religion of the Present and Future*, a collection of sermons (1871); *Political Science* (1877); *Communism and Socialism* (1880); and *Helpful Thoughts for Young Men* (1882).

WOOLSEY, THEODORE SALISBURY (1852–). An American legal scholar, born at New Haven, Conn, son of Theodore Dwight Woolsey. He graduated at Yale (1872) and at Yale Law School (1876), and after traveling in Europe was instructor in public law at Yale, and from 1878 to 1911 professor of international law. He was one of the founders of the *Yale Review* and a frequent contributor. He wrote several essays which were collected under the title *America's Foreign Policy* (1898), and he edited *Woolsey's International Law* and *Pomeroy's International Law.*

WOOLSON, wul'sŭn, CONSTANCE FENIMORE (1848–94). An American novelist, born in Claremont, N. H She was a grandniece of James Fenimore Cooper. She was educated in Cleveland, Ohio, and at a French school in New York City. She lived first at Cleveland, then (1873–79) in Florida and the neighboring States, and thereafter chiefly in England, and in Italy, at Rome, Venice, and Florence. Her first literary work appeared in *Harper's Monthly* in 1870, and here much of her subsequent writing was published. Her volumes were *The Old Stone House* (1873), *Castle Nowhere. Lake-Country Sketches* (1875); *Two Women. A Poem* (1877), *Rodman the Keeper· Southern Sketches* (1880), *Jane* (1882), *For the Major* (1883), *East Angels* (1886), *Jupiter Lights* (1889); *Horace Chase* (1894), which may be regarded as her best piece of work, and *The Front Yard, and Other Italian Stories* (1895) "No Woman," says Mr. Stedman, "of rarer personal qualities, or with more decided gifts as a novelist, figured in her own generation of American writers" Miss Woolson depicted American types skillfully

WOOL-SORTER'S DISEASE. See ANTHRAX, MALIGNANT PUSTULE, OCCUPATIONAL DISEASES

WOOLSOWER (wul'sō'ĕr) **GALL.** See OAK INSECTS

WOOLWA, wo͝ol'wa. A Central American tribe. See ULUA.

WOOL WAX. See WAXES.

WOOLWICH, wo͝ol'ĭch *or* -ĭj A metropolitan borough of London, England, on the Thames, 9 miles east of St. Paul's Cathedral (Map: London, E 9). The royal arsenal, the largest in Britain, contains war stores and establishments for manufacturing them The arsenal covers 593 acres and employs over 14,000 men. On the common, south of the town, is the Royal Military Academy, colloquially called "The Shop," for the education of cadets for the artillery and engineers. Pop, 1901, 117,178; 1911, 121,376

WOOLWORTH, FRANK W. (1852–1919). An American merchant, born at Rodman, N. Y. In 1879 he started a "5-cent" store at Utica, N Y., removed in that year to Lancaster, Pa., where he continued in the same business, and gradually expanded his interests until he had a chain of about 700 "5 and 10-cent" stores in the United States and Canada, as president of the F. W Woolworth Company. He built a famous skyscraper in New York, the Woolworth Building, of which Cass Gilbert (q.v) was the architect. See ARCHITECTURE, *Recent Architecture.*

WOONSOCKET. A city in Providence Co., R. I., 16 miles north by west of the city of Providence, on the Blackstone River, here spanned by a fine bridge, and on the New York, New Haven, and Hartford Railroad and its leased lines (Map: Rhode Island, C 1). It has the Sacred Heart College and the Harris Institute Library. There are three public parks, and a soldiers' monument. Woonsocket is primarily an industrial city, being especially known for the manufacture of cotton and worsted goods. Other important manufactures include foundry and machine-shop products, wringing machines, knit goods, hosiery, rubber boots and shoes, etc. Pop., 1900, 28,204; 1910, 38,125; 1915 (State census), 40,075; 1920, 43,496 Woonsocket was settled about 1666; in 1867 it was incorporated as a town and in 1888 was chartered as a city. Its area was enlarged in 1871 by the annexation of a portion of Smithfield. Consult Richardson, *History of Woonsocket* (Woonsocket, 1876).

WOORALI, wo͝o-rä'lĭ, or WOORARI, wo͝o-rä'rĭ. A South American vegetable poison. See CURARI

WOOSTER. A city and the county seat of Wayne, Co, Ohio, 52 miles south by west of Cleveland, on the Pennsylvania and the Baltimore and Ohio railroads (Map: Ohio, G 4). It

is the seat of the University of Wooster (Presbyterian), opened in 1870, and has a Carnegie library, and the Ohio Agricultural Experiment Station, which possesses fine buildings and grounds The principal manufactures include boilers, pumps, aluminium ware, brushes, buggies, bricks, engines, farm implements, flour, lumber products, pianos, glass, etc Pop., 1900, 6063, 1910, 6136

WOOSTER, DAVID (1711–77). An American soldier He was born in Stratford, Conn, graduated at Yale in 1738, and, entering the provincial army in 1739, served throughout King George's War (q v), acting as captain in the Louisburg expedition of 1745, and commanding for a time the sloop of war *Connecticut* He became colonel of a Connecticut regiment in 1755, and served throughout the French and Indian War, during which he rose to the rank of brigadier general. He was appointed collector of customs at New Haven, but resigned on the approach of the Revolutionary War, and was one of the eight brigadier generals appointed by Congress in June, 1775 After serving in Canada, where for a time, owing to the death of General Montgomery, he held the chief command, he resigned to become major general of Connecticut militia, and was mortally wounded (April 26, 1777) near Danbury, while defending that place against the attack of General Tryon

WORCESTER, wŭs'tĕr The capital of Worcestershire, England, in the centre of the Severn valley, on the eastern bank of the river, 27 miles southwest of Birmingham (Map· England, D 4). The most important public buildings are the cathedral, the shire hall, the guildhall, the county prison, the city library, the Worcester museum, the corn exchange, the music hall, and a city grammar school, founded by Queen Elizabeth A cathedral, dedicated to St. Peter, was founded as early as the seventh century. In 1084 Bishop Wulfstan laid the foundation of a new cathedral, which was not completed till 1216. Restored since 1855, it is now distinguished by the simplicity, if not plainness, of the exterior, which is amply compensated for by a fine perspective, the lofty roof, and generally charming effect of the interior. The tombs of King John, of Arthur, Prince of Wales (eldest son of Henry VII), and of Bishop Gauden (q v), are the chief ancient monuments in the building. Glove making, leather dressing and staining, porcelain factories, for which the city is specially famous, ironworks, locomotive-engine factories, tanning and currying, horse-hair weaving, vinegar, wine and sauce making, coach building, and the manufacture of chemical manures and agricultural implements are the chief industries. The frequent discovery of ancient remains proves that Worcester was a Roman station It became a city under the kings of Mercia, and holds charters from Richard I and subsequent monarchs. Here Cromwell overthrew a Scotch army under Charles II, Sept. 3, 1651 Pop., 1901, 46,623; 1911, 47,987. Consult Brassington, *Historic Worcestershire* (Birmingham, 1894–95).

WORCESTER. The second city of Massachusetts, and one of the two county seats of Worcester Co.; 44 miles west-southwest of Boston, on the Blackstone River (Map: Massachusetts, D 3). It has one union railroad station, occupied by the Boston and Albany, the New York, New Haven, and Hartford, and the Boston and Maine. The street railway system reaches every part of the city and extends into nearly all the neighboring towns

Worcester is mainly situated in a valley, surrounded by hills of moderate elevation, and is about 500 feet above sea level There are 17 public parks, comprising 1092 acres The largest are Green Hill Park, 500 acres, Boynton Park, 113 acres; Lake Park, 110 acres, and Elm Park, 86 acres. Among the important edifices of a public or semipublic character are the city hall, courthouse, art museum, public library, which contains 212,000 volumes, the post office, State armory, State lunatic asylums, five hospitals, and the buildings of the Woman's Club, the Boys' Club, the American Antiquarian Society, the Worcester Society of Antiquity, the Young Men's Christian Association, the Young Women's Christian Association, and the State Mutual Life Assurance Company. The public-school system includes four high schools. Worcester is the seat of Clark University (q.v.), Clark College (q.v.), the College of the Holy Cross (see HOLY CROSS, COLLEGE OF THE), the Worcester Polytechnic institute (q.v.), a State normal school, and the Worcester Academy.

Worcester is preeminently a manufacturing city. The largest establishment in the city employs more than 6000 men in the making of every kind of wire. Other important industries are manufactures of looms, emery wheels, elevators, envelopes, corsets, carpet, firearms, and cars. Besides these there are many smaller establishments for the manufacture of skates, wrenches, wall paper, boots and shoes, clothing, leather, machinery, machinists' tools, woven-wire goods, and woolens.

The government is vested in a mayor, elected annually, a board of 11 aldermen, one elected at large, and one from each ward; and a board of councilmen, three from each of the 10 wards. These two boards constitute the City Council, and elect the heads of departments and have power to confirm or reject nominations made by the mayor to either board. The amounts paid for the support of the principal departments in 1915 were: for schools, $990,000; for the fire department, $288,000, for the police department, $281,000; for streets, $474,000; for the public library, $61,000; for the support of the poor, $99,000. The net funded debt was $7,574,000; and the valuation of taxable property $179,199,000. The water works are owned by the city and have cost $7,150,000 The sewerage system now includes 234 miles of sewers. It has cost $7,079,000.

Pop, 1800, 2411; 1850, 17,049; 1870, 41,405; 1880, 58,291; 1890, 84,655; 1900, 118,421; 1910, 145,986; 1915 (State census), 162,697; 1920, 179,754. More than one-third the population in 1910 was of foreign parentage, principally Irish, Swedish, and Canadian. More than 40 different nationalities were represented.

A settlement called Quansigamog Plantations was made here in 1673, but on the outbreak of King Philip's War in 1675, it was abandoned. In 1684 the place was resettled and called Worcester (from Worcester, England), but was again virtually abandoned on account of difficulties with the Indians in 1702. The permanent settlement dates from 1713. In 1722 Worcester was incorporated as a town, and in 1848 it was chartered as a city. In 1775 Isaiah Thomas (q.v.), the publisher, removed hither from Boston, and from 1790 to 1800 Worcester was one of the most important publishing centres in the

United States. Consult Hurd, *History of Worcester County* (Philadelphia, 1889), and Reed's *Worcester in 1898* (Worcester, 1899).

WORCESTER, WINSTER, DEAN CONANT (1866–1924). An American zoologist, public official, and authority on the Philippines. He was born at Thetford, Vt., and was educated at the University of Michigan (A.B., 1889). While an undergraduate he had visited the Philippines as a member of the Steere scientific expedition (1887–88), and in 1890, as one of the leaders of the Menage expedition, he returned to the islands. For three years he studied their fauna, topography, history, and inhabitants. In 1893 he became instructor in morphology at the University of Michigan, and in 1895 assistant professor of zoology and curator of the zoological museum. From 1899 to 1901 he was a member of the United States Philippine Commission; thenceforth until 1913 served as secretary of the interior for the Philippine Insular Government. His publications include, besides various papers, *The Philippine Islands and Their People* (1898); *The Non-Christian Tribes of Northern Luzon* (1906); *The Philippines Past and Present* (2 vols., 1913, new ed., 1914).

WORCESTER, EDWARD SOMERSET, second MARQUIS OF (1601–67). An English nobleman and inventor, the son of the first Marquis of Worcester. In early life he devoted himself to mathematical and mechanical researches. In 1641 he entered the service of Charles I, who, in 1645, sent him to treat secretly with the Irish Catholics and to raise troops for service in England. The secret was discovered, Worcester was imprisoned on the charge of treason, and Charles I disowned him. After his release Worcester spent four years in voluntary exile, and upon his return to England in 1652, was imprisoned in the Tower until 1654. Worcester wrote *A Century of the Names and Scantlings of Such Inventions as at Present I Can Call to Mind to have Tried and Perfected* (1663), in which he described a steam engine as an admirable and most forcible machine for "driving up water by fire." Though he is known to have erected great water works at Vauxhall, there is no proof that he constructed the engine described above. Consult Henry Dircks, *The Life, Times, and Scientific Labors of the Second Marquis of Worcester*, with an annotated reprint of his *Century of Inventions* (London, 1865).

WORCESTER, ELWOOD (1863–). An American Protestant Episcopal clergyman and author. Born at Massillon, Ohio, he graduated from Columbia in 1886, and from Leipzig, (Ph.D.) in 1889. He served as professor of philosophy and psychology and chaplain at Lehigh University (1890–96), as acting rector of St. John's, Dresden, Germany (1894–95), and as rector of St. Stephen's Church, Philadelphia (1896–1904), and thenceforth of Emmanuel Church, Boston. Shortly after assuming this last charge, Dr. Worcester organized in connection with his church a class for the treatment of nervous disorders. About 1906 the outcome of this attempt became known as the Emmanuel Movement, more properly described as a movement for the moral treatment of nervous disorders, in coöperation, when necessary, with medical practitioners. With Dr. Worcester was associated another clergyman, Dr. Samuel McComb. The treatment, which also had a psychological side, involved helpful suggestion to the afflicted and in exceptional cases hypnosis, always with the consent of the patient, and under the supervision of a physician. Cases of organic disease also were sometimes admitted, with the cooperation of a physician. Dr. Worcester's publications include *Religious Opinions of John Locke* (1889), *The Book of Genesis in the Light of Modern Knowledge* (1901), *Religion and Medicine* (1907), *The Living Word* (1908); *The Christian Religion as a Healing Power* (1909); *Religion and Life* (1914); *The Issues of Life* (1915).

WORCESTER, FLORENCE OF. See FLORENCE OF WORCESTER.

WORCESTER, JOSEPH EMERSON (1784–1865). An American lexicographer and philologist, born at Bedford, N. H. A graduate of Yale (1811), he taught at Salem, and after a brief stay at Andover moved to Cambridge (1819), where he devoted himself to study and writing till his death. He began his work in lexicography in 1828 by an edition of Johnson's *Dictionary* and an abridgment of *Webster's American Dictionary* (1829). In 1830 he published a *Comprehensive Pronouncing and Explanatory English Dictionary*. From 1831 to 1843 he edited *The American Almanac*. In 1846 he issued *A Universal and Critical Dictionary of the English Language*, and after a suspension of his labors, owing to failure of his eyes (1847–49), repeatedly enlarged this until it became the great quarto *Dictionary of the English Language* (1860), the first illustrated dictionary in English. Worcester's various dictionaries were the first in America to take an objective rather than a didactic position towards the language. In contrast especially to the work of Webster, they sought to represent the language as it was rather than to mold it in special forms.

WORCESTER, NOAH (1758–1837). A New England theologian, born at Hollis, N. H. He served in the Continental Army during the War of Independence; in the New Hampshire Legislature; was licensed as Congregational preacher in 1786; ordained pastor at Thornton in 1787; and in 1802 was employed as State missionary. From 1810 to 1813 he had a ministerial charge at Salisbury, N. H., and then moved to Brighton, Mass., where he began a prolific literary career as editor of *The Christian Disciple* (1813–18), followed by *The Friend of Peace* (1819–29). He was active in founding the American Peace Society (1815). Among his more noteworthy publications are *Respectful Address to the Trinitarian Clergy* (1812); *The Atoning Sacrifice: A Display of Love, not of Wrath* (1829), and *Last Thoughts on Important Subjects* (1833). Consult Henry Ware, *Memoirs of Noah Worcester, D.D.* (Boston, (1844).

WORCESTER COLLEGE. A college at Oxford, England. It was founded about 1698 by bequest of Sir Thomas Cookes, Bart., of Bentley Pauncefoot, Worcestershire, for a provost, six fellows, and six scholars. Worcester, though far from the largest or most splendid, is one of the most attractive of Oxford colleges, both in the variety of its buildings, dating from the old monastic houses to the newly decorated chapel, and in the beauty and extent of its gardens, which are of remarkable size and charm. According to the revised statutes of 1882 there were a provost, eight fellows, several honorary fellows and lecturers, 15 scholars, and 15 exhibitioners. The number of undergraduates is

about 100 The college presents to 10 livings Consult Daniel and Barker, *Worcester College* (London, 1900)

WORCESTER MUSICAL FESTIVAL. One of the most important annual music festivals in the United States, held at Worcester, Mass. It originated from the annual conventions held by various choirs in the vicinity of Worcester for the purpose of discussing and studying church music. The first festival was held in September, 1858, under the direction of Benjamin F. Baker of Boston, when one concert of anthems and selected choruses from oratorios was given. An entire oratorio was not attempted until 1866 when Karl Zerrahn (q v) became conductor In 1863 the choirs of 20 towns were incorporated under the name Worcester County Musical Convention, and the present title Worcester County Musical Association, was adopted in 1871. At first the accompaniment was played on a piano, after 1864 on the organ in Mechanics' Hall. In 1868 an orchestra of 10 players participated, and as the orchestra increased, instrumental numbers were included. To-day the festival consists of four concerts, one or two of which are devoted to some large oratorio or choral work. Zerrahn was conductor till 1897. His successors were George W. Chadwick (1898–1901), Wallace Goodrich (1902–07); Arthur Mees (1908–) (qq.v.). For the Festival at Worcester, England, see THREE CHOIRS FESTIVAL.

WORCESTER POLYTECHNIC INSTITUTE. A college of engineering founded at Worcester, Massachusetts, in 1865 by John Boynton of Templeton. It was opened for students in 1868. The institution offers five courses of study—mechanical, civil, and electrical engineering, chemistry, and general science—each covering four years, and all identical in the freshman year It includes the Salisbury laboratories, appropriated to work in physics and chemistry; the mechanical engineering and power laboratories; the Alden laboratory, for hydraulic testing; the Washburn shops, for industrial management; Boynton Hall, containing offices and lecture rooms; and electrical engineering laboratories. The degree of Bachelor of Science is conferred in regular course, and the advanced degrees of Master and Doctor of Science, and Mechanical, Civil, and Electrical Engineer are given after the completion of graduate courses. In 1915–16 the total enrollment was 543 students and there were 29 professors and 25 instructors. The library contains 14,544 volumes. The president in 1916 was Ira M. Hollis, A.M.

WORCESTERSHIRE, wŭs'tĕr-shĭr. A western inland county of England, bounded by Stafford, Warwick, Gloucester, Hereford, and Shropshire (Map. England, D 4). Area, 751 square miles. Its surface is in general hilly and picturesque; it is watered by the Severn and Avon rivers. Orchards and pastures are the most important and extensive portions of the improved lands, the grain crops being small. Manufactures, especially of machinery, are also important, and the mineral products include large amounts of salt, clay, coal, and some iron. Pop, 1901, 357,402; 1911, 427,064. County town, Worcester.

WORDE, wôrd, WYNKIN DE (?–c.1534). A famous English printer and typographer. He was born, probably, in Lorraine, and went to England in 1477, as an assistant to Caxton. He superintended Caxton's famous printing office till the latter's death, and afterward succeeded him. He made great improvements in the art of printing, and especially in that of type cutting, which then formed a branch of the profession. He is said to have first introduced Roman letters into England, using them as italics are now used. He also made extensive use of engravings, which, however, appear to have been mostly obtained from the Continent The books printed by him are distinguished by their neatness and elegance, and number 408 distinct works, against 99 by Caxton.

WORDEN, wûr'den, JOHN LORIMER (1818–97). An American naval officer, born in Westchester Co., N. Y. He joined the navy as midshipman in 1835, and was commissioned a lieutenant in 1846. On March 9, 1862, he commanded the *Monitor* in her celebrated battle with the *Merrimac* or *Virginia* in Hampton Roads. During the action he was partially blinded by a shell, which struck the lookout hole of the pilot house just opposite his eyes After this engagement he was commissioned commander and placed in command of the ironclad *Montauk*. He twice bombarded Fort McAllister, in January and February, 1863; on February 3 was commissioned captain; on the 28th destroyed the *Nashville* under the guns of Fort McAllister, and on April 7 assisted Admiral Du Pont in the attack on the defenses of Charleston. He was on special duty in New York in 1864–66, was head of the Naval Academy in 1870–74; was commissioned commodore in 1868, and rear admiral in 1872, and retired in 1886.

WORDSWORTH, wûrdz'wûrth, CHARLES (1806–92). An Anglican bishop. He was born at Lambeth, London, and graduated with honors at Oxford (1830), was private tutor at Cambridge (1830–33); second master of Winchester College (1835–46); and warden of Trinity College, Glenalmond, Perthshire (1847–54), contributing largely to its establishment, and building the chapel largely at his own expense. He was consecrated Bishop of St. Andrews, Dunkeld, and Dunblane He was a member of the New Testament revision committee. His publications were numerous and varied. Of them may be mentioned *Shakespeare's Knowledge and Use of the Bible* (1865); a *Life* of Bishop Joseph Hall (1872); commentary on Ecclesiasticus (1881); *Public Appeals on Behalf of Christian Unity*, a collection of writings on this subject from 1854 to 1885 (1886); *Primary Witness to the Gospel* (1892). He was noted for his translations into Latin in prose and verse. His *Greek Primer for Beginners* reached its 83d thousand in 1896. Consult: his *Annals of My Early Life (1806–46)* (London, 1891); *Annals of My Life (1847–56)* (ib., 1893); John Wordsworth, *The Episcopate of Charles Wordsworth* (ib., 1899, with full bibliography).

WORDSWORTH, CHRISTOPHER (1774–1846). An English divine, the youngest brother of William Wordsworth. He was born at Cockermouth, in Cumberland, and was educated at Trinity College, Cambridge. He became rector of Ashby in Norfolk (1804), domestic chaplain to the Archbishop of Canterbury (1805), rector of Woodchurch in Kent (1806), dean and rector of Bocking in Essex (1808), rector of St. Mary's, Lambeth, and of Sundridge in Kent (1816), and in 1817 chaplain of the House of Commons. From 1820 to 1841 he was master of Trinity and in 1820–21 and 1826–27 vice chancellor of the university. Among his publications are:

Ecclesiastical Biography (6 vols., 1810); *Christian Institutes* (1836); and *Who Wrote Icon Basilike?* (1824).

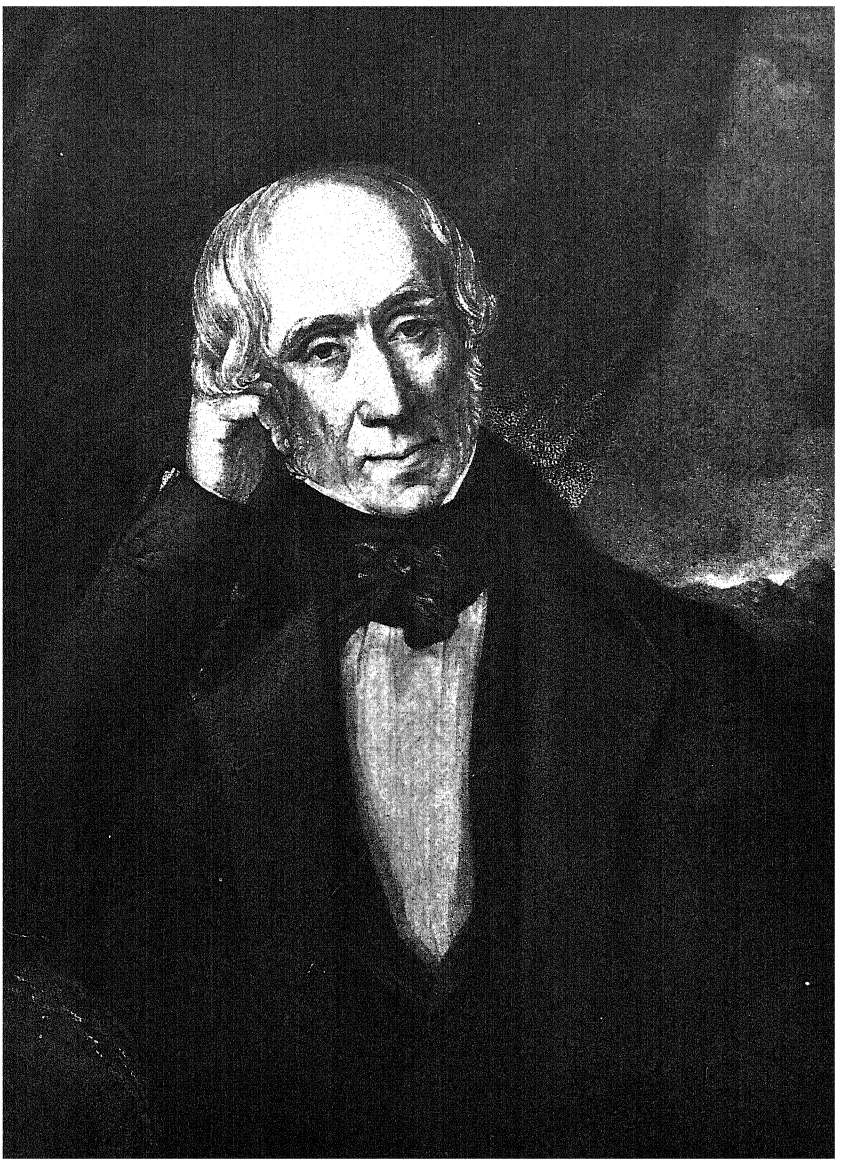
WORDSWORTH, CHRISTOPHER (1807–85). An English divine and scholar, born at Cockermouth, in Cumberland, the youngest son of Christopher Wordsworth (1774–1846). He was educated at Winchester School, and at Trinity College, Cambridge, graduating in 1830. Elected fellow of his college in the year just named, he was soon appointed tutor. In 1832–33 he visited Greece. He was master of Harrow (1836–44), canon of Westminster (1844), archdeacon of Westminster (1865), and Bishop of Lincoln (1868). His great work was a commentary on the Bible: *The New Testament* (1856–60) and *The Old Testament* (1864–70). Late in life he published a *Church History to A.D. 451* (1881–83). He early gained a considerable reputation in classical scholarship with *Athens and Attica* (1836); *Pompeian Inscriptions* (1837); *Greece, Pictorial and Descriptive* (1839; new ed. with 600 engravings, 1858; revised by Tozer, 1882); and *Theocritus* (1844). Consult the *Life* (London, 1888) by J. H. Overton and Wordsworth's daughter, Elizabeth Wordsworth, who for a time was principal of Lady Margaret Hall, Oxford; A. C. Benson, *The Leaves of the Tree* (New York, 1911).

WORDSWORTH, DOROTHY (1771–1855). See WORDSWORTH, WILLIAM.

WORDSWORTH, JOHN (1843–1911). An English bishop, born at Harrow, son of the Bishop of Lincoln and grandnephew of William Wordsworth. He was educated at Winchester and Oxford (New College), and became assistant master of Wellington College in 1866. In 1870 he was appointed prebendary of Lincoln. From 1883 to 1885 he was Oriel professor of Scripture interpretation at Oxford, fellow of Oriel, and canon of Rochester. In 1885 he was made Bishop of Salisbury. He wrote: *Fragments and Specimens of Early Latin* (1874); *Bampton Lectures* (1881; 2d ed., 1887); *Old Latin Biblical Texts* (vol. i, 1883); vol. ii, with Sanday and White (1886); *Novum Testamentum Latine, Secundum Editionem S. Hieronymi* (1898); *Bishop Serapion's Prayer Book* (1899); *Teaching of the Church of England for the Information of Eastern Christians*, with Greek by Dr. John Gennadius (1900); *The Ministry of Grace* (2d ed., 1904); *Education Question* (1906); *The Invocation of Saints and the Twenty-Second Article* (1908); *The Law of the Church as to the Marriage of a Man with his Deceased Wife's Sister* (1908); *Ordination Problems* (1909); *Unity and Fellowship* (1910). Consult E. W. Watson, *Life of Bishop John Wordsworth* (London, 1916).

WORDSWORTH, WILLIAM (1770–1850). An English poet, born at Cockermouth, in Cumberland, April 7, 1770. He came from a family that had long been settled in the north country. William was the second son. His sister Dorothy (1771–1855), a remarkable woman, was the poet's companion through mature life. William was sent to the schools at Cockermouth and Penrith, and, after the death of his mother (1778), he was transferred to the grammar school at Hawkshead, a picturesque village by Esthwaite Water, where he remained till 1787. His father had died in 1783. The years passed at Hawkshead were the seedtime of his soul. He read widely, joined in the society of the country folk, took long solitary strolls, and had mystic visions in which nature seemed to palpitate with life. Wordsworth studied at St. John's College, Cambridge, graduating in 1791. In 1790 he interrupted his studies to take a tour through France and Switzerland with Robert Jones, a college friend, afterward fellow of St. John's. Unsettled in his plans, after a three-months' stay in London, he again went to France, staying a full year (November, 1791, to December, 1792). He embraced the principles of the Revolution, and in spite of its excesses, his republicanism was not wholly dissipated till the French invasion of Switzerland (1798). Later he became a stanch Conservative, if not a Tory. For this change, sincere and natural, he was severely criticized by many of his republican contemporaries, e.g., by Byron; and in *The Lost Leader*, Browning, while not intending it directly for Wordsworth, yet used him as a subject in describing the effect upon ardent young Liberals of the defection of an admired leader. Returning to England, Wordsworth made his first appearance as poet in *An Evening Walk* (1793), and *Descriptive Sketches taken during a Pedestrian Tour among the Alps* (1793). The poet's masters were then Pope, Goldsmith, and Cowper. These two poems, composed in the heroic couplet, contain many refined and delightful sketches taken from nature at first hand. Coleridge saw in the second volume "the emergence of an original poetical genius." In 1795 Wordsworth settled with his sister at Racedown, near Crewkerne, moving (1797) to Alfoxden, 3 miles from Nether Stowey, where Coleridge was then living. At Racedown Wordsworth wrote several poems, in which the heroic couplet was abandoned. Among them were *Guilt and Sorrow* in the Spenserian stanza, and a tragedy in blank verse, devoid of dramatic power, called *The Borderers*. But the main outcome of the period was a joint publication of the two poets entitled *Lyrical Ballads* (1798), a memorable volume, which, though severely criticized by reviewers and neglected by the public, marks an epoch in the history of English poetry. Coleridge contributed *The Ancient Mariner* and three other poems. Wordsworth's poems, *Simon Lee, We Are Seven, Expostulation and Reply*, "were written" (so runs the advertisement) "with a view to ascertain how far the language of conversation in the middle and lower classes of society is adapted to the purposes of poetic pleasure." The volume closed with the beautiful *Lines on Tintern Abbey*, commemorating a tour with Dorothy up the Wye valley. The volume *Lyrical Ballads* was republished in 1800, with the addition of the famous and epoch-making preface. In this *Preface* Wordsworth elaborated the thesis that there is no "essential difference between the language of prose and metrical composition." The thesis was ably criticized by Coleridge in his *Biographia Literaria* (1817), and is now generally regarded as an extreme position. To it Wordsworth always held in theory, but, to his good fortune, he often forgot it in practice. The *Preface*, though needing qualification, was most salutary. It put an end to the conventional poetic diction of the eighteenth century; the publication of the little book is generally taken to mark the definite beginning of the Romantic movement in England, and of the glories of nineteenth-century English poetry.

Meanwhile Wordsworth and his sister, having been supplied with funds by the Wedgwoods,



WILLIAM WORDSWORTH

FROM AN ENGRAVING BY EDWARD McINNESS, AFTER A PAINTING BY MISS McINNESS

had accompanied Coleridge to Germany (1798–99) Coleridge went to Göttingen to study philosophy, the Wordsworths settled down in Goslar for the winter The poet hardly knew a word of German, but his genius throve at Goslar. There he began his *Prelude* and his first song of "Lucy." Returning to England, William and his sister settled in Dove Cottage at Grasmere, the loveliest spot among the English Lakes (1799), and they finally made their home at Rydal Mount (1813). In 1802 the Earl of Lonsdale died, and his successor paid over to the Wordsworths a debt of £8500 and afterward further helped them. Having thus a competency, Wordsworth married (Oct. 4, 1802) Miss Mary Hutchinson (born Aug. 16, 1770), a friend from youth, portrayed in "She was a phantom of delight." For nearly 50 years Wordsworth's life flowed on tranquilly, a noble illustration of "plain living and high thinking." Coleridge for a time lived near him and with him, but the poets became estranged, never to be wholly reconciled Friends and admirers gathered around Wordsworth—John Wilson, De Quincey, Henry Crabb Robinson, and Sir George Beaumont, the landscape painter. Southey, too, lived near at Keswick. In London Wordsworth associated with Rogers, Haydon, Hunt, Keats, and others. He made many tours, of which those into Scotland, to the Highlands, furnished him with exquisite poetic material. In 1813 Wordsworth was appointed distributor of stamps for Westmoreland, a post that brought him £400 a year. In 1820 he spent four months in Switzerland and in Italy, visited Belgium in 1823 and 1828, and made his last Continental tour in 1837. In 1842 he received a government pension of £300 a year; and in 1843 he succeeded Southey in the laureateship. He died at Rydal Mount, April 23, 1850, and was buried in the Grasmere churchyard. Dorothy survived her brother till Jan. 25, 1855 Mrs. Wordsworth died Jan 17, 1859. A favorite child, Dorothy, who had married Edward Quillinan (q.v.), died in 1847. Two sons survived.

Wordsworth consecrated his life to poetry, issuing volume after volume, and for a long time meeting with little favor. The attitude of the orthodox critics was summed up in Jeffrey's "This will never do!" (*Edinburgh Review*, November, 1814). Wordsworth nevertheless had defenders in Wilson, De Quincey, Lamb, Coleridge, and the younger generation; and his serene belief in himself was justified by full recognition. *Poems* (2 vols., 1807) contained much of his finest verse, as "To a Highland Girl," "The Solitary Reaper," "I wandered lonely as a cloud," and the odes to duty and on immortality. In 1814 appeared *The Excursion*, a didactic epic in blank verse, ridiculed by Byron, but now regarded as the best of Wordsworth's longer poems. In 1815 Wordsworth republished his poems in two volumes, arranging them on philosophical principles. Later he published *The White Doe of Rylstone* (1815); *Thanksgiving Ode* (1816); *Peter Bell* (1819); *The Waggoner*, with Sonnets (1819); *The River Duddon* (1820), a series of noble sonnets, the best since Milton; *Ecclesiastical Sketches* (1822), an unfortunate attempt to shape the history of the Church in Britain to a sonnet sequence; *Yarrow Revisited, and Other Poems* (1835); *Poems*, chiefly of early and late years (1842); *The Prelude*, a highly interesting autobiographical poem (posthumous, 1850); and *The Recluse*, a fragment (1888). Wordsworth also issued collected editions of his work, containing revisions and additions, in 1820, 1827, 1832, 1836–37, 1843, 1846, and 1849–50. It was Wordsworth's aim to depict the elemental passions in unaffected language, and in his best work he succeeded—though his simplicity sometimes became tedious. In his inspired moments, "Nature herself," said Matthew Arnold, "seemed to take the pen out of his hand, and to write for him with her own bare, sheer, penetrating power." Wordsworth's passion for nature and his insistence on the brotherhood of man passed into the thought of the nineteenth century. Though Burns and Cowper and Crabbe had described nature before him, it was his to take up what Arnold has called the office of modern poetry, the moral interpretation of nature He held a sort of Neo-Platonic, almost pantheistic, view of the existence of a soul, something conscious and all but divine, in nature. He also vindicated the possibility of treating the lives and emotions of the humblest classes in a strain of deep poetry.

Bibliography. The principal editions of Wordsworth's works are as follows: *Poetical Works*, ed by W. A. Knight (8 vols., Edinburgh, 1882–86), full bibliography in vol. viii; *The Complete Poetical Works*, Aldine ed. by Edward Dowden (7 vols., London, 1892–93); *Poetical and Prose Works, together with Dorothy Wordsworth's Journal*, ed. by W. A Knight (16 vols., ib., 1896, 2d ed. of the *Journals*, 2 vols., ib., 1904); *Complete Poetical Works*, Oxford ed. by Thomas Hutchinson (ib., 1904); *Complete Poetical Works*, Cambridge ed. (Boston, 1904); *Complete Poetical Works*, Globe ed. by John Morley (New York, 1909), a chronologic arrangement; *The Patriotic Poetry of William Wordsworth*, ed. by A. H. D Acland (Oxford, 1915); *Prose Works*, ed. by A. B. Grosart (6 vols., London, 1876); *Guide to the Lakes* (5th ed., ib., 1835; new ed., with introduction by Ernest de Sélincourt, ib., 1906); *A Description of the Wordsworth and Coleridge Manuscripts in the Possession of T. N. Longman*, ed. by W. Hale White (New York, 1897); also Dorothy Wordsworth, *Recollections of a Tour in Scotland*, ed. by J. C. Shairp (London, 1874). For lives consult: *The Memoirs*, edited by Christopher Wordsworth (London, 1851); F. W. H. Myers, *Wordsworth*, in "English Men of Letters" (New York, 1880, reprinted, 1904); W. A. Knight, *Life of William Wordsworth* (3 vols., London, 1889); Marie Gothein, *Wordsworth: sein Leben, seine Werke, seine Zeitgenossen* (2 vols, Halle, 1893); Emile Legouis, *La jeunesse de William Wordsworth: étude sur le "Prelude"* (Paris, 1896; Eng. trans. by J. W. Matthews, London, 1897); Ellis Yarnall, *Wordsworth and the Coleridges* (Philadelphia, 1899); *Letters of the Wordsworth Family from 1787 to 1855* (3 vols., Boston, 1907); D. W. Rannie, *Wordsworth and his Circle* (New York, 1907), containing a bibliography; W. A. Raleigh, *Wordsworth* (ib., 1915); G. McL. Harper, *William Wordsworth: His Life, Works, and Influence* (2 vols., ib., 1916). General criticism, etc.: Matthew Arnold, *Essays in Criticism, Second series* (London, 1888); Leslie Stephen, in *Hours in a Library*, vol. ii (new ed., New York, 1894); V. D. Scudder, *The Life of the Spirit in the Modern English Poets* (Boston, 1895); C. H. Herford, *The Age of Wordsworth*, in "Handbooks of English Literature" (London, 1901); P. E. More, in *Shelburne Essays, Seventh Series* (ib., 1907); E. S. Robert-

son, *Wordsworth and the English Lake Country* (ib., 1911); S. F. Gingerich, *Wordsworth, Tennyson, and Browning: A Study in Human Freedom* (Ann Arbor, Mich., 1911); Emile Legouis, "William Wordsworth," in *Cambridge History of English Literature*, vol. xi (New York, 1914), containing a full bibliography; W. A. Knight, *Coleridge and Wordsworth in the West Country* (ib., 1914); L. J. Wylie, *Social Studies in English Literature* (Boston, 1916); C. T. Winchester, *William Wordsworth: How to Know Him* (Indianapolis, 1916); J. R. Tutin, *A Wordsworth Dictionary of Persons and Places* (Hull, 1891); Lane Cooper, *Concordance to the Poems of Wordsworth* (New York, 1911).

WORK (AS. *weorc*, OHG. *werah*, *werc*, Ger. *Werk*, work). Whenever there is a displacement of a body upon which a force is acting, work is done if the displacement is in the line of action of the force, or has a component in that direction. Thus, if one raises a body from the floor to a table, work is done against the force of gravity. If the body falls, work is done by the force of gravity. The work done is given the numerical value equal to the product of the force by the component of the displacement of the body in the line of action of the force. In angular motion it is the product of the angular displacement and the moment of the force acting. Work is done whenever energy is transferred from one body to another. (See MECHANICS and ENERGETICS.) The unit of work on the C. G. S. system is the erg, or a force of one dyne acting through a distance of one centimeter. A more practical unit is the joule, which is 10^7 ergs. On the foot-pound system, the unit of work is that required to raise one pound one foot vertically against the force of gravity at sea level at latitude 45°; this unit is called a foot pound. It equals 1.383 joules, approximately.

WORK, HENRY CLAY (1832–84). An American song writer and inventor, born at Middletown, Conn. In boyhood he was taken to Illinois by his father. Returning to Connecticut, Work was apprenticed to a printer, studied harmony, and achieved universal popularity during the Civil War by his songs, among which the most popular were "Kingdom Coming," "Marching Through Georgia" (1865), "Babylon is Fallen." He wrote also temperance songs, the best known of which is "Father, Dear Father, Come Home with Me Now," and sentimental melodies, as "My Grandfather's Clock" and "Lilly Dale." He was an inventor and, among other things, patented a knitting machine, a walking doll, and a rotary engine.

WORKHOUSE. A name given in England to establishments for the segregation and maintenance of paupers; sometimes in the United States to institutions in which vagrants, drunkards, and other minor offenders are detained on short sentences and at labor, but which are usually and rightly known as houses of correction. The institutions established in London and Westminster during the reign of Charles II, which are commonly referred to as the first English workhouses, were in reality houses of correction to which vagabonds and other petty offenders were committed. William III, in creating the Board of Trade, instructed its members to "consider the proper methods of setting on work and employing the poor, and making them useful." The idea was in the air that a workhouse, in the literal sense of the word, could be made an effective discouragement of unnecessary pauperism. In 1676 John Cary, a merchant of Bristol, brought about the building and opening of a workhouse in that city. The experiment was so successful that it was followed by the cities of Plymouth, Worcester, Hull, and Exeter. John Locke about this time, writing the first report of the Board of Trade, made a strong plea for the technical instruction as well as the compulsory industry of the dependent elements of society, but the public was well enough satisfied with a scheme of segregation and hard work so long as it diminished the burden of the support of the poor. And so remarkable in fact was the suppression of vagrancy and the lowering of the poor rate by the workhouse experiments which have been mentioned, that in 1722 a general Act of Parliament authorized parishes, singly or in unions, to build workhouses and to refuse relief to all who would not enter them. For nearly 50 years the dread of the workhouse stimulated the poor to provide for themselves, but this wholesome condition was completely changed by a period of sentimentalism wherein the famous statute 22 George III, c. 83, in 1783, known as Gilbert's Act, practically broke down the workhouse principle. From this time began those abuses of outdoor relief which resulted in the appointment of the Poor Law Commission of 1832 and the Poor Law Amendment Act of 1834. See PAUPERISM.

The workhouse or house of correction in the United States is not a feature of the poor-law system of a commonwealth, but of its system of penology. It is usually a developed or modified county jail. The nearest American approach to such a test of aid-deserving poverty as the English workhouse is intended to be is found in the woodyards and laundries maintained by charity organization societies.

WORKINGMEN'S ASSOCIATION, INTERNATIONAL. See INTERNATIONAL WORKINGMEN'S ASSOCIATION.

WORKINGMEN'S CLUBS. Organizations of workingmen for various purposes, but partaking nothing of the character of trade unions or friendly societies. Such clubs are practically unknown in the United States, but are common in England and on the Continent. A large proportion of the London clubs of this kind were gambling or drinking associations. There are a large number of philanthropic clubs, connected as a rule with some church organization. The political clubs, about one-fourth of the total number, are generally Socialistic in tone. A small number are organized for educational purposes or social purposes of an educational nature. On the Continent the clubs comprise athletic organizations, Socialist clubs, and church societies.

WORKINGMEN'S COMPENSATION. Under the employers' liability laws the injured worker was required to bring suit at law and break down the employers' defenses before he could secure damages for his injury. These defenses required the worker to prove that he was not himself responsible, that no fellow worker was responsible, and that the accident to which injury was due was not a normal risk of the industry. The result was that only a small proportion of injuries were ever requited and much unmerited hardship was forced upon the working class. In consequence the system of compensation for accidents has been introduced. This

removes the employers' defenses, obviates the necessity of a lawsuit, and provides definite scales of compensation for accidental injuries incurred during working hours regardless of who is responsible therefor Since workmen's compensation laws are usually accompanied by laws requiring the reporting of all accidents to a public board charged with the determination of the amounts of compensation, the injured worker, or, in case of death, his family, receives payment very quickly without expense

Legislation of the compensation type began with the compulsory accident insurance law of Germany in 1884, followed by the British workmen's compensation act of 1897. (See SOCIAL INSURANCE for full statement.) In the United States the Federal government, 31 States and 2 Territories, had enacted compensation laws by the close of 1915. Aside from 10 southeastern States, the only States lacking such laws were Arkansas, Idaho, Missouri, New Mexico, North and South Dakota, and Utah. Nearly all of these laws apply to public as well as private employees As a rule they provide specific benefits in case of death, of total disability, and of partial disability due to specific injuries or continuing during specified periods. While they all introduced the principle of compensation, they vary much in scope, in the degree of compulsion, and in the prominence given to insurance by employers. Elective compensation laws have been enacted by the following Alaska, Colorado, Connecticut, Illinois, Indiana, Iowa, Kansas, Louisiana, Maine, Michigan, Minnesota, Montana, Nebraska, New Hampshire, New Jersey, Pennsylvania, Rhode Island, Vermont, and Wisconsin. Compulsory compensation is provided by: Arizona, California, Canal Zone, Hawaii, Maryland, New York, Oklahoma, and the United States. Elective insurance in funds under State control or supervision is provided for by laws of Massachusetts, Nevada, Oregon, Texas, and West Virginia; and compulsory insurance in State funds, is required in Ohio, Washington, and Wyoming. See SOCIAL INSURANCE; EMPLOYERS' LIABILITY; INSURANCE, *Employers' Liability Insurance;* and ACCIDENTS, INDUSTRIAL.

WORKINGMEN'S INSURANCE. The insuring of workingmen against accident, sickness, unemployment, or old age, carried on solely by the government or by the government in conjunction with employers and employees. The system has attained its fullest development in Germany, Austria, Great Britain, Denmark, and Australia, and is making fairly rapid progress throughout Western nations. See OLD AGE PENSIONS; SOCIAL INSURANCE.

WORKINGTON. A seaport in Cumberland, England, at the mouth of the Derwent, on the Solway Firth, 7 miles north of Whitehaven (Map: England, C 2) Its importance is due to the neighboring coal mines, the extensive iron, steel, and other factories, a thriving salmon fishery, and an export trade in industrial products. Pop., 1901, 26,141; 1911, 25,092.

WORKINGWOMEN'S CLUBS. Organizations of workingwomen for social and educational purposes. They are as a rule self-governing and self-supporting, the fees, however, being very moderate. The primary aim of such clubs is to bring within the reach of the woman in factory, shop, or store the advantages of wholesome lodgings and pleasant surroundings, dancing, books, music, etc., but a common feature is the instruction given in the various branches of domestic science as well as in stenography, typewriting, bookkeeping, etc. In a number of cases vacation homes are maintained The movement began in Boston about 1890 and has made rapid progress. There are now several State organizations of women's clubs and many independent organizations See WOMEN'S CLUBS.

WORKMAN, FANNY BULLOCK (?–1925) An American alpinist, born at Worcester, Mass. Educated in New York, France, and Germany, she was married in 1881 to W. Hunter Workman (q.v.), whom she accompanied on extensive travels in North Africa, Asia Minor, and the Far East In 1899 she made record first ascents for women in the Himalaya, including: Mount Bullock Workman, 19,450 feet; Mount D 41, 20,700 feet; Mount Koser Gunge, 21,000 feet. Her first ascent of one of the Nun Kun peaks in the Himalaya to the height of 23,300 feet in 1906 gave her the world record for mountaineering for women Mrs. Workman explored and mapped seven glaciers of the Hushe and Kindus systems in 1911, and in 1912 surveyed the 50-mile Rose Glacier and discovered the water parting between the Indus and Chinese-Turkestan regions. She became a fellow of the Royal Geographical Society, lectured before learned societies and alpine clubs, and received various decorations. In collaboration with her husband she wrote books cited in the article on him.

WORKMAN, GEORGE COULSON (1848–). A Canadian biblical critic. He was born at Grafton, Ontario, graduated at Victoria University in 1875, and at Leipzig (Ph.D.) in 1889. He was assistant editor of *The Christian Guardian* in 1876–78, and for some years held Methodist pastorates. At Victoria University, Coburg, he was professor of Old Testament exegesis and literature (1884–88) and of Oriental languages and literature (1889–91). In 1904–08 he occupied the chair of Old Testament exegesis and literature in the Wesleyan Theological College, Montreal He studied abroad on leave, and after returning to Canada his theological writings were the first important embodiment and defense of the higher criticism in that country. He published: *The Text of Jeremiah* (1889); *The Old Testament Vindicated* (1897); *The Messianic Prophecy Vindicated* (1899); *How to Study the Bible* (1902); *The Servant of Jeremiah* (1907); *At Onement or Reconciliation with God* (1911).

WORKMAN, HERBERT BROOK (1862–). An English Wesleyan Methodist clergyman and educator, born at Peckham. Graduating from Owens College, Manchester, and later from Didsbury College, he entered the ministry in 1885. From 1903 he was principal of Westminster Training College. In 1908 he was elected to the Legal Hundred of his church, and he held various offices, educational and denominational. Besides serving as an editor of *A New History of Methodism* (2 vols., 1909) and contributing to Hastings's *Encyclopædia of Religion and Ethics*, he wrote: *The Church of the West in the Middle Ages* (2 vols., 1898); *The Dawn of the Reformation* (1900); *The Letters of John Hus* (1904); *Persecution in the Early Church*, the Fernley lecture for 1906; *Christian Thought from the first Century to the Reformation* (1911); *Methodism* (1912); *The Evolution of the Monastic Ideal* (1913); *The Martyrs of the Early Church* (1913).

WORKMAN, WILLIAM HUNTER (1847–). An American alpinist, born at Worcester, Mass. He graduated from Yale in 1869, and from Harvard M.D., in 1872, and studied also at Vienna, Heidelberg, and Munich. From 1873 to 1888 he practised medicine at Worcester. In 1892-96, by bicycle, he traveled extensively with his wife, Fanny Bullock Workman (q.v.), in Europe and Algeria, and in 1897-99 in Ceylon, Java, and India. He made an expedition to the Great Biafo Glacier in 1899, and made pioneer ascents of three snow peaks of 18,600, 19,450, and 21,000 feet respectively. In the ascents of Mount Chogo and Mount Lungma in 1903 he was accompanied by his wife, but in addition made an ascent of a snow peak of 23,394 feet. With his wife he explored the Nun Kun group in 1906 and the Hispar Glacier in 1908. The Workmans made their seventh Himalayan expedition in 1911 and their eighth in 1912. In collaboration with Mrs. Workman he wrote, *Algerian Memories* (1895); *Sketches Afoot in Modern Iberia* (1896), *In the Ice-world of Himalaya* (1900); *Through Town and Jungle* (1904); *Ice-bound Heights of Mustagh* (1908); *Peaks and Glaciers of Nun Kun* (1909); *The Call of the Snowy Hispar* (1910).

WORKMEN'S COMPENSATION. See WORKINGMEN'S COMPENSATION.

WORKS, JOHN DOWNEY (1847–). An American lawyer, jurist, and legislator, born in Ohio Co., Ind. He served in the United States Volunteers during the Civil War, was admitted to the bar in 1868, and practiced law at Vevay, Ind., until 1883, when he took up practice at Los Angeles, Cal. A Republican in politics, he was a member of the Indiana House of Representatives in 1879, judge of the superior court of San Diego, Cal., in 1886-87, and justice, by appointment and election, of the Supreme Court of California in 1888-91. Afterward he resumed practice and identified himself with efforts to secure irrigation. A leader in the clean-up campaign in Los Angeles and in the elimination of race-track gambling in the State, a bitter opponent of the Southern Pacific Railroad and of machine politics, and an advocate of social justice, he was known as an independent and progressive Republican and was indorsed in the primary election of 1910 for the United States Senate over Senator Flint, taking his seat in 1911. As Senator he often cooperated with the Democrats. He was the author, in 1912, of the Senate resolution providing that the President's term be six years and that he be ineligible for re-election. He published *Courts and Their Jurisdiction* (1894), and *Practice, Pleading, and Forms* (3 vols., 1882-86; 4th ed., rev., 1906); *Irrigation* (1900); and numerous periodical articles.

WORKS AND DAYS. See HESIOD.

WORKSHOPS, NATIONAL. See NATIONAL WORKSHOPS.

WORKS OF SUPEREROGATION. See SUPEREROGATION, WORKS OF.

WORKSOP, wûrk'sŭp. A town in Nottinghamshire, England, 16 miles southeast of Sheffield, on the Ryton (Map: England, E 3). It has a fine old Norman church, with two lofty towers, a relic of an Augustinian monastery, founded in 1103, and other interesting remains. Malting is the staple industry and there are agricultural implement works, iron and brass foundries, saw mills, and chemical works. Windsor chairs are a specialty of the town. Pop., 1901, 16,112; 1911, 20,387.

WORLD CONFERENCE ON CHRISTIAN UNITY. See CHRISTIAN UNITY, WORLD CONFERENCE ON.

WORLDLY WISEMAN, MR. A character in Bunyan's *Pilgrim's Progress*.

WORLD PEACE MOVEMENT. The dream of the abolition of war is many centuries old, but only in recent decades has any movement for its accomplishment acquired anything like world-wide proportions. The growth of international trade, commerce, and investments has given rise to enormous economic interests dependent on the continuance of peace. The growth of communication and travel has tended to allay national suspicions and arouse national friendliness. Moreover the cost of maintaining the ever-expanding and ever more expensive military equipments necessitated a burden of taxation that impeded the development of economic resources and checked the improvement of social conditions. There have resulted numerous national and international organizations seeking to put an end to war and to preparations for war. For an historical account see ARBITRATION, INTERNATIONAL, CARNEGIE ENDOWMENT FOR INTERNATIONAL PEACE; PEACE MOVEMENT; WAR: WAR IN EUROPE.

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WORLD'S COLUMBIAN EXPOSITION. An international exposition held in Chicago, Ill., from May 1 to Oct. 30, 1893, to celebrate the four hundredth anniversary of the landing of Columbus. On April 25, 1890, a bill passed by Congress was approved, providing for the celebration of "the Four Hundredth Anniversary of the Discovery of America by Christopher Columbus by holding an International Exhibition of Arts, Industries, Manufactures, and the Products of the soil, mines, and sea, in the City of Chicago." A World's Columbian Commission was authorized, of which Thomas W. Palmer became president, by whom George R. Davis was appointed director general. The funds for the Exposition consisted of $10,000,000 raised by the city of Chicago, a loan of $2,500,000 from Congress, debenture bonds for $5,000,000 issued by the Exposition authorities, together with miscellaneous contributions from various sources of about $3,000,000, making a total fund of about $20,000,000 that was available for use before the opening day. A site was chosen in Jackson Park in the southeastern part of Chicago, on the shore of Lake Michigan, covering an area of 666 acres, where 150 different buildings were erected.

The work of designing and construction was placed under the charge of a Bureau of Construction, of which Daniel H. Burnham was made chief. The principal buildings were constructed of a composition called staff, consisting of a mixture of plaster of Paris, with a little cement, glycerin, and dextrin, in water, which

at a short distance gave the effect of marble This appearance led to the name of White City, by which the Exposition subsequently became generally known. The following were the larger buildings. Administration Building, in the style of the French Renaissance, surmounted by a gilded dome which formed one of the many conspicuous objects on the ground; Agricultural Building, in the classic Renaissance style, Electrical Building, in the Corinthian style, Fine Arts Building, in the Greek-Ionic order and a pure type of the most refined classical architecture; Forestry Building, in the rustic style, with a veranda, supporting the roof of which was a colonnade consisting of a series of columns composed of tree trunks in their natural state with bark undisturbed; Fisheries Building, in the Spanish style, consisting of a large central structure with two small polygonal buildings connected with it on either end by arcades, Government Building, in the classical style constructed of iron and glass, with an imposing central dome 120 feet in diameter and 150 feet high; Horticultural Building, embracing a central pavilion with two end pavilions, each connected with the central one by a front and rear curtain forming two interior courts. The centre of the pavilions was roofed by a crystal dome, under which were exhibited the tallest palms, bamboos, and tree ferns that could be procured. Machinery Hall was in the best type of the Spanish Renaissance At the first story a covered loggia furnished a promenade which encircled the entire building. The building was spanned by three arched trusses, and the interior presented the appearance of three railway train houses side by side. Manufactures and Liberal Arts Building, in the Corinthian style, was the largest exposition building ever constructed up to that time. The principal thoroughfare of the building extended longitudinally and was 50 feet wide, while an avenue of like width crossed it at right angles at the centre. The main roof was of iron and glass, and arched an area 1400 feet long by 385 feet wide. Mines and Mining Building, in the early Italian Renaissance style, had columns and arches, overhanging the principal entrances, which were richly decorated with sculptured groups and other embellishments emblematic of mining and its allied industries. Transportation Building, in the Romanesque style, had its interior treated similarly to a Roman basilica, with broad naves and aisles. The main entrance consisted of an immense single arch enriched with carvings, bas-reliefs, and mural paintings coated with gold leaf, whence its name of the Golden Doorway. Woman's Building, by Miss Sophia Hayden, in the Italian Renaissance style, was two stories in height, with an open rotunda 70 by 65 feet, which reached through the height of the building and was protected by a richly ornamented skylight. The rotunda was surrounded by a two-story open arcade producing an effect similar to that of the Indian courtyard.

In addition to the foregoing there were numerous State buildings, of which that of California was in the style of the old Missions; that of Florida, a miniature of Fort Marion; that of Massachusetts, a copy of the John Hancock House; and that of Virginia, a suggestion of Mount Vernon. The foreign buildings were in many instances characteristic. Scattered through the grounds were numerous groups of sculpture, of which the most famous was the Columbian Fountain by MacMonnies, facing which was a colossal statue of the Republic by French, and over the peristyle still beyond was a quadriga representing the Triumph of Columbus, while the figures and animals by Kemeys and Proctor were especially noteworthy. The amusement features were collected in a strip of land west of Jackson Park, to which the name of Midway Plaisance was given. During the Exposition a series of international congresses, grouped under 20 departments and 224 general divisions, were held in Memorial Art Palace. The total attendance at the Exposition was 27,539,041, of which 21,479,661 were paid There were 65,422 exhibitors representing over 250,000 separate exhibits, these were examined by an international jury of awards consisting of 852 judges, about one-half of whom were foreigners The award, consisting of a bronze medal and diploma, was given to 27,757 exhibitors, or 36 per cent of the whole number catalogued, exclusive of those from France and Norway, whose exhibits were withdrawn from examination At the close of the Exposition the total receipts from all sources were $33,290,065, while the total disbursements were $31,117,353. An official account of the Exposition is given in a *History of the World's Columbian Exposition Held in Chicago in 1893*, edited by Rossiter Johnson (4 vols., New York, 1897–98)

WORLD SOUL. See ANIMISM.

WORLD'S WOMAN'S CHRISTIAN TEMPERANCE UNION. An international association organized through the instrumentality of Miss Frances E. Willard (q.v.) in November, 1883. Mrs. Margaret Bright Lucas, at that time president of the British Woman's Temperance Association, was the first president. She was succeeded by Miss Willard, who held the position until her death in 1898, when Lady Henry Somerset of England became president She was succeeded by the Countess of Carlisle of York, England, in 1906. The first world's convention was held in Faneuil Hall, Boston, in 1891, being the first international woman's convention of any kind ever held. Conventions have since been held in Chicago (1893), London (1895), Toronto, Canada (1897), Edinburgh (1900), Geneva (1903), Boston (1906), Glasgow (1910), and Brooklyn (1913). Fifty-eight countries are affiliated with the organization and the presidents of the national societies are ex-officio vice presidents of the World's Union, which has an aggregate membership of about 500,000.

The work of the World's Union is carried on under six main departments. That of organization is in charge of the general officers and has two branches, the young woman's and the Loyal Temperance Legion. The preventive and educational departments have the following bureaus: Sunday school work, moral education, promotion of purity in art and literature, little white ribboners, antinarcotics, antiopium, antigambling, schools of methods, press, literature, medal contest, mercy, school savings, medical temperance, food reform, and labor. The evangelistic department carries on a crusade among penal and charitable institutions, railway men, soldiers and sailors, miners and lumbermen, raises the world's missionary fund. and encourages systematic giving. The social department conducts parlor meetings, counter attractions to the saloon, exhibits, and flower missions. The legal department has bureaus devoted to petitions and legislative work, the protection of native races,

peace and international arbitration, and the franchise. Through the missionary fund World's White Ribbon missionaries are sent out under five-year engagements to aid organization in newer countries. There were 10 such in 1916. Such work had been begun by eight round-the-world missionaries sent out by the National Woman's Christian Temperance Union of the United States. The World Union publishes a *Bulletin* and numerous pamphlets. Besides the numerous publications in the United States there are official papers in England, Scotland, Australia, Canada, India, Burma, New Zealand, Norway, Sweden, Denmark, Finland, and Japan.

The most important special work undertaken by the World's Woman's Christian Temperance Union has been the polyglot petition against legalizing the sale of opium and alcohol, addressed "To the Governments of the World." This petition, written by Miss Willard, has been circulated throughout the world during many years in every important nation. It has received over 7,000,000 signatures and attestations. The petition has been presented to the governments of the United States, Great Britain, and Canada, and eventually will be presented to rulers in all leading countries.

WORM (AS. *wyrm*, Goth *waúrms*, OHG *wurm*, Ger *Wurm*, worm, snake, dragon; connected with Lat. *vermis*, ORuss. *vermie*, worm, Gk. *ῥόμος*, *rhomos*, wood worm). A popular term for a great variety of animals, variously classified. All are of low organization, and generally of elongated form and with very short legs or none at all. Many caterpillars, moreover, maggots, grubs, and other larval forms of insects are popularly, but unscientifically, called worms. See CLASSIFICATION OF ANIMALS; ANNULATA; ASCARIS; CESTODA; EARTHWORM; ENTOZOA; FLATWORM; GORDIUS; LEECH; NEMATHELMINTHES; NEMERTINEA; PALOLO; ROUNDWORM; SCOLECIDA; SIPUNCULA; THREADWORMS; TRICHINA; VERMES; and similar titles.

Fossil Worms. Fossil worms are known from geological formations of all ages. The tube-dwelling worms are represented by *Serpula*, which is common from the Jurassic upward and which is very abundant in some beds of Lower Cretaceous age in Germany, known on that account as the Serpulitenkalk and Serpulitensand. *Spirorbis*, also a recent genus, is common in the Upper Paleozoic formations, where its small spiral tubes are often found on fragments of shell and on the leaves and roots of Devonian and Carboniferous plants. Other Paleozoic genera are *Autodetus*, *Cornulites*, *Conchicolites*, *Ortonia;* and perhaps also *Tentaculites* (q.v.) may be included here. Burrows and trails are common in all beach and sandy shallow-water formations, but the form of the worms that made them can seldom be determined. *Scolithus*, *Arthroplycus*, *Planolites*, *Scolecoderma*, and many other generic terms have been applied to the different forms. Impressions of the bodies of worms and also their excrements are common in the Mesozoic rocks (*Eunicites* and *Lumbricarina*), and have been found also in the Paleozoic, *Vermites* in the Cambrian, and *Planolites* and *Gyrochnites* in the Devonian. Conodonts (q.v.) are found in most formations from Ordovician to Carboniferous age. Consult K. A. Von Zittel, *Textbook of Palæontology*, Eng. trans. by C. R. Eastman (2 vols., New York, 1903, 2d ed., vol. 1, London, 1913).

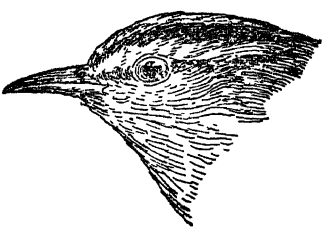


FOSSIL JAWS OF ANNELID WORMS.

a, *Lumbriconereites basalis*, *b*, *Œnonites rostratus*; *c*, conodont of *Prioniodus elegans*, *d*, conodont of *Polygnathus dubius*.

WORM. See ENDLESS SCREW.

WORM-EATING WARBLER. One of the most interesting and widely distributed of American warblers (q.v.). It is olive-green, yellow on the under surface, with darker stripes on its crown. It makes its nest in a well-hidden hollow of the ground in the woods, and breeds plentifully northward to Illinois and southern New England. Its scientific name is *Helmintheros vermivorus*.



WORM-EATING WARBLER

WORMELEY, wûrm'li, KATHARINE PRESCOTT (1830–1908). An American translator and author, born in Ipswich, England. The daughter of a British admiral, she came to the United States in girlhood and first gained distinction by her active interest in the relief of Union soldiers during the Civil War. In this connection she published *The United States Sanitary Commission* (1863); *Letters from Headquarters During the Peninsular Campaign* (1862); and *The Other Side of War* (1888). She translated the works of Balzac (36 vols., 1883–97), Molière (6 vols., 1892), *Versailles Historical Memoirs* (20 vols., 1898–1901), and other works from the French, and wrote a *Memoir of Balzac* (1892).

WORM GEAR (WORM DRIVE or WORM AND WHEEL). See ENDLESS SCREW; GEARING.

WORM GRASS. See SPIGELIA.

WORMS, vôrms. A town of the Grand Duchy of Hesse, Germany, on the left bank of the Rhine, 22 miles north of Heidelberg (Map: Germany, C 4). Its chief structure is the cathedral, dating from the eleventh century, with a richly ornate Gothic portal of the fifteenth century. Second only in interest to the cathedral is the church of St. Paul, now used as a museum. The church of St. Martin (restored in 1888), the Gothic Liebfrauen-Kirche, and the town library, with early historical records and mementos of Luther, are other notable buildings. The town possesses a Luther monument in which numerous statues of his contemporaries are included. An interesting object is the mediæval Jewish synagogue. The town has manufactures of leather, cloth, machinery, shoddy, worsted yarn, chicory, chemicals, slate, and flour. In the vicinity is produced the famous wine known as *Liebfraumilch*. The town has a considerable river and canal trade. Pop., 1910, 46,891. Worms is the Roman *Borbetomagus*. From very early times the town was the seat of a bishop. It became the capital of the Burgundians, and later was occasionally the residence of the Frankish kings. It gradually emancipated itself from the rule of its bishops and became a free Imperial city. In 1122 the famous Concordat (q.v.), which settled the dispute regarding investitures, was concluded here. The most celebrated event in the history of Worms was the holding of the

Imperial Diet of 1521, before which Luther made his sturdy defense The town suffered greatly in the Thirty Years' War, and in 1689 was almost entirely destroyed by the French, a blow from which it never wholly recovered In 1801 it was joined to France, and in 1815 to Hesse-Darmstadt

WORMS. The larger number of entozoa for which the human body is the host are developed in the intestines. The list of wormlike parasites preying upon man is rapidly extending with our increasing knowledge of tropical diseases. For a classification of the parasites attacking man, see article PARASITIC DISEASES and references there given; see also HOOKWORM DISEASE. The intestinal worms of frequent occurrence are *Ascaris lumbricoides*, the lumbricoid or roundworm; *Oxyuris vermicularis*, the threadworm or seat worm; and the *tænia* or tapeworm (q.v.). The lumbricoid is treated under ASCARIS, with regard to its appearance in animals, and under LUMBRICOID in its relations to the human being. The *Oxyuris*, known also as the thread, seat, or pin worm, inhabits the large intestine, and especially the rectum. It is from 2 to 5 lines in length, and is frequently found in large numbers, agglutinated by mucus into a ball. While more frequent in young children, they occur at any period of life. They cause pain in the rectum, itching, and straining, all symptoms being worse at night, interfering with sleep. In girls the entozoa may migrate into the vagina and occasion pruritus vulvæ and leucorrhœa. The treatment is simple. An enema of cold water, salt and water, or infusion of quassia given twice a day for about two weeks eliminates the parasite Vinegar, camphor, and creosote have also been used.

WORMS. See BORMIO.

WORMS, vôrN, RENÉ (1869–). A French sociologist, born at Rennes and educated there and at the University of Paris. He lectured upon philosophy and social subjects, practiced law as well, and filled several important posts in the administrative service. He was active in founding the Parisian Société de Sociologie and the Institut International de Sociologie, of both of which he became secretary. He edited the *Revue internationale de sociologie*. In Worms's best-known work, *Organisme et société* (1896), he presents human society as a real organism, carrying the analogy much further than Herbert Spencer. His other publications include: *De la volonté unilatérale considérée comme source de l'obligation* (1891); *Précis de philosophie* (1891; 3d ed., 1905); *Eléments de philosophie scientifique et de philosophie morale* (1891); *La morale de Spinoza* (1892); *Philosophie des sciences sociales* (3 vols., 1903–07; 2d ed., 1913); *Les principes biologiques de l'évolution sociale* (1910); *La sexualité dans les naissances françaises* (1912).



A WORMSHELL.

WORMSEED. See CHENOPODIUM.

WORMSEED MUSTARD. See ERYSIMUM.

WORMSHELL. A mollusk of the family Vermetidæ, allied to the fresh-water Melaniidæ, whose body is slender and annelid-like, and whose small uncoiled shells resemble the twisted tubes of some annelids These mollusks are free and spiral in early life, but soon settle down and become stationary, when the further growth of the shell is uncoiled Most species are found in Eastern seas. A well-known species is *Vermetus lumbricalis*, which is illustrated herewith.

WORMWOOD (from AS. *wermod*, Ger. *Wermuth;* etymology uncertain). A perennial herb, *Artemisia absinthium*, native in Europe and Asiatic Russia and found also in gardens and by roadsides in the United States and Canada It has an erect somewhat shrubby stem from 2 to 4 feet high. The plant is aromatic, tonic, and bitter, and was used by the ancients for its medicinal properties. In Europe it is still used as an aid to weak digestion. Its principal use now is in the manufacture of absinthe. The name "wormwood" is sometimes extended to the entire genus *Artemisia*. See ABSINTHE; ARTEMISIA.

WORSAAE, vôrs'a, JENS JACOB ASMUSSEN (1821–85). A Danish historian and archæologist, born at Veile, in Jutland. He was appointed assistant in the Copenhagen Museum of Northern Antiquities in 1838 In 1847 he was appointed inspector of antiquities in Denmark, and two years later received a commission to arrange and preserve the archæological remains of the country. In 1854 he became professor at Copenhagen University. He later became titular director of Danish antiquities, director of the Museum of Northern Antiquities at Copenhagen (1866), and of the Ethnographical Museum. In 1874–75 he was Minister of Public Instruction and Ecclesiastical Affairs. Among his works may be mentioned: *Danmarks Oldtid oplyst ved Oldsager* (1843; Eng. trans., *The Primeval Antiquities of Denmark*, 1849); *Blekingske Mindesmærker fra Hedenold* (1846); *Minder om de Danske og Nordmændene i England, Skotland og Irland* (1851; Eng. trans., *Memorials of the Danes and Norwegians in England*, 1852); *Den Danske Erobring af England og Normandiet* (1863); *Nordens Forhistorie* (1881; Eng. trans., *Prehistory of the North*, 1886).

WORSHIP (AS. *weor scipe*, honor, from *weor, wur*, worthy, honorable + *-scipe*, abstract suffix, Eng. -ship). The expression of any form of the reverence which man feels for a superior being, and especially for spirits and gods, in any stage of the growth of religion. In primitive religion sacrifice (q.v.) is the central element of worship, and is offered alike to objects of nature worship and to the spirits of the dead. Prayer and other parts of the ritual were originally, for the most part, the accompaniments of sacrifice. Dances and music, used first to arouse or express emotion, early became elements of worship, used in honor of a god. In Judaism worship was especially the sacrifices in the temple. Christianity borrowed its form of worship, not from the temple, but from the synagogue with its prayer, praise, and instruction. The church later drew a sharp distinction between the worship of God (*latria*) and the adoration of the saints (*dulia*), for which properly the term "worship" should not be used. Worship was originally the act of the tribe or community, since the god was a tribal god. When individual religion arose, worship also became individual, and might be offered in private. The value of social worship, however, is so great that individual religions, like Christianity, re-

tain and emphasize it. See LITURGY; PRAYER; RITE; RITUAL.

WORSLEY, wûrz'lĭ. A coal-mining and cotton-manufacturing town in Lancashire, England, 5 miles west-northwest of Manchester. Pop., 1901, 12,448; 1911, 13,906.

WORSLEY, wûrz'lĭ, PHILIP STANHOPE (1835–66). An English poet, born at Greenwich, in Kent. He was educated at the Cholmeley Grammar School, Highgate, and at Corpus Christi College, Oxford, where he won the Newdigate prize for English verse in 1857, and graduated in 1861. His original poems appeared in 1863 under the title, *Poems and Translations* (reprint with additions, 1875). Though they are graceful, Worsley's fame rests on his translations of the *Odyssey* and of the first 12 books of the *Iliad* in Spenserian stanzas. The *Odyssey* was published in 1861 and the *Iliad* in 1865. The *Iliad* was completed by John Conington in 1868. Consult Matthew Arnold's essay *On Translating Homer*.

WORSTED, wŭs'tĕd. See WOOL AND WORSTED MANUFACTURES.

WORT. See BREWING.

WÖRTH, vërt. A village of Alsace-Lorraine, situated on the Sauer, about 10 miles southwest of Weissenburg (Map: Germany, B 4). Here, on Aug. 6, 1870, subsequent to their defeat at Weissenburg, the French under MacMahon were defeated with great loss by the Germans commanded by the Crown Prince of Prussia. The fiercest fighting of the day occurred in the village of Fröschweiler, which was taken by storm after a desperate struggle in the streets. The French lost 8325 men in dead and wounded and 9000 prisoners. The German loss was 9270 men in dead and wounded. French historians refer to it as the battle of Reichshofen. Pop., about 1100.

WORTH, wûrth, CHARLES FREDERICK (1825–95). An Anglo-French dressmaker, born at Bourne, Lincolnshire. In 1846 he went to Paris, and for 12 years was in the employ of Gagelin, a silk weaver. He began to design articles of dress and in 1858 went into business as a lady's tailor. He came to the notice of the Empress Eugénie, and became famous as a designer. The house established by him continued to be one of the best known of its kind.

WORTH, WILLIAM JENKINS (1794–1849). An American soldier, born in Hudson, N. Y. He entered the Twenty-third Infantry as a first lieutenant in March, 1813; served as an aid to General Scott; and was brevetted captain for gallantry at Chippewa, and major for gallantry at Lundy's Lane, where he was severely wounded. In 1838 he was made colonel of the Eighth Regiment of Infantry, and on April 19, 1842, defeated the Seminole Indians at Palaklaklaha. During the Mexican War he served under General Taylor, and for services in the attack on the Bishop's palace at Monterey was brevetted major general. He then served under General Scott in the Southern campaign; greatly distinguished himself at Cerro Gordo, Churubusco, Molino del Rey, and Chapultepec; and on Sept. 13, 1848, received from the authorities of the city of Mexico the overtures for a surrender. After the war until his death he commanded the Department of Texas. A monument to his memory was erected at the intersection of Broadway and Fifth Avenue, New York, in 1858.

WORTHEN, wûr'thĕn, WILLIAM EZRA (1819–97). An American civil engineer, born at Amesbury, Mass. He graduated from Harvard in 1838, and immediately became engaged in hydraulic work at Lowell and Boston, part of the time under James B. Francis (q.v.). He continued in hydraulic, railway, and mill work in Massachusetts until 1850, when he moved to New York. There he designed many large buildings and the water works of several cities. Worthen was for a time engineer of the New York and New Haven Railroad, and vice president of that road until 1854. He built the dam across the Mohawk River at Cohoes, N. Y., and was sanitary engineer of the Metropolitan Board of Health (New York, Brooklyn, and vicinity) throughout the existence of that board in the late sixties. In 1887 he was president of the American Society of Civil Engineers. He published: *Cyclopædia of Drawing* (1857); *First Lessons in Mechanics* (1862); *Rudimentary Drawing for Schools* (1863).

WORTHIES OF ENGLAND, THE. The greatest work of Thomas Fuller, a voluminous collection of national biographies, published in 1662.

WORTHING, wûr'thĭng. A fashionable watering place on the Sussex coast, England, 10 miles west of Brighton (Map: England, F 6). Its importance began with the nineteenth century. Early fruits are grown under glass here, an industry to which many acres of land are devoted. Pop., 1901, 20,006; 1911, 30,305.

WORTHINGTON, wûr'thĭng-tŏn, HENRY ROSSITER (1817–80). An American inventor and hydraulic engineer, born at Tarrytown, N. Y. He early devoted himself to the study of steam machinery; invented the independent feed pump, and in 1849 patented the direct-acting steam pump. Five years later he built the first direct-acting compound condensing engine, and soon afterwards he invented the duplex pump. See PUMPS AND PUMPING MACHINERY.

WORTHINGTON, JOHN. See CAMBRIDGE PLATONISTS.

WOTHERSPOON, wŏth'ĕr-spōōn, WILLIAM WALLACE (1850–1921). An American soldier and public official, born in Washington, D. C. He was appointed second lieutenant of the Twelfth United States Infantry in 1873, served with the rank of captain at the time of the Spanish-American War, and in 1905 graduated from the Army War College, of which he was president in 1907–09 and 1910–12. He served on the general staff in 1905–09, was promoted to brigadier general in 1907 and major general in 1912, was assistant to the chief of staff in 1909–10 and 1912–14, and in the latter year served as chief of staff of the United States Army from April to November. Retiring from the United States army, he was appointed by Governor Whitman New York State Superintendent of Public Works in 1915.

WOTTON, wŏt'ŭn, SIR HENRY (1568–1639). An English diplomat and poet. He was born at Boughton Malherbe, in Kent, and educated at Winchester School and at New and Queen's Colleges, Oxford. He traveled for nearly seven years on the Continent. In 1595, after his return to England, he entered the service of Robert Devereux, Earl of Essex, and made a number of foreign journeys in his behalf. Being implicated, through this connection, in the condemnation falling upon Essex for conspiracy (1601), Wotton remained out of England during the remainder of Elizabeth's reign, though once he journeyed from Italy to Scotland, disguised



WOUWERMAN

THE SMITHY," FROM THE PAINTING IN THE ROYAL GALLERY, DRESDEN

as an Italian, to warn James VI (afterward James I of England) of a conspiracy against his life. Upon the accession of James I he was recalled to England and appointed Ambassador to Venice in 1604. With two intermissions he retained the post until 1624. In 1624 he became provost of Eton and held the post until his death. Wotton is the author of two poems included in nearly every collection of English verse, "The Character of a Happy Life," and "On His Mistress, the Queen of Bohemia," and a posthumous publication, *Reliquiæ Wottonianæ, or a Collection of Lives, Letters, Poems, with Characters of Sundry Personages and Other Incomparable Pieces of Language and Art* (1651). This volume contained the memoir by Izaak Walton. Consult also P. E. More, *Shelburne Essays*, Fifth Series (New York, 1908).

WOTTON, William (1666–1726). An English scholar, born at Wrentham, in Suffolk. His father, trained in the classics by Méric Casaubon, began to teach the boy Latin and Greek at the age of four, and Hebrew at the age of five. In his tenth year William entered Catharine Hall, Cambridge, and the master, John Eachard, recorded that in these languages he was second neither to Hammond nor to Grotius. After graduating B.A. in 1679, Wotton was elected fellow of St. John's College, Cambridge, took orders, and held various livings, eventually becoming a prebendary in Salisbury Cathedral (1705). His scholarship was recognized by an election to the Royal Society (1687). Wotton, one of the most precocious of scholars, is best known as the author of *Reflections upon Ancient and Modern Learning* (1694), written on the side of the moderns in the famous controversy of the time. Among his other works were a *History of Rome* (1701) and *Traditions and Usages of the Scribes and Pharisees* (1718). Wotton also studied Welsh. After his death appeared *Leges Wallicæ* (1730), a translation of the laws of Hywel Dda. For the principles on which Wotton was educated, consult Henry Wotton's *Essay on the Education of Children* (London, 1753).

WOUND, wōōnd (AS. *wund*, OHG. *wunta*, Ger. *Wunde*, wound). An injury attended with a division of tissue produced by sudden mechanical force. The skin may be broken, as in an open wound; or it may be unbroken, and deep structures attacked, as in a subcutaneous wound. Wounds are termed penetrating, when they enter a cavity without emerging; perforating, when they enter and emerge from a cavity. All wounds are accompanied by some death of tissue. If great areas are contused or lacerated, death and destruction are great, and graver conditions arise. Wounds may be classified as aseptic, when they are not contaminated by poisonous infection; and as septic, when bacterial or other fermentative agents have been admitted, in which case suppuration and sloughing ensue.

Among the local symptoms of wounds are impairment of function, pain, bleeding, and shock. Severing of muscles may be the result of a wound, leaving a limb powerless. Pain results from laceration of nerves, and may vary in character from a sharp twinge to a dull ache. The amount of hæmorrhage depends upon the nature and size of the wound, and the number and size of blood vessels injured. For shock, see that title. This condition occurs when fat globules gain access to the blood and are carried in the circulation to lodge in some organs and produce death.

Repair is the process by which the cells of the part replace lost tissue. The most economical method is by primary adhesion or first intention. This occurs when parts can be brought together in close coaptation and the wound is aseptic. There may be few or no symptoms of inflammation. Pressure, suturing, or position may secure the coaptation necessary. If this be impossible, and the edges must be left apart or there is a large amount of tissue missing, healing by secondary intention or granulation occurs. That is, new tissue grows up in the deepest part of the wound, appearing like a heap of granules, gradually filling the gap, and finally the skin grows across when the granulations reach the surface. After surfaces of a wound have begun to granulate, they may be brought together so that the granulations fuse and the gap is closed. This is called healing by third intention. Subcutaneous wounds heal similarly, the exudations being absorbed, and if there be no bacterial infection the process is rapid. Healing under a blood clot or by scabbing is nature's method of closing small superficial wounds. In the case of a fracture or wound of bone, a callus (or provisional deposit of new bone) occurs, covering the ends of the fragments and cementing them together. Gradually part of this callus disappears after healing is complete.

In treatment the surgeon must first stop the hæmorrhage by ligature, pressure, torsion of arteries, or the application of heat. The wound must then be cleansed and disinfected, all dead or dying tissue, blood, and foreign bodies being removed. The lips of the wound must then be brought together as far as possible, and kept in place by suture (q.v.), or by bandages. Drainage must be secured by the use of a tube, a piece of gauze, or other device, if the wound cannot be closed, or is known to be infected. An aseptic dressing must then be applied. This may be of wool, cotton, gauze, jute, etc., carbolized, sublimated, or treated with boric acid, thymol, iodoform, or other disinfectant. Dressings must be changed and removed, according to indications.

Poisoned wounds may be the results of the microbial infection of glanders, anthrax, rabies, actinomycosis, etc. (qq.v.), or may be due to chemical agents. Dissection wounds are septic wounds generally of great virulence, contracted during post-mortem examinations or the dissection of dead bodies. They are due to microbic poisoning. In many poisoned wounds amputation is necessary, or free incisions to favor suppuration and sloughing off of the attacked tissue. Meanwhile internal supportive treatment is administered. See Gunshot Wound, Surgery, Military.

Consult G. E. Brewer, *A Textbook of Surgery* (New York, 1915).

WOUNDWORT, wōōnd'wûrt. See Stachys.

WOUWERMAN, wou'wĕr-măn, Philips (1619–68). A Dutch animal, genre, and landscape painter. He was born at Haarlem, the son of a painter, and probably studied with Frans Hals, and afterward certainly under Pieter Verbeeck, a painter of horses. In 1638, in order to marry a Catholic, he went to Hamburg, where he worked with Evert Decker. On his return he came under the influence of Pieter de Laer. In 1640 he is recorded as a member of the painters' guild, in 1645 as its commissaire. He seems to have acquired much wealth by his art, as for the marriage of his daughter in 1672 he provided a dowry of 20,000 florins. From the foreign scenes in his landscapes, the country houses of

French aristocracy, a first-hand knowledge of the Alps, and echoes of Italy in the antique, it is assumed that he traveled extensively. He died May 19, 1668. Wouwerman's art shows its greatest originality in the combination of figures and landscape. Both are treated with equal mastery, neither being subordinate, yet without loss of the harmony of the picture. He was, above all else, the painter of the horse, which he portrayed engaged in all of its services to mankind: in battle and hunting scenes, the pampered riding or carriage horse of the rich, the overworked cart horse of the poor. A feature of his pictures is usually a white or gray horse, upon which the high light is concentrated. Wouwerman is a facile draftsman, and his compositions show fertile imagination and poetic feeling. His landscapes are especially good in aërial perspective. The color scheme, at first a warm brownish one, gradually became a silvery gray, giving play to a harmonious coloring with fine discrimination of values. In later life his paintings became careless in execution, too dark, and often inharmonious in color. The most prolific of the Little Masters, he executed over 1000 paintings, of which above seven hundred survive, besides the many figures he painted for the landscapes of others. The Dresden Gallery and the Hermitage, St. Petersburg, each possess fifty, the Cassel and Munich galleries twenty, and he is well represented in the Louvre and various English collections.

His younger brother PIETER (1623–82) developed under Philips's influence, and painted similar subjects, though his work is far inferior to that of his more gifted brother. Many of the works ascribed to Philips are probably by his brother. The works of JAN (1629–66), the youngest member of the family, represent moonlight scenes and sand dunes, and are extremely rare. Consult: Wurzbach, in Dohme, *Kunst und Künstler Deutschlands und der Niederlande* (Leipzig, 1878); Kämmerer, *Ueber die Composition in Wouwermans Gemälden* (ib., 1879); Wilhelm Bode, *Great Masters of Dutch and Flemish Painting* (New York, 1909).

WOVOKA (Cutter), or JACK WILSON (*c.*1856–). A Piute Indian prophet of Nevada, the originator of the Messiah or Ghost Dance religion, born in Mason Valley, west of Walker Lake, Nevada. On his father's death, about 1870, the boy was taken into the family of David Wilson, a ranchman from whom he got his "white" name. In 1888–89, while in delirium from fever, Wovoka thought he saw the God of the Indians and all the Indians who had died engaged in their old-time sports and occupations, as before the white man came. He was given a revelation and a dance which he was commanded to communicate to his people, with the promise that by strictly observing the doctrines and ceremonial they would be enabled to rejoin their departed friends in a new Indian earth which was rapidly approaching from the west, stocked with game and everything of the old Indian life, and which would slide over the present earth, driving the whites before it. In the same connection he was to preach the brotherhood of the Indian race, and the abolition of tribal warfare, the war dance and all that savored of war; to forbid laceration, destruction of property, and excessive grief at funerals, and to permit the [illegible] of women in ceremonial affairs. On his return from the spirit world he at once began to preach the new doctrine, which, in spite of its prohibition of their cherished war and funeral customs, appealed strongly to the Indians for the hope it held out of a happy future. The songs and dances of the ceremonial, popularly known as the Ghost Dance, soon became general among the Piute (q.v.), and the report spread to other tribes across the mountains, which sent delegations to interview and receive instructions from the Messiah until the Ghost Dance had spread to nearly all the Indian tribes from the Sierras to the Missouri River, and from the Canadian frontier almost to the Mexican border. Among the Sioux (q.v.) the religious ferment intensified a feeling of dissatisfaction over certain treaty grievances, resulting in the war of 1890–91. The dance reached its highest point about a year later, after which the excitement rapidly subsided, owing to the failure of the prophecies at the appointed time. It exists now only as a semisocial affair. Consult James Mooney, *The Ghost Dance Religion* (Washington, 1896).

WOYRSCH, voirsh, FELIX (1860–). A German composer, born at Troppau (Silesia). Although he studied for a short time with H. Chevallier in Hamburg, he was practically self-taught. In 1895 he became conductor of the Singakademie at Altona, and in 1903 conductor of the municipal symphony and popular concerts. His compositions include a symphonic prologue to Dante's *Divina Commedia;* two symphonies (C minor and C major), an overture to *Hamlet;* the large choral works with orchestra: *Die Geburt Jesu, Sapphische Ode an Aphrodite, Totentanz, Deutscher Heerbann, Der Vandalen Auszug;* a Passion Oratorio; and the operas *Der Pfarrer von Meudon* (1886), *Der Weiberkrieg* (1890), *Wikingerfahrt* (1896).

WRANGEL, vräng'ĕl, FRIEDRICH HEINRICH ERNST, COUNT (1784–1877). A Prussian general. He was born at Stettin; entered the Prussian army as ensign, 1796; fought in the campaigns against Napoleon, rising to the rank of colonel, and was made major general in 1823 and lieutenant general in 1838. He was given command of the allied forces against Denmark in 1848, but in September he was summoned home, and in November suppressed a popular uprising in Berlin, for which service he was made general of cavalry. He was created a field marshal in 1856, upon the sixtieth anniversary of his entrance into the military service. He commanded the allied Austrian and Prussian forces against Denmark in 1864, but soon after the opening of the war retired from the command.

WRANGEL, or **WRANGELL**, vräng'ĕl, FERDINAND, BARON (*c.*1794–1870). A Russian explorer and naval officer. He was born in Livonia, and after graduating at the Imperial Naval Academy at St. Petersburg entered the Russian navy. He sailed twice around the world and took part in several scientific expeditions. In 1820 he was placed in command of an expedition planned to explore the Polar regions north of Asiatic Russia. He advanced on sledges to lat. 72° 2′ N., from which point he sighted the open sea beyond. The land known as Wrangel Land was not discovered by him, but was named after him. It was first definitely known by the cruise of an American whaler, T. Long, who sailed along its southern shores in 1867. Wrangel was chief director of the Alaskan colonies from 1831 to 1836. During his administration an observatory was established at Sitka, extensive areas of the territory explored, and

new colonies planted He was influential in exposing the abuses of the Russian American Company, which prevented an extension of its charter in 1862 In 1849 he became a vice admiral, and from 1853 to 1858 he held the post of Minister of Marine He opposed the sale of Alaska to the United States. Among Wrangel's works was *Statistische und ethnographische Nachrichten uber die russischen Besitzungen, an der Nordwestlichen Kuste von Amerika* (1839). His own complete account of his Polar expedition was published in Russian (St Petersburg, 1844) A briefer account, being extracts from his diaries, was published in German by Engelhardt (Berlin, 1839), and an English translation, made by Mrs Sabine and edited by Major Sabine, was entitled *Narrative of an Expedition to the Polar Sea in 1820–23* (London, 1840).

WRANGEL, vrang'ĕl, KARL GUSTAF, COUNT (1613–76). A Swedish commander, born at Skokloster, near Upsala He entered the military service in 1627, under Gustavus Adolphus After the death of the King (1632) he served with Bernhard of Saxe-Weimar and Banér. At the death of Banér in 1641, though the command of the army was his by right, he consented to serve under Torstensson In 1644 he took command of the Swedish fleet and defeated the Danes near the island of Fehmarn. At the close of the Danish war in 1645 he was made Count, and in the following year took command of the Swedish army in Germany With Turenne he forced Maximilian of Bavaria to an armistice in 1647. He served against the Poles in 1655–56, and against the Danes in 1657–59, with much distinction. In 1674 he led the Swedish army against the Elector of Brandenburg, but was compelled by failing health to leave it, and returned to Sweden.

WRANGELL, răn'gel. A town in the southern district of Alaska, 150 miles southeast of Juneau, on Wrangell Island, at the mouth of the Stikine River (Map: Alaska, N 7) It is in direct steamship communication with Seattle, Wash., and has salmon canneries, a hatchery, and a saw mill There are also a government school for natives, a wireless station, and a weekly paper. The first independent Indian church of Alaska was organized here in 1876, and in 1877 the first American mission by the Presbyterians. Wrangell was settled by Russians in 1833, and was of considerable importance as a distributing centre at the time of exploitation of the Cassier gold fields. Pop., 1900, 868; 1910, 743.

WRANGEL (răn'gel) **LAND.** An island in the Arctic Ocean, in lat. 71° 32′ N., long. 178° W., about 400 miles northwest of Bering Strait (Map: Arctic Regions, C 5). It is about 70 miles long and 35 miles broad, and consists chiefly of naked granite rocks over 2000 feet high. The island was first reported by natives of the Siberian coast early in the nineteenth century, and the Russian explorer Wrangel, after whom it was named, went in search of it in 1821. It was first sighted, probably by Kellett, in 1849. An American whaler, Thomas Long, coasted along its southern shores in 1867, and it was explored in 1881 by Hooper, who took possession of it for the United States and called it New Columbia. Consult Hooper, Rosse, Muir, and Nelson, *Cruise of the Corwin* (Washington, 1883).

WRANGELL MOUNTAINS. A group of very lofty volcanic mountains situated east of Copper River, Alaska (Map: Alaska, K 4) They have been inactive since 1819 The highest peaks are Castle, 10,314 feet. Drum, 12,002; Jarvis, 12,230, Regal, 13,400; Wrangell, 14,005 and Blackburn, 17,140.

WRANGLER. A term formerly applied to one who attained a first class in the mathematical tripos examination in the University of Cambridge. The word owes its origin to the public disputations formerly held as part of the examinations. The honor men, or those reaching a certain rank, were divided into three classes according to merit, wranglers, senior optimes, and junior optimes, the highest of the first class being known as senior wrangler The term and the system disappeared after 1909, when the practice of publishing the results of the examination in these classes was introduced with the names in each class arranged in alphabetical order.

WRASSE, răs (from Welsh *gwrachen*). A spiny-rayed marine fish of the family Labridæ. The form is somewhat perchlike, but the back is straighter. There is a single long dorsal fin, the spines of the anterior portion of which are surmounted by short membranous filaments, the posterior portion having short and split rays. The mouth is protrusible, with thick fleshy lips, folded so as to appear double. The colors are generally very brilliant, especially in the Oriental genus *Julus* (for an example, see Colored Plate of PHILIPPINE FISHES). They chiefly frequent rocky shores, and are generally seen in small shoals, often hiding under seaweeds, where they feed on crustaceans, mollusks, and marine worms. They are often caught by bait intended for other fish, but their flesh is not esteemed. No North American fish is popularly called a wrasse, but the family is represented by cunners, tautogs, ladyfishes, doncellas (qq.v.), and similar forms.

WRATH, CAPE. See CAPE WRATH.

WRATISLAW, ALBERT HENRY (1822–92). An English Slavonic scholar. He was born at Rugby of a Czechic family which had settled in England. He was educated at Rugby and at Cambridge, and in 1850 was appointed head master of Felsted School. In 1855 he became the head of King Edward VI's school at Bury St. Edmund's, where he remained till 1879, when he was given the living of Manorbier, Pembrokeshire. In 1889 he retired. His more important works are *Lyra Czecho Slovanska* (1849): *Life, Legend, and Canonization of St. John Nepomuk* (1873); *The Native Literature of Bohemia in the Fourteenth Century* (1878); and *Sixty Folk-Tales from Exclusively Slavonic Sources* (1889).

WRAXALL, răks'al, SIR FREDERICK CHARLES LASCELLES (1828–65). An English writer, born in Bristol; a grandson of Sir Nathaniel William Wraxall (q.v.). He lived mostly on the Continent, and served for nine months as assistant commissary in the Crimean War. Among his books are: *Armies of the Great Powers* (1859): *Camp Life* (1860); and *Life and Times of Caroline Matilda, Queen of Denmark and Norway* (1864), a substantial work. He also wrote several novels.

WRAXALL, SIR NATHANIEL WILLIAM (1751–1831). An English historical writer. He was born at Bristol and was educated there. He lived for several years as an author and would-be man of fashion, partly in England and partly on the Continent. In 1780 he entered Parliament, where for 14 years he pursued a somewhat

tortuous and noisy career. After his retirement he devoted himself largely to compiling his historical memoirs and was often involved in quarrels as a result of his publications. Wraxall must be regarded as a fairly accurate raconteur, though his veracity has been often impeached, and his pictures of political life have some historical value. His publications include: *Memoirs of the Kings of France of the Race of Valois* (1777); *Memoirs of the Courts of Berlin, Dresden, Warsaw, and Vienna* (1779); *Historical Memoirs* (1815); and *Posthumous Memoirs* (1836). The last two were republished with additions by H. B. Wheatley in 1884.

WRAY'BURN, EUGENE. A kindly, indolent young barrister in Dickens's *Our Mutual Friend.*

WRECK (AS. *wræc,* exile, misery, from AS. *wrecan,* Icel. *reka,* Goth. *wrikan,* to persecute, Ger. *rachen,* to revenge). A vessel which has been stranded or so badly injured as to be helpless. The number of wrecks which occur annually is very large, amounting to about 4 per cent of all ships in actual use. This has led to the development of a special form of industry called wrecking. The means of raising sunken vessels and removing stranded ones are various. They may be lifted with chains; by submerging hollow caissons, lashing them to the hull and then pumping them out; by closing all openings in the vessel's hull and pumping the water out; by inserting air bags in the hull and inflating them; or by a combination of these methods or of similar ones. Stranded wrecks have been removed in many different ways: by digging a canal to them from deep water; by building launching ways underneath; by cutting them in two (where caught on the rocks) and removing the parts separately and reconnecting them; and of course by hauling them into deep water by means of lines leading to tugs or anchors.

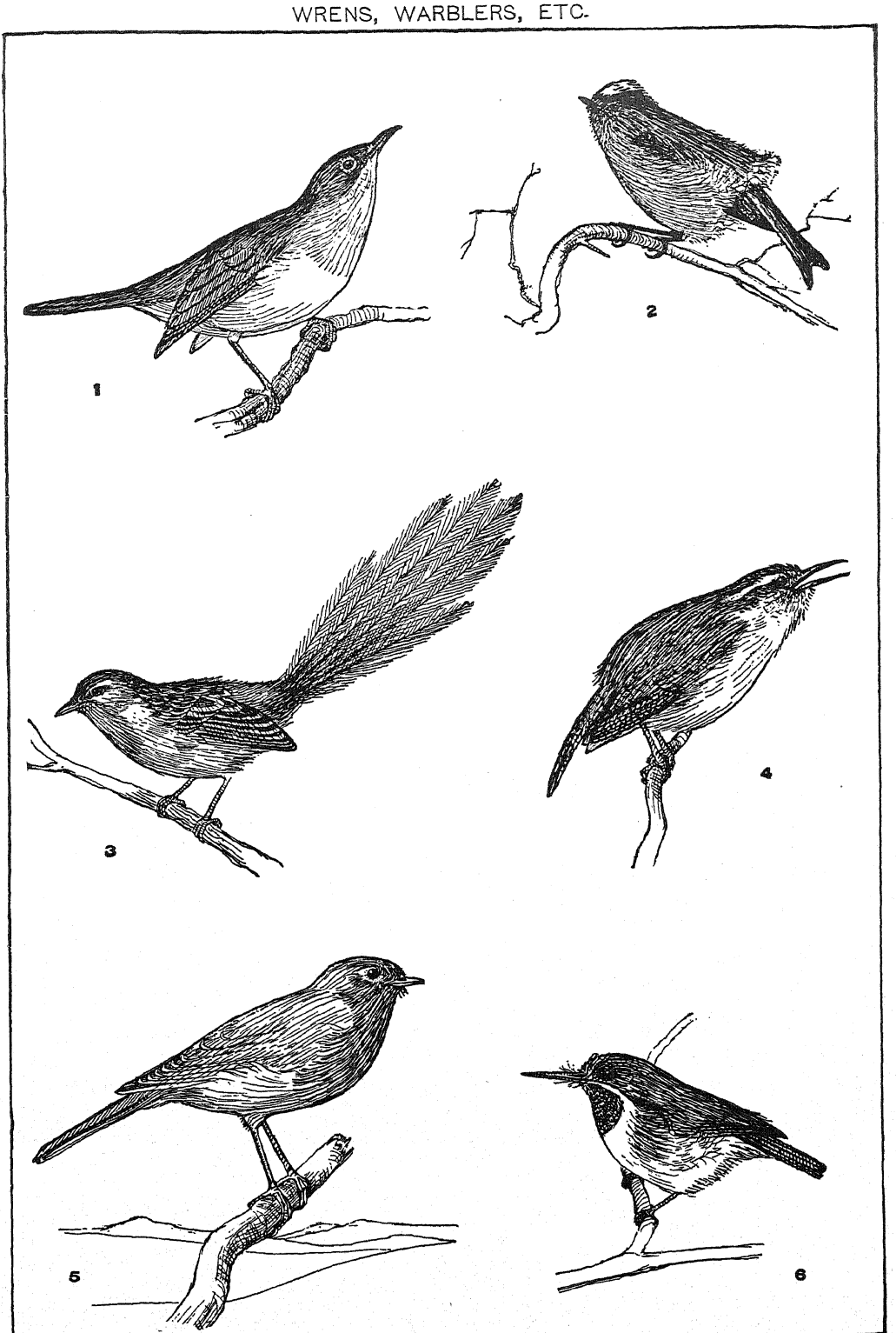
In law, wreck is defined as parts of vessels or their cargoes cast upon the land by the sea. By the common law, fragments of vessels or other property floating upon the sea do not come under this classification; they are known as derelict property, and belong to the jurisdiction of the admiralty courts. By the British statute of 17 and 18 Victoria all jetsam, flotsam, and ligan, which were formerly classed as derelict property, were included under the head of wreck. Under the ancient English law all wreck belonged to the crown, but by the statute above referred to the owner may claim his property upon the payment of the proper salvage. In the United States the disposition of wrecks belongs to the several States. The owner of a wrecked vessel may abandon his property and is not obliged to remove it, even though it obstruct navigable waters, nor is he liable for damage occasioned thereby. Federal statutes provide that stealing from wrecks, obstructing the escape of a crew from a wrecked vessel, extinguishing lights or setting up misleading lights in order to cause wrecks, shall be punished as felony. In the law of marine insurance a vessel becomes a wreck and may be abandoned to the insurers when she becomes so disabled as to be unnavigable. See SAFETY AT SEA; SALVAGE; SHIPWRECK.

WRECKFISH. One of the great deep-water sea bass of the genus *Polyprion,* closely related to the jewfish (*Stereolepis*). It is usually to be seen about floating timber and wrecks. Two species are known—one in the South Pacific, and the other (*Polyprion cernium*), the stone bass of English and cernier of French fishermen. The latter reaches a weight of 86 pounds, and its flesh is excellent. Consult W. Yarrell, *History of British Fishes* (London, 1862).

WREDE, vrā'de, KARL PHILIPP, PRINCE (1767–1838). A Bavarian field marshal, born at Heidelberg. He studied at the university in his native city. In 1799 he led a body of Bavarian volunteers to join the Archduke Charles of Austria in the struggle against the French, and for his conduct in that campaign he was made a major general. After the peace of 1801 he devoted time and labor to the organization of the Bavarian army. He held important commands in the French campaigns against the Austrians, Prussians, and Russians till 1813, when Bavaria joined the allies. He was defeated by Napoleon at Hanau. Soon after he was chosen to command the Fifth Corps of Schwarzenberg's army, and fought in the battles of La Rothière, Bar-sur-Aube, and Arcis-sur-Aube in the campaign of 1814. His services were rewarded by the dignities of field marshal and prince, and by the gift of the domain of Ellingen.

WREN (AS *wrenna, wrænna,* wren; perhaps connected with AS. *wræne,* wanton). A subfamily of birds (Troglodytinæ) of the family Troglodytidæ, the other members of which are the mocking birds and thrashers (qq.v.). The wrens have a slender, slightly curved, and pointed bill, the edge of the mandibles entire; the wings very short and rounded; the tail short and often carried erect; the legs slender and rather long. Their plumage is generally dull. There are about 150 species, natives chiefly of the Northern Hemisphere, and most of them are American They live near the ground, seeking food among low bushes, etc. About 98 per cent of the food of wrens is composed of grasshoppers, beetles, caterpillars, bugs, and spiders. Perhaps the best-known species, and a good example of the group is the European wren (*Troglodytes troglodytes* or *vulgaris*). It is only about 4 inches long, reddish brown above, with narrow transverse streaks of dark brown, yellowish white below, the greater wing coverts with three or four small beadlike spots of white. It frequents gardens, hedges, and thickets, flitting here and there. The male has a loud, sweet song. The nest is large for the size of the bird, oval, domed above, with an opening on the side, and is composed of hay or moss, lined with feathers.

No other true wren is found in Europe, but the United States has a dozen or more species, several of which agree very closely in color and habits with the European type. Such a one is the familiar house wren (*Troglodytes aëdon*), abundant in the eastern parts of the United States. It is less shy than the European wren, and often builds its nest near houses, and in boxes prepared for it. The nests are made to fill the boxes; and to effect this a large mass of heterogeneous materials is sometimes collected. The song of the house wren is simple but sweet. The male is a very bold, pugnacious bird. In the southern half of the United States another very similar species, Bewick's wren (*Thryomanes bewicki*), is prevalent. It has a much longer tail than the house wren but behaves in the same way, and its nest and eggs (see Plate of EGGS OF SONG BIRDS) are of the typical pattern. The winter wren (*Nannus hiemalis*) is similar to the European wren. It is common throughout North America, but is migratory, breeding in Canada and wintering in the Southern States. It is noted for the surprising loud-



1. CEYLON WHITE-EYE (Zosterops ceylonensis).
2. GOLDEN-CROWNED KINGLET (Regulus satrapa).
3. EMU WREN (Stipiturus malacurus).
4. CAROLINA WREN (Thryothorus ludovicianus).
5. ENGLISH ROBIN REDBREAST (Dandalus rubecula).
6. JAMAICAN GREEN TODY (Todus viridis).

ness as well as the musical quality of its spring song.

The other wrens of the United States belong to still different genera. Among the best known is the Carolina wren (*Thryothorus ludovicianus*), a rather southerly species breeding as far north as Connecticut and wintering from Maryland southward. It is a large species, 5½ inches long, with considerable white in the plumage This bird is one of the most varied and cheerful vocalists in America; it sings a sweet and gleeful medley of notes, some of which seem culled from other bird songs, so that this fine species is popularly called the mocking wren. (See Plate of WRENS, WARBLERS, ETC) Other wrens, except marsh wrens (q v), are mainly denizens of the West and Southwest. The cactus wrens of the genus *Heleodytes* (large brownish birds frequenting the arid, cactus-growing plains of the Mexican border), and the cañon wrens of the genus *Catherpes*, inhabiting the rocky defiles of the southern Rocky Mountain region and noted for their brilliant singing, are conspicuous Western species; also the rock wren (q.v.).

Consult: Elliott Coues, *Birds of the Colorado Valley* (Washington, 1878); E H. Forbush, *Useful Birds and their Protection*, published by Massachusetts Board of Agriculture (Boston, 1913); *Bulletin 30, United States Biological Survey;* and references given under BIRD.

WREN, SIR CHRISTOPHER (1632–1723). One of the greatest of English architects, born at Knowle, Wiltshire He was a graduate of Wadham College, Oxford, fellow of All Souls' in 1653, and Savilian professor of astronomy in 1660 He was one of the founders of the Royal Society and its president in 1681. As a scientist and mathematician of wide reputation he was in 1663 appointed one of the commissioners for the repair of old St. Paul's Cathedral (q.v.), London. There were at this time few trained architects in England, and Wren, finding himself gradually drawn, by frequent consultations on building matters, into a profession which he had not originally intended to follow, devoted himself to its study with increasing enthusiasm In 1665 he began the Sheldonian Theatre at Oxford and the Library of Trinity College, Cambridge.

The great fire of London in 1666 gave the real opportunity for the manifestation of his genius; from that time on for forty years there was hardly an important building in or near London planned without his aid. Winchester Palace, an extensive addition to Hampton Court, Chelsea Hospital, Marlborough and Buckingham Houses, the old Royal Exchange, Greenwich Hospital (in part), and a series of fifty-three parish churches in London, are among the works. He employed assistants and deputies to carry out his plans, but impressed the stamp of his individual style on everything that was in his charge. He showed extraordinary ability in producing monumental effects with slender financial resources; and was the originator of the modern Renaissance type of steeple. For his great masterpiece, see ST. PAUL'S CATHEDRAL.

Working in an age when his art had declined in England, he raised the standard of taste by his refinement and propriety of design. His work exerted strong influence on the nascent architecture of the American colonies, especially that of churches, though it is doubtful whether he designed any American buildings. He is buried in St. Paul's, his tablet bearing the well-known epitaph, "Si monumentum requiris circumspice" (If thou seek his monument, look about thee). Consult his biography by Elmes (London, 1852) and by Phillimore (ib., 1883), Clayton, *Churches of Sir Christopher Wren* (ib., 1848), Loftie, *Inigo Jones and Wren* (New York, 1893), and the authorities referred to under ST. PAUL'S CATHEDRAL.

WREN TIT, or GROUND TIT. A small, long-tailed, brown, wrenlike bird (*Chamæa fasciata*) of the coast region of southern California, which keeps close to the ground, searching for its insect food, and uttering a low, trilling, titmouse-like call It nests in low bushes and lays light-blue, unspotted eggs It is set apart in a family (Chamæidæ) by itself, and is regarded as intermediate between the gnatcatchers and the titmice.

WRESTLING (from *wrestle*, AS *wræstlian*, *wraxlian*, to wrestle, frequentative of *wræstan*, Icel *reista*, to twist, probably from AS. *wrīpan*, Icel. *rīþa*, OHG *rīdan*, to turn, twist, wrest). A sport in which one person tries to throw another to the ground. The rule with the Greek wrestlers was to secure three throws before the victory was decided. The wrestlers were accustomed to rub their bodies with oil in the belief that they secured a greater pliancy of limb, and doubtless also to check excessive perspiration. In order to obviate the difficulty of grasping each other with firmness owing to the coating of oil, the wrestlers were required either to roll in the dust of the stadium or to be sprinkled with the fine sand kept for that purpose at Olympia. Should one in a match fall and drag his adversary with him, the combat was continued on the ground. The Greek method of wrestling subsequently passed to the Romans, and by them was introduced throughout Europe. Græco-Roman wrestling of to-day must not be confused with the ancient Greek method of wrestling, for it is neither a variation of the ancient Greek or Roman, nor even a compound of the two. The Græco-Roman style was adopted in France about the middle of the nineteenth century and is now the only recognized mode in that country It was introduced into England in 1869 and 1870. In America it has become popular. The style proper does not begin until both men are on the ground

"Tripping," the essence of the English game, is barred in the Græco-Roman. Of the distinctive English style of wrestling, the following points are important. In the Cornwall and Devon style the wrestler is required fairly to throw his opponent flat on his back before a decision can be won. In order to secure the throw, two shoulders and one hip must be on the ground, or two hips and one shoulder This is called three points down. The various artifices used in this style of wrestling are called trips or chips. They include the flying mare, the inside lock forward, the inside lock backward, the double lock, the forehand play, the after play, inside and outside clamp, the pull under, and the cross heave. In the Lancashire style, or catch-as-catch-can, unlimited action is permitted. It is the roughest of English methods but one which most appeals to the athlete. Throttling is forbidden by the rules, but it is almost invariably resorted to. Tripping and catching hold of the legs are permitted, and in the floor work the style comes nearer the French or Græco-Roman than any other method. The most important trips are the double Nelson, the half and three-quarter Nelson, the lock, ham and

leg, the flying mare, heave and leg holding. The cleanest style, with the most simple rules, is the Cumberland and Westmoreland style, in which the wrestlers on taking hold stand up chest to chest, each combatant placing his chin on his opponent's right shoulder, at the same time grasping him around the body, one man placing his left arm above the right of his antagonist. When both men have secured their hold and are reckoned as fairly on their guard, the struggle begins. If one of them breaks hold (loses his grip), if yet on the ground and his opponent retains his hold, the one who has lost his grip is declared loser. Similarly if either man touches the ground with one knee or any other part of the body, though he may still retain his hold, he is not permitted to recover himself and is declared loser. The Irish, or collar-and-elbow, style is interesting and peculiar. The contestants seize each other by the neck with one hand and by the elbow with the other, and when one of them touches the ground with his hand, knee, back, or side the fall is won. In Burma and throughout the East Indies wrestling has reached a high degree of development. The wrestlers are nude, and skill rather than strength is made to count.

Japanese Wrestling (JUJUTSU or JIUJITSU). A method of self-defense without weapons; the modern form of the old samurai weaponless combat. It first became popular in Japan in the sixteenth century, its origin being traced to Akiyama, a learned physician, who at that period lived at Nagasaki. He is said to have brought it back from China. Before he died, Akiyama had elaborated the Chinese system to the extent of discovering 303 methods of seizing and throwing an opponent, or otherwise disabling him. Jujutsu, owing to its semisecret character, is usually taught in night sessions, and although most pupils gain considerable skill in the system, only a few acquire complete mastery. It is difficult to penetrate the secrets of the higher playing, owing to the close guard of its professors. The rank and file of the police departments of Tokyo, Kobé, and Yokohama are compelled to attain a certain degree of efficiency, although no pupil receives a lesson before taking oath not to reveal the methods. When it is realized that the master of this science can by a slight, swift movement benumb a victim's brain, dislocate his hip or shoulder, burst or twist a tendon, or break an ankle, there is reason for the Japanese system of confining the proficiency in the higher degrees of the art only to men of perfect self-command and good moral character. The Japanese wrestler does not meet his opponent by a sustained counter effort as does a boxer, but instead makes a shirking of physical contact and the avoidance of effort an important part of his play. An aggressive combatant has to be careful that his agressiveness and impetuosity are not deftly deflected so that by the exercise of some little trick he himself is made to dislocate his shoulder or break a limb without expenditure of the slightest effort by his opponent. At the beginning of the twentieth century there were many important kinds of jujutsu throughout Japan, which, although they differed slightly from one another in methods and practice, were practically a unit in teaching the idea of Akiyama. There were 40 different schools in Tokyo alone. Consult: H. I. Hancock, *Jiu-jitsu Combat Tricks* (New York, 1904); W. E. Cann, *Manual of Wrestling* (Battle Creek, Mich., 1912).

WREXHAM, rĕks'am. A municipal borough in Denbighshire, North Wales (Map: Wales, C 3). It stands 12 miles southwest of Chester, on an affluent of the Dee. The town is well built, and St. Giles Church, a handsome edifice in Perpendicular, dating from 1470, with a tower 135 feet in height, is styled "one of the seven wonders of Wales." The churchyard contains the tomb and quaint epitaph of Elihu Yale (1648–1721), founder of Yale College. It is also the seat of the Roman Catholic Bishop of Menevia, whose diocese includes most of Wales. In the vicinity are collieries and lead mines, and the town has ironworks, paper mills, breweries, and important markets and fairs. Pop., 1901, 14,966; 1911, 18,377.

WRIGHT, ADAM HENRY (1846–). A Canadian physician. He was born at Brampton, Ontario, graduated at Toronto University in arts in 1866, in medicine in 1873, and later studied abroad. He was connected with the Toronto School of Medicine (1879–87), the Toronto General Hospital, the Women's Medical College, and, as professor of obstetrics, with Toronto University (from 1887). In 1900 he was elected president of the Ontario Medical Association and in 1909 president of the Canada Medical Association. He published *Lectures on Obstetrics* (1905).

WRIGHT, SIR ALMROTH (EDWARD) (1861–). A British physician. He was educated at Dublin University, and at Leipzig, Strassburg, and Marburg, was a demonstrator of pathology at Cambridge in 1887 and of physiology at Sydney University (Australia) in 1889, and held the chair of pathology in the Army Medical School at Netley from 1892 to 1902. He was also a member of the Indian Plague Commission from 1898 to 1900. In 1906 he was knighted. During the European War he served in 1914–15 as consultant physician in France, where he did a great work in reducing the dangers of wound infection. In 1900 Wright, with others, developed the opsonin (q.v.) theory, a method of measuring the protective substances in human blood. This discovery led to therapeutic inoculation with dead cultures for bacterial infections (see VACCINE THERAPY), and especially to antityphoid inoculation (see TYPHOID FEVER), in which he did pioneer work. His publications include: *Treatise on Anti-Typhoid Inoculation* (1904); *Principles of Microscopy* (1906); *Studies in Immunisation* (1909); *Technique of the Teat and Capillary Glass Tube* (1912); *The Unexpurgated Case against Woman Suffrage* (1913); *Wound Infections* (1915).

WRIGHT, ARTHUR WILLIAMS (1836–1915). An American physicist, born at Lebanon, Conn. He graduated at Yale in 1859, and was an instructor in the Sheffield Scientific School in 1867–68. He studied in Heidelberg and Berlin in 1868–69; was professor of physics and chemistry in Williams College in 1869–72; and at Yale served as professor of molecular physics and chemistry in 1871–87, and thenceforth until his retirement in 1906 as professor of experimental physics. He contributed numerous scientific papers, chiefly on astronomical and electrical subjects, to various publications, and became a fellow of the Royal Astronomical Society of Great Britain and a member of the National Academy of Sciences. He did much to make the X-ray of practical use.

WRIGHT, CARROLL DAVIDSON (1840–1909). An American economist and statistician, born in

Dunbarton, N. H He began to study law in 1860, but his course was interrupted by the Civil War, in which he served first as a private and finally as a colonel in the Union army. He was admitted to the bar in 1865; served two years (1871–72) in the Massachusetts Senate; and from 1873 to 1885 did distinguished service as chief of the Massachusetts Bureau of Labor Statistics. In this position he superintended the State censuses of 1875 and 1885 and was in charge of the Tenth United States Census in his State In 1885 he became the first chief of the United States Bureau of Labor and was continued in this position irrespective of the party in power until 1902 He then resigned to become president of Clark College, Worcester, Mass. He had charge of the completion of the census of 1890; made various investigations for Congress; was a member of the Anthracite Coal Commission in 1902; and served on many other boards of conciliation. Wright served as president of the American Statistical Association, the American Social Science Association, the American Unitarian Association, and the American Association for the Advancement of Science. From 1895 to 1903 he had an honorary chair of political science in the Catholic University in Washington. He lectured at Harvard, Johns Hopkins, Michigan, and Northwestern universities at various times; was an original trustee of the Carnegie Institution and in charge of its section on the economic history of the United States; was corresponding member of learned societies in England, Russia, France, and Germany, and was decorated with the Cross of the Legion of Honor of France. His writings include: *The Industrial Evolution of the United States* (1895); *Outlines of Practical Sociology* (1899); *Some Ethical Phases of the Labor Question* (1902); *Battles of Labor* (1906); *The Apprenticeship System in its Relation to Industrial Education* (1908). Consult H. G. Wadlin, *Carroll Davidson Wright, a Memorial* (Boston, 1911).

WRIGHT, Charles Henry Hamilton (1836–1909). An Anglican clergyman and scholar, born in Dublin, Ireland, and educated at Trinity College, Dublin. Besides holding various charges, he was Bampton lecturer (1878), Donnellan lecturer (1880), and Grinfield lecturer on the Septuagint at Oxford (1893–97); examiner in Hebrew at the University of London (1897–99), at Victoria University, Manchester (1897–99), and at the University of Wales (1897–1901), and from 1898 to 1907 clerical superintendent of the Protestant Reform Society. His publications include: *Grammar of Modern Irish* (1855; 2d ed., 1860); *Book of Genesis in Hebrew* (1859); *Bunyan's Works with Notes* (1866); *Biblical Essays* (1885); *An Introduction to the Old Testament* (1890; 4th ed., 1898); *Roman Catholicism* (1896; 4th ed., 1909); *Genuine Writings of St. Patrick, with Life* (1902); *Daniel and his Prophecies* (1906).

WRIGHT, Chauncey (1830–75). An American physicist and philosophical writer, born in Northampton, Mass. He graduated at Harvard in 1852, and became a computer for the *American Ephemeris and Nautical Almanac*, then just established. By frequent contributions to scientific periodicals he won a reputation as a physicist and mathematician. He was corresponding editor of the American Academy of Arts and Sciences from 1863 to 1870, delivered a course of university lectures at Harvard on the principles of psychology, and was an instructor at Harvard in mathematical physics in 1874–75 He published at intervals between 1864 and 1875 a notable series of articles in the *North American Review*, on topics suggested by the works of John Stuart Mill, Charles Darwin, Herbert Spencer, and Alexander Bain. He was also a frequent contributor to the *Nation*, and in 1871 published two papers on the "Genesis of Species" in reply to St. George Mivart's attack on the theory of natural selection, which were republished in England at Darwin's instance. A collection of his writings with a biographical sketch by Charles Eliot Norton was published under the title *Philosophical Discussions* (1877). Consult a chapter in John Fiske, *Darwinism and Other Essays* (Boston, 1885).

WRIGHT, Elizur (1804–85). An American journalist and Abolitionist, born in South Canaan, Conn. He graduated at Yale in 1826, and was professor of mathematics and natural philosophy at Western Reserve College, 1829–33. Then he settled in New York, where he was for five years secretary of the Antislavery Society, editing within that time two antislavery periodicals, *Human Rights* and the *Quarterly Anti-Slavery Magazine*. In 1839 he went to Boston and edited the *Massachusetts Abolitionist*, the *Chronotype*, and its successor, in 1850, the *Commonwealth*. He was State insurance commissioner of Massachusetts in 1858–66, and he wrote frequently on insurance and political topics.

WRIGHT, Fanny (Madame Frances D'Arnsmont) (1795–1852). A Scottish-American philanthropist and reformer, born at Dundee, Scotland. In 1818 she visited the United States, and after her return to Great Britain in 1820 she wrote a volume of *Views of Society and Manners in America*, which was published in London the following year and in Paris in 1822. Five years later she again visited the United States, and, becoming interested in the slavery question, she purchased land and founded a colony of free negroes at Neshoba, now Memphis, Tenn. The colony proved a failure, however, and the colonists were finally settled in Haiti. During 1833–36 she attracted considerable attention as a fearless and radical lecturer on social problems. She then, for a time, edited the *Gazette*, and later the *Free Enquirer* at the Owen community of New Harmony, Ind. During a visit to France in 1838 she married a M. D'Arnsmont, but soon afterward separated from him, and, returning to the United States, made her home in Cincinnati. Her published works include: *Altdorf*, a tragedy (1817); *A Few Days in Athens*, a defense of the philosophy of Epicurus (1822); and *A Course of Popular Lectures on Free Inquiry, Religion, Morals, Opinions, etc.* (1829; 6th ed., 1836). Consult Amos Gilbert, *Memoir of Fanny Wright, the Pioneer Woman in the Cause of Women's Rights* (Cincinnati, 1855).

WRIGHT, George Frederick (1838–1921). An American theologian and geologist, born at Whitehall, N. Y., and educated at Oberlin College and Theological Seminary. After holding Congregational pastorates, he was professor of New Testament language and literature at Oberlin Seminary from 1881 to 1892, and then professor of the harmony of science and religion until 1907, when he became president of the Ohio Historical and Archæological Society. He served on the United States Geological Survey in 1884–92. His publications include: *Studies in Science and Religion* (1882); *Glacial Bound-*

ary in Ohio, Kentucky, and Indiana (1889, 5th ed, enl and rev, 1911), *The Ice Age in North America* (1889, 5th ed, 1911), *Man and the Glacial Period* (1892, 2d ed, 1896), *Greenland Icefields and Life in the North Atlantic* (1896), *Scientific Aspects of Christian Evidences* (1898), *Asiatic Russia* (2 vols, 1902), *Scientific Confirmations of Old Testament History* (1906), *Origin and Antiquity of Man* (1912), *See Ohio First* (1915)

WRIGHT, HAROLD BELL (1872–) An American novelist He was born at Rome, N Y He was employed as a painter and decorator in 1887–92, and as a landscape painter in 1892–97 Entering the ministry of the Christian (Disciples) Church, he held various Western pastorates between 1897 and 1908 His books, some of which were very popular and circulated widely, include *That Printer of Udell's* (1903), *The Shepherd of the Hills* (1907), *The Calling of Dan Matthews* (1909), *The Uncrowned King* (1910), *The Winning of Barbara Worth* (1911), *Their Yesterdays* (1912), *The Eyes of the World* (1914), *Hidden Things* (1915)

WRIGHT, HORATIO GOUVERNEUR (1820–99) An American soldier, born at Clinton, Conn He graduated at West Point in 1841, entered the corps of engineers, for about six years was engaged in important engineering work for the government, and in 1855 was promoted to be captain In April, 1861, he went as chief engineer on the expedition sent to destroy the Norfolk Navy Yard He was chief engineer of General Heintzelman's division at the first battle of Bull Run and he held the same position in the Port Royal expedition, during which he also commanded a brigade He became brigadier general of volunteers in September, 1861, and in 1862 commanded the land forces which captured Fernandina, Jacksonville, and St Augustine In 1864 he was promoted to be major general of volunteers, and brevetted colonel in the regular army for gallantry at Spottsylvania, where he had been wounded When General Early threatened Washington in July, 1864, Grant sent Wright with the Sixth Corps to defend the national capital After driving the Confederates as far south as Winchester, Wright took part in the Shenandoah campaign, was again wounded at Cedar Creek, and later rejoined Grant before Petersburg, where he led his troops in the assault on April 2, which broke the Confederate line and ended the siege For this he was brevetted major general in the regular army He was commissioned lieutenant colonel of engineers on Nov 23, 1865 After the close of the Civil War he was a member of various important commissions, and in June, 1879, was promoted to the rank of brigader general and was made chief of engineers He retired in 1884

WRIGHT, SIR JAMES (1716–85) A British Colonial Governor, born in Bloomsbury, London. He entered Gray's Inn, London, in 1741, was called to the bar, and practiced in Charleston, S C He became agent of that Colony, and on May 13, 1760, was appointed Lieutenant Governor of Georgia, and in 1762 Governor The attempt of South Carolina to extend her jurisdiction over parts of Georgia was defeated and the territory of the latter Colony was enlarged through treaties with the Indians Wright was able to cause a limited use of the stamps provided under the Stamp Act, for which use Georgia was much blamed by the other Colonies In 1771–73 he visited England and was created a baronet for his services On his return he was unable to prevent the appointment of a committee of correspondence, but did cause Georgia to be unrepresented in the First Continental Congress in 1774 The Liberty Boys seized the magazine in Savannah in 1775 and took charge of the port On June 18, 1776, Wright was arrested, but escaped to a man-of-war in the harbor and remained until after an unsuccessful attempt to take the city, when he returned to England On the recapture of Savannah by the British, Dec 29, 1778, he returned and attempted to institute severe measures against the Revolutionary party Wright abandoned the province July 11, 1782, and was active in endeavoring to secure compensation for the American Loyalists In return for his efforts and his own losses he received a pension of £500 Consult Georgia Historical Society *Collections* (1873)

WRIGHT, JOHN HENRY (1852–1908) An American classical scholar, born at Urumiah, Persia He graduated in 1873 at Dartmouth College, to which, after two years (1876–78) at Leipzig, he returned to be associate professor of Greek In 1886 he was appointed professor of classical philology and dean of the Collegiate Board in Johns Hopkins, and a year later was called to be professor of Greek at Harvard, where in 1895 he was made dean of the Graduate School In 1894 he was president of the American Philological Association He edited Colligon's *Manual of Greek Archæology* (Eng trans, 1886) and *A History of All Nations* (24 vols, 1902) He was associate editor (1888–1906) of the *Classical Review*, editor in chief (1897–1906) of the *American Journal of Archæology*, and associate editor (1907–08) of the *Classical Quarterly*

WRIGHT, JOSEPH (1756–93) An American portrait painter He was born at Bordentown, N J, the son of Patience Wright, a noted modeler of miniature heads in wax In 1772 he went to London, where he studied designing, but devoted himself particularly to portrait painting In 1782 he went to Paris, where he had the patronage of Benjamin Franklin, and the following year he returned to the United States He painted a three-quarter length portrait of General Washington (1783), then a portrait of General Washington and his wife, and he also executed a miniature profile of Washington from life Other portraits include those of John Jay (1786, Historical Society, New York) and James Madison In 1792 President Washington appointed him draftsman and die sinker of the newly established mint at Philadelphia, and he designed the earliest coins and medals issued by the government

WRIGHT, JOSEPH (1855–) An English philologist In 1891 he was appointed deputy professor, and in 1901 professor, of comparative philology at Oxford In 1899 he was granted a civil-list pension of £200 a year to help him in completing his valuable *English Dialect Dictionary* (6 vols, 1896–1905) His works include primers of *Old High German* (1888, 2d ed, 1906), *Middle High German* (1888, 2d ed, 1899), and *Gothic* (1892, 2d ed, 1899), *Grammar of the Dialect of Windhill* (1892); *English Dialect Grammar* (1905), *Historical German Grammar*, vol. 1 (1907), *Old English Grammar* (1908, 2d ed, 1914), *Grammar of the Gothic Language* (1910), *Comparative Grammar of the Greek Language* (1912). He was responsible (1888) for vol. 1 of an Eng-

lish translation of Brugmann's *Grundriss der vergleichenden Grammatik der indogermanischen Sprachen.*

WRIGHT, LUKE E. (1846–1922). An American lawyer, administrator, and cabinet officer. He was born at Memphis, Tenn., where he was admitted to the bar He took an active part in the relief work during the yellow fever epidemic of 1878. From 1880 to 1888 he was Attorney-General of the State. In 1896 he supported Palmer and Buckner, the Gold Democratic candidates for the presidency and vice presidency. A member of the Philippine Commission in 1900–04, he was president of the Commission in 1903–04, and served as Governor of the Philippines in 1904–06. In 1906–07 Wright was Ambassador to Japan, and in 1908–09, Secretary of War in President Roosevelt's cabinet.

WRIGHT, MABEL OSGOOD (1851–). An American author, born in New York City. In 1884 she was married to James Osborne Wright, an Englishman She became president of the Audubon Society of the State of Connecticut on its organization in 1898. Beginning as a writer about children, nature, and outdoor life, she received a cordial reception from the public, but concealed her identity as the author of later books, novels, until they had won recognition independently. Much of the material to which she gave attractive literary expression she found in the large garden at her home in Fairfield, Conn. Her writings include: *The Friendship of Nature* (1894), *Birdcraft* (1895); *Four-footed Americans* (1899), *Flowers and Ferns in their Haunts* (1901); *The Garden of a Commuter's Wife* (1901), under the pseudonym of Barbara; *Dogtown* (1902), *The People of the Whirlpool* (1902); *The Garden, You, and I* (1906); *The Open Window* (1908); *Poppea of the Post Office* (1909); *The Love that Lives* (1911); *The Stranger at the Gate* (1913).

WRIGHT, MARCUS JOSEPH (1831–). An American soldier and author, born at Purdy, Tenn. He was admitted to the bar, and practiced at Memphis During the Civil War he was military governor of Columbus, Ky, from February, 1862, until its evacuation, and with his regiment was present at Belmont and Shiloh. After serving on the staff of Gen. B. F. Cheatham, he became brigadier general, Dec. 13, 1862, and fought at Chickamauga and Missionary Ridge In 1863–64 he was in charge of the district of Atlanta. After the evacuation of the city he commanded at Macon, and then in northern Mississippi and western Tennessee. After 1878 he was agent of the United States War Department for collection of military records. He published *Life of Gov William Blount* (1884); *Life of General Scott* (1894); *Analytical Reference* (1904); *Tennessee in the War* (1908); *General Officers of the Confederate Army* (1911); *The Social Evolution of Woman* (1912).

WRIGHT, ORVILLE (1871–). An American aviator and designer of aëroplanes. He was born at Dayton, Ohio. With his brother, Wilbur Wright (q.v.), he devoted his attention after 1903 to the perfecting of a biplane of their own make. Orville Wright made numerous flights in the United States and abroad, and in 1909 was awarded a gold medal by the French Academy of Sciences. He received an honorary B.S. from Earlham College, Ind., LL.D. from Oberlin, and Sc.D. from Trinity. In 1915 he sold out his interest in the Wright Aëroplane Company at Dayton, but remained with the company as consulting engineer In the same year he was appointed to the United States Naval Consulting Board See AERONAUTICS, *Aviation*

WRIGHT, ROBERT RAMSAY (1852–). A Canadian biologist and educator He was born at Alloa, Scotland, graduated at Edinburgh University in 1873, went to Canada in 1874, and the same year was appointed professor of natural history in University College, Toronto. In 1887–1912 he was professor of biology in the University of Toronto, where he was also vice president of the university and dean of the faculty of arts from 1901. In 1901, also, he was appointed assistant director of the biological station of Canada Wright was president of the Canadian Institute, the American Association of Anatomists, and the Royal Society of Canada. He contributed many papers to scientific periodicals.

WRIGHT, SILAS (1795–1847). An American political leader, born at Amherst, Mass., May 24, 1795. He graduated at Middlebury College, Vt, in 1815, was admitted to the bar in 1819, and began the practice of his profession at Canton, N. Y. From 1823 to 1827 he was a member of the State Senate, acting with the Bucktail faction in opposition to the policy of De Witt Clinton. He rendered conspicuous service in the State militia, of which he became brigadier general in 1827. In 1827–29 he was a Democratic member of Congress, but voted for the tariff Act of 1828. He was then Comptroller of the State of New York until 1833, when he was chosen to succeed William L. Marcy in the United States Senate. As a senator he supported the administration of President Jackson, advocated the establishment of the subtreasury system, and voted for the annexation of Texas. On the slavery question he maintained the right of petition and the sovereignty of Congress in the Territories, although he favored the exclusion from the mails of Abolition literature calculated to excite the prejudices of the Southern States. In 1844 he was elected Governor of New York chiefly on account of the factional fight between the Hunkers and Barnburners, led by Marcy and Van Buren respectively, but was defeated for reelection. He opposed the calling of the constitutional convention of 1846, vetoed a bill for canal improvements, and took strong measures against the antirent disturbances. Upon the expiration of his term in 1847 he retired to his farm. He died at Canton, N. Y., Aug. 27, 1847 Consult the *Lives* by Gillet (Albany, 1874) Hammond (Syracuse, 1848), and Jenkins (Auburn, 1847).

WRIGHT, THOMAS (1809–84). A British paleontologist, born at Paisley, Renfrewshire Scotland, and educated at the Royal College of Surgeons, Dublin, and at St. Andrews He practiced as a physician, but it was as a geologist that he became chiefly distinguished. His collection of Jurassic Echinodermata and Cephalopoda was unsurpassed. In 1878 he won the Wollaston medal. He wrote: *British Fossil Echinodermata of the Oölitic Formations* (1860–61); *The Cretaceous Echinodermata* (1864) and *Lias Ammonites* (1878–84)

WRIGHT, THOMAS (1810–77). An English antiquary, born at Tenbury in Shropshire and educated at Trinity College, Cambridge. In 1836 he went to London and in 1837 he was elected a fellow of the Society of Antiquaries He was one of the founders of the Camden So

ciety (1838), of the Percy Society (1841), of the Shakespeare Society (1841), and of the British Archæological Association (1843). Wright published nearly a hundred works, including translations and books edited for various learned societies. He was careless and inaccurate to an astonishing degree, and yet he deserves much credit for opening the way to better equipped scholars. The range of his researches is indicated by the following partial list of his works: *Early English Poetry*, an anthology in black letter (4 vols., 1836); *The Latin Poems Commonly Attributed to Walter Mapes* (1841); *Specimens of Old Christmas Carols* (1841); an edition of the *Canterbury Tales* (1847–51); *Popular Treatises on Science, Written During the Middle Ages* (1841); *The Chester Plays* (1843–47); *Reliquiæ Antiquæ. Scraps from Ancient Manuscripts, Illustrating Early English Literature and the English Language* (1839–43); *Queen Elizabeth and her Times* (1838); *St. Patrick's Purgatory* (1844); *Wanderings of an Antiquary, Chiefly upon the Traces of the Romans in Britain* (1854); *Essays on Archæological Subjects* (1861); *A History of Domestic Manners and Sentiments in England During the Middle Ages* (1862); *Political Poems and Songs Relating to English History* (1859–61); and *Feudal Manuals of English History* (1872).

WRIGHT, THOMAS (1859–). An English author. He was born at Olney, in Buckinghamshire, and was educated at Buxton College, Forest Gate. At Olney he became principal of the Cowper School. His writings comprise: *The Town of Cowper* (1886); the standard *Life of William Cowper* (1892); lives of Defoe (1894), Edward Fitzgerald (1904), Sir Richard Burton (1905), Walter Pater (1907), Col. Fred Burnaby (1908), William Huntington (1909), Isaac Watts (1914), and others. In several of his biographies he did valuable work, notably in the case of his *Cowper* and *Burton;* but he often fails in taste, sympathy, and insight, as his *Pater* only too clearly proves. His *Correspondence of William Cowper* (4 vols., 1902) should also be mentioned. Wright wrote, too, some verse and some fiction.

WRIGHT, WILBUR (1867–1912). An American pioneer in aviation. He was born near Millville, Ind. With his brother, Orville Wright (q.v.), he became interested in aëronautical experiments with kites and gliding machines at Dayton, Ohio. In 1903 they began fruitful experiments at Kittyhawk, N. C. The Wright brothers built a number of biplanes in 1906 and in 1908 went to France, where Wilbur Wright won the Michelin prize on September 21 of that year. During the Hudson-Fulton celebration in New York City in 1909 he flew from Governor's Island up the Hudson River as far as Grant's Tomb and returned. The French patent rights of the Wright machine were disposed of for $100,000, and the machine was adopted by the United States army. Further experiments were made at Kittyhawk by the brothers with a motorless glider in 1911. Wilbur Wright received a gold medal from the French Academy of Sciences in 1909. See AËRONAUTICS, *Aviation.*

WRIGHT, WILLIAM (1830–89). An English Orientalist, born at Mallai on the Nepal frontier, India. He studied at St. Andrews, Edinburgh, at Halle, and at Leyden, gaining a wide knowledge of Syriac and Arabic under such teachers as Rödiger and Dozy, and adding an acquaintance with Sanskrit. He was professor at University College, London (1855–56), and at Trinity College, Dublin (1856–61). From 1861 to 1870 he was engaged in cataloguing the Syriac manuscripts in the British Museum (published 1871). In 1870 he became professor of Arabic at Cambridge. He assisted in preparing the Syriac lexicon of Payne Smith and the Arabic lexicon of Dozy, and published: in Arabic, the *Travels of Ibn Jubair* (1852); *Opuscula Arabica* (1859); *Kamil of Al Mubarrad* (1864–82); and an Arabic grammar, based on *Caspari*, but in the later editions practically an independent work (1859–62; 3d ed., by de Goeje, 1896–98); in Syriac the *Homilies of Aphraates* (1869); *Apocryphal Acts of the Apostles* (1871); *Chronicle of Joshua the Stylite* (1882); and *Book of Kalilah and Dimnah* (1883). His *Lectures on the Comparative Grammar of the Semitic Languages* was published posthumously (1890), edited by his successor at Cambridge, Robertson Smith.

WRIGHT, WILLIAM ALDIS (1836–1914). An English scholar. He was educated at Trinity College, Cambridge, of which college he was vice master from 1888 to 1912. With William George Clark (q.v.) he collaborated on the Cambridge Shakespeare (9 vols., 1863–66; 2d ed., 1891–93), the Globe Shakespeare (1864), and the Clarendon Press series of single Shakespearean plays (1868–97). With J. Eastwood he edited *The Bible Word Book* (1866; rev. ed., 1884). He also contributed largely to Smith's *Dictionary of the Bible* (1860–66). Among the works edited independently are Bacon's *Advancement of Learning* (1869); the *Chronicle of Robert of Gloucester* (1887); *Letters and Literary Remains of Edward FitzGerald* (1889); *Letters of FitzGerald to Fanny Kemble* (1895); *Facsimile of the Milton MS. in the Library of Trinity College, Cambridge* (1899); *FitzGerald's Miscellanies* (1900); *More Letters of FitzGerald* (1901); *Works of FitzGerald* (7 vols., 1903); *English Works of Roger Ascham* (1904); *The Hexaplar Psalter* (1911).

WRIGHTIA, rīt'ī-à (Neo-Lat., named in honor of William Wright, a Jamaica physician and botanist of the eighteenth century). A genus of plants of the family Apocynaceæ, containing some of the greatest twining shrubs of the East Indies. Attaching themselves to trees for support, they finally attain a treelike thickness and height, and kill the supporting trees by their choking embrace. The timber of some species, as *Wrightia tomentosa* and *Wrightia coccinea*, is valuable. The latter species is a large tree, the other treelike species being comparatively small. *Wrightia zeylanica*, a native of Ceylon, yields Conessi bark, which was formerly a popular medicine. *Wrightia tinctoria*, common in many parts of India, yields an inferior indigo.

WRIOTHESLEY, rī'ŭths-lĭ *or* rŏts'lĭ, HENRY. See SOUTHAMPTON, EARL OF.

WRIST DROP. See LEAD; NEURITIS; OCCUPATIONAL DISEASES.

WRIT (from AS. *wrītan*, to write, OHG. *rīzan*, Ger. *reissen*, to tear). A mandatory precept issued by a court in the name of the State for the purpose of compelling a designated person to do some act specified therein. Under the common-law system of practice all actions were begun by original writs or by bill. The dates of the origin of the older writs are not certain, but they provide only for the redress of certain

flagrant wrongs which recurred most frequently These writs were issued by the chancellor or by the clerks of the Court of Chancery in the name of the King There was a long period during which no new writs were devised and justice was often denied because the circumstances of a case were not similar to those alleged in any existing writ This hardship led to the enactment of the Statute Westminster II (13 Edw. I, ch 24), by which it was provided that where there was an injury or wrong which was similar (*in consimili casu*) to a recognized wrong, for which there was a remedy under an existing writ, the Court of Chancery should frame a writ to cover the new facts. The statute was not at first liberally construed, but it resulted in several additions to the original writs and was ultimately responsible for the legal development of practically all the modern law of torts and contracts The forms of the original writs were preserved in a court record known as *The Register of Writs.*

An original writ contained a short statement of the facts complained of, and directed the sheriff to command the defendant to satisfy the claim, and if he failed to do so, to summon him to appear in court and answer the complaint. As each writ could be used to begin an action upon any state of facts practically similar to those alleged in it, the complaint in a writ was usually a fiction, and the plaintiff was permitted to prove the actual facts upon which he based his claim. This use of fictions became the distinctive feature of common-law pleading and continues where that system prevails. Among the more important writs for the beginning of real and mixed actions are: The writ of right, for the recovery of real property; formedon, for the recovery of lands; dower for the enforcement of a widow's right of dower; quare impedit, to ascertain the right of presentation to a benefice or to try title to an advowson; writ of entry, to try title to land. The most important writs for the beginning of personal actions are: debt, for recovery of a sum of money due; covenant, to recover for breach of a promise under seal; detinue, for the specific recovery of goods unlawfully detained; trespass on the case, for any wrong which could not be redressed by the remedies of covenant or trespass, and out of this writ sprang the actions of trover and assumpsit. If the defendant did not appear in response to an original writ he was arrested under a judicial writ known as a capias ad respondendum. Other writs were the writ of subpœna, of error, and of certiorari for the review of judicial decisions.

Habeas Corpus. This most important writ, sometimes known as the bulwark of English liberty, is treated at length under its own title, which see.

A writ may be issued and served on Sunday in most States, but usually cannot be made returnable on that day. Statutes relating to this remedy usually prescribe a penalty against a judge who refuses to grant the writ in the proper cases.

Other modern writs are those of prohibition, mandamus, etc.

Consult: Pollock and Maitland, *History of the English Law* (2d ed., Cambridge, Boston, 1899), Hurd, *On the Right of Personal Liberty* and on *The Writ of Habeas Corpus* (2d ed., Albany, 1876); Hallam, *Constitutional History* (New York, 1872); Blackstone, *Commentaries on the Laws of England;* and the writings of Story, Rawle, and Pomeroy on the United States Constitution, also see FORMS OF ACTION.

WRITER. A term vaguely applied in Scotland to a law practitioner or his clerk; in provincial towns more definitely to a law agent practicing before the sheriff, and acting as factor in the management of private affairs

WRITERS' CRAMP. See NEUROSIS, OCCUPATIONAL DISEASES

WRITERS TO THE SIGNET. An incorporated Scottish law society of great antiquity. The signet is the royal seal employed for authenticating writs or warrants connected with the administration of justice, and it is probable that the phrase "writers to the signet" was originally employed to describe the clerks in the office of the Secretary of State upon whom the duty devolved of issuing such writs. However this may be, we find this important duty, from an early period of Scottish history, exercised and monopolized by an exclusive society of legal practitioners, who, though performing a public function, were not subject to public appointment, but regulated admissions to their own ranks by rules of their own framing Besides possessing this exclusive right to issue such writs as required authentication by the signet, which gave them a certain monopoly of litigation, writers to the signet thus came, in the course of time, to assume very much the place and to perform the functions of the Inns of Court in England, that, viz, of regulating admissions to the bar. While, however, they still retain a certain preëminence at the Scottish bar, not unlike that formerly enjoyed by serjeants at law in the sister country, their monopoly of litigation has been destroyed by modern legislation (36 and 37 Vict., ch. 63). See BARRISTER; LAWYER, SOLICITOR.

WRITING. The art of fixing thoughts in a visible and lasting shape, so as to make them intelligible and capable of preservation. The ways in general fall into two classes: picture writing, where the picture or symbol denotes the object or idea as a whole, and phonetic writing, where the characters employed denote the spoken word or its elements, either syllables, or single sounds, such as vowels and consonants. The phonetic signs are believed to have been developed from the primitive pictographic methods. In a wide sense various mnemonic systems might be described as writing, but commonly the term is restricted to markings upon some more or less durable surface. It is, however, rather to the picture that we must look for the origin of the complicated systems which lie at the basis of human progress into a higher civilization. In its most primitive form picture writing is a representation of an object or group of objects, which of necessity tells its own story. Even here it is not long before a certain degree of symbolism or at any rate conventionality is introduced, and it becomes somewhat difficult for the stranger to interpret the series of pictures. Interesting examples of the conventionalized forms are to be found among the Indians and also in Polynesia. Such pictures are, however, at best limited in scope, and are usually but condensed means of expression. The pictures tend more and more to become ideograms, i e., symbols with a conventionalized meaning, as when an arrow stands for an enemy. Here we have a form of writing intelligible only to the instructed. The pictures also tend to

become conventional rather than natural, and this transformation becomes rapid when in place of carving on stone incision with a stylus in soft clay or writing with a brush or pen becomes common. Many Chinese characters are good examples of ancient pictures modified by a cursive script. Even the ideogram, however, does not suffice, and we advance to the further step where the picture or character derived from it suggests a sound rather than an object, thus the picture of an eye would denote I, etc. In a monosyllabic language, like Chinese, the same sound may have many meanings, as the sound eye in English in the example above, and therefore to the phonogram may be joined an ideogram to indicate the sense in which the sound is used.

Passing now to the methods of writing in vogue in the great civilizations of the ancient world, we find in Egypt the elaborate pictorial system known as hieroglyphics (q.v.). This system might almost serve alone as an example of the various ways in which characters might be used. The signs are all pictures, more or less conventionalized, but these only occasionally indicate the actual object represented. Sometimes they are symbolic, as when an arm holding a whip denotes the abstract idea of power. Again, they are real phonograms, where two or more pictures together denote another object whose Egyptian name is a combination of the names of the pictures, as in the modern pictorial rebus. From this use it is but a step to the selection of a limited number of these signs to denote uniformly syllables, or again of a still more limited number to be used as single letters. All of these steps the Egyptians had taken at a very early date. They discovered, indeed, the principle of expressing a consonantal, and possibly also a vowel, sound by a single sign, but did not follow it logically to the abandonment of ideograms and complements, so that they never gained the advantages to be derived from the use of a few alphabetic signs, though it must be admitted that they retained a system well adapted for the decorative effects which Egyptian inscriptions frequently seem designed to produce. The cuneiform system of writing, invented by the Sumerians and adopted by Akkadians, Assyrians, Mitannins, Hittites, Chaldians, Elamites, Persians, and others, likewise originated in pictographs. This is most obvious in the earliest linear inscriptions, but may also be seen in the grouping of the wedges after the script had been fully developed. It presents a mixture of ideograms and syllabic signs; determinations indicating the class to which an object belongs are freely used. In Susiana a definite syllabic system was developed; while the Persians in the Achæmenian period used what is practically a cuneiform alphabet of 36 characters. (See CUNEIFORM INSCRIPTIONS.) In the eastern Mediterranean, and perhaps further west, other systems were also in use, most of which still defy interpretation. The Hittite monuments bear inscriptions in strange pictorial characters which have not yet been deciphered. (See HITTITES.) In Cyprus there was in use by the Greeks a peculiar syllabary, first read by the aid of bilingual inscriptions. Crete was the home during the third and second millenniums B.C. of two systems, one apparently hieroglyphic or pictorial, though the pictures finally became decidedly conventional in some cases; the other, described as linear or geometric, apparently syllabic, as the number of signs is more limited. Still another type is found on the disk of Phæstus (q.v.). Many of these signs bear a close resemblance to the Cypriote syllabary, and others suggest the early Greek and Semitic alphabets. The origin of the north and south Semitic alphabets, from which the Greek, the Latin, the later Persian, the Indian, and the modern alphabets are derived, is still obscure. But while it is not capable of strict proof, many scholars deem it probable that they were developed under the influence of the system of writing the Philistines (q.v.) are likely to have brought with them from their original home, Crete. The subjects touched upon in this article and the later history of writing are treated more fully in ALPHABET; CUNEIFORM INSCRIPTIONS; HIEROGLYPHICS, INSCRIPTIONS; PALEOGRAPHY; and the articles on the separate letters.

WRITING MACHINES. See TYPEWRITERS.

WRIT OF ASSISTANCE. See ASSISTANCE, WRIT OF.

WRIT OF ENTRY. See ENTRY, WRIT OF.

WRIT OF ERROR. See ERROR, WRIT OF.

WRIT OF INHIBITION. See INHIBITION, WRIT OF.

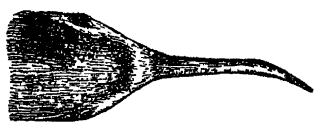
WRIT OF INQUIRY. See INQUIRY, WRIT OF.

WROBLEWSKI, vrō-blĕf'skĭ *or* -blĕs'kĭ, ZYGMUNT FLORENTY (1845–88). A Polish physicist. He was born at Grodno, Russia, and when a student at Kiev was banished to Siberia for taking part in the Polish insurrection of 1863. Pardoned in 1869 he resumed his studies, and after working at the universities of Berlin, Heidelberg, and Munich, he took his doctor's degree at the last-named place in 1874 and became an assistant in the physical laboratory. He then served as assistant or lecturer at Strassburg, Paris, London, Oxford, and Cambridge, and in 1882 he was appointed professor of physics at the University of Cracow. Wroblewski is best known for his work on the liquefaction of gases which he carried on after 1883. (See LIQUEFACTION OF GASES.) His first work of importance was *Ueber die Diffusion der Gase durch absorbirende Substanzen* (1874). While working in Paris in the laboratory of Sainte-Claire-Deville, he investigated the properties of liquids and gases under heavy pressures and discovered the hydrate of carbonic oxide. With Olszewski he was able to liquefy oxygen, nitrogen, and carbon monoxide and to solidify alcohol and bisulphide of carbon.

WRONSKI, vrŏn'skĭ, JOSEPH MARIE (1778–1853). A Polish philosopher and mathematician, whose real name was Hoéne, born in Posen. He studied mathematics and philosophy in Germany and France, and at first was an enthusiastic follower of Kant, but later advocated a system of his own, *Messianism*, which seeks to prove that the world is governed by reason. He also applied his philosophy to mathematics (analysis, theory of numbers, and theory of probabilities), and contributed to celestial mechanics and various branches of physics. He wrote *Philosophie critique découverte par Kant et fondée définitivement sur le principe absolu du savoir* (1803); *Introduction à la philosophie des mathématiques* (1811); *Prospectus du Messianisme* (1831); *Réfutation de la théorie des fonctions analytiques de Lagrange* (1812); *Critique de la théorie des fonctions générales de M. Laplace* (1819); *Messianisme, union finale de la philosophie et de la religion* (1831–39); and *Nouveau système des*

machines à vapeur (1835). Consult: Bobynin, *Hoene-Wronski*, in Russian (Moscow, 1894)

WRYBILL. A New Zealand plover (*Anarhynchus frontalis*), allied to the killdeers, which is unique in having the end of its bill bent to the right It seeks its food on the seashore, feeding upon small crustaceans and insects which hide

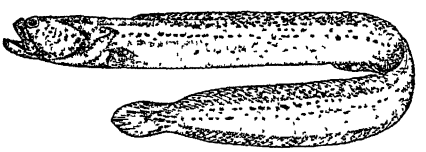


THE WRYBILL
Head from above, showing normal bend in the beak.

under stones; and gets it by running around these stones, always from left to right, and reaching far under them with its bent bill Consult Buller, *Birds of New Zealand* (London, 1888).

WRY-LEGGED TERRIER. See HOUND, *Turnspit*

WRYMOUTH. Any one of the large blennies of the family Cryptacanthodidæ. They are slender, lathlike fishes, from two to three feet long, with large oblique mouths, very heavy lower jaws, and the dorsal fins of strong spines hidden



WRYMOUTH (*Cryptacanthodes maculatus*).

in skin. The Eastern species (*Cryptacanthodes maculatus*) is brownish, with dark spots; but an albino form is so frequently seen as to be well known under the name "ghostfish." A closely related form (*Delolepis virgatus*) inhabits Puget Sound and northward.

WRYNECK, or TORTICOLLIS. A disease characterized by a spasm of the muscles of the neck, which results in tilting the head to one side and raising the chin, the point of which is directed towards the sound side Spasmodic wryneck is a disease of the nervous system. It may be congenital. The symptoms are pain in the neck and spasm, at first clonic and intermittent, later tonic and fairly persistent. The sterno-mastoid and the upper fibres of the trapezius are the muscles affected. In a rare form both sides are affected and the head is drawn backward. The neurosis involves the bulbar and lower cerebral centres. The disease is rarely cured. A great number of drugs are suggested, including opium, atropine, conium, zinc, asafœtida, chloral, bromides, cocaine, gelsemium The galvanic and faradaic currents are useful, as also massage and systematic exercise. Partial or complete cutting of the tendon of the sterno-mastoid muscle near its sterno-clavicular attachment has been the resort in some cases, with a few cures resulting. Acquired wryneck may be due to many diverse causes, all of which should be investigated before treatment is instituted. Thus rheumatism, inflammation of the lymphatic glands, caries of the vertebræ, or exposure to cold may be a cause.

WRYNECK. A genus of small birds of the woodpecker family, having a short, straight, conical beak; the feet with two toes in front and two behind; and a short, rounded tail of soft feathers, utterly unlike the tail of a woodpecker. There are several species, one of which, the common wryneck (*Iynx torquilla*), is a summer visitant of Great Britain and the North of Europe. It is seven inches long, of a rusty ash color, irregularly spotted with brown and black. It feeds on caterpillars and insects, and is often seen on the ground near ant hills, feeding on ants and their eggs The construction of its tongue resembles that of woodpeckers. The wryneck does not chisel out a nest, but deposits its eggs on fragments of decayed wood in a cavity in a tree. The name "wryneck" is derived from the bird's habit of writhing its head and neck quickly with an undulating snakelike motion, often accompanied by a hissing noise. See Plate of WOODPECKERS.

WRY TOE. See HALLUX VALGUS.

WUCHANG, wōō'chäng'. A *fu* or departmental city of China, capital of the Province of Hupeh, and the seat of the Governor-General of the combined provinces of Hunan and Hupeh. It stands on the right bank of the Yang-tse River, opposite Hanyang, and diagonally opposite Hankow (Map: China, K 5). Its lofty walls inclose considerable space, and it is a place of much importance, having a college, a government mint, cotton mills, an oil-crushing mill and other industries, and it has electric lights. Its north gate is surmounted by an imposing tower. The city is included in the port and customs district of Hankow. Wuchang has very good sanitation and is known as a centre of learning. Industrially it is progressing rapidly. The three cities of Wuchang, Hankow, and Hanyang are frequently spoken of as the Wuhan towns. The Chinese revolution of 1911 broke out at Wuchang on October 10. Pop., with its suburbs, 500,000 to 600,000.

WUCHOW, or **WUCHAU,** wōō'chou'. A *fu* or departmental city of the Province of Kwangsi, China, on the left bank of the Si-kiang or West River, about 200 miles west of Canton (Map: China, K 7). It was opened as a treaty port in 1898, and forms an admirable distributing point for the provinces of Yunnan, Kweichow, and Kwangsi. It lies in a highly cultivated and picturesque region, but is subject to inundations in summer. Its exports include star aniseed, pearl barley, native coal, firewood, glue, raw hemp, hides, indigo, leather, medicines, tin, sugar, poultry, tea, wood, and aniseed and other oils. The principal imports are kerosene, matches, betelnuts, woolen and cotton goods, aniline dyes, fish, flour, gypsum, and lamps. Pop., 59,000.

WUHU, wōō'hōō'. A *hien* or district city of the Province of Nganhwei (or Anhui), China, which gives its name to a river port on the Yang-tse opened as a treaty port in 1877. It lies about a mile from the right bank of the river, from which it is reached by a wide creek. It is about 125 miles below Anking (Ngan-kingfu), the capital of the province, and 60 miles above Nanking (Map: China, L 5). It is walled, is connected by several canals and creeks with productive districts in the interior, and is thus well adapted for foreign trade. Its native industries are represented by its cutlery, and its red cord, for which it is noted. The city suffered greatly during the Taiping rebellion, but under the influence of foreign trade is now reviving and prosperous. Pop., 137,000. A foreign settlement was opened at Wuhu in 1905. In 1912 the total trade of the port amounted to 29,506,289 Haikwan Taels (Hk. Tael = $0.74).

WULFENITE, wul'fe-nīt (named in honor of F. X. *Wulfen*, an Austrian mineralogist of the eighteenth century). A mineral lead molybdate crystallized in the tetragonal system. It has a resinous lustre, and is yellow to orange and red in color, sometimes passing into olive green. It occurs in veins with various ores of lead, and is found at various localities in Austria, Hungary, Siberia, Saxony, France, Colorado, Mexico, and in the United States. A variety containing chromium has been found, to which the name *chromowulfenite* has been given. See MOLYBDENUM.

WULFILA, wul'fi-la. A bishop of the Goths. See ULFILAS.

WULFSTAN, wulf'stan, **WULSTAN**, or **WOLSTAN**, wul'stan. The name of three Anglo-Saxon prelates and authors. (1) A monk of Winchester who flourished about 980 A.D. He is the reputed author of a Latin poem on the miracles of St. Swithin. For a study of his life and work consult Clemens Blume, *Wolstan von Winchester und Vital von Saint-Evroult*, in the "Proceedings of the Imperial Academy of Sciences of Vienna" (vol. 146, 1903), and P. M. Huber, *S. Swithunus, Miracula Metrice* Metten, 1906). (2) An archbishop of York from 1003 until his death in 1023, and the author of two pastoral letters and several sermons in Anglo-Saxon. His homilies were edited by A. S. Napier (Berlin, 1883). Consult also the same author's *Ueber die Werke des altenglischen Erzbischofs Wulfstan* (Weimar, 1882), Kinaird, *Study of Wulfstan's Homilies* (Baltimore, 1897); L. H. Dodd's *Glossary of Wulfstan's Homilies* (New York, 1908); R. Becher, *Wulfstans Homilien* (Leipzig, 1910); and A. Brandl in Paul's *Grundriss der germanischen Philologie*, vol. ii (revised ed., Strassburg, 1901–09). (3) A bishop of Worcester (c.1007–95) and a saint of the English calendar. He was born at Icentum, in Warwickshire, and was educated at Evesham and Peterborough. He became a priest and afterward a monk. He was made prior of the monastery of Worcester, and in 1062 bishop of that see. He lived through the troubles of the Norman Conquest, and enjoyed the favor not only of the Conqueror, but of William Rufus. He rebuilt the cathedral of Worcester, and was canonized by Pope Innocent III in 1203. He is regarded by some as the author of that portion of the Anglo-Saxon Chronicle which extends from 1034 to the death of the Conqueror. Consult the lives of St. Wulfstan by Hemming and Florence of Worcester in H. Wharton, *Anglia Sacra* (2 vols., London, 1691), and E. A. Freeman, *Norman Conquest* (6 vols., ib., 1867–79).

WÜLKER, vül'kēr, RICHARD PAUL (1845–1910). A German philologist, born at Frankfort-on-the-Main. He was educated at the universities of Berlin, Leipzig, and Marburg. In 1875 he was appointed professor of English at Leipzig. He published: *Das Evangelium Nikodemi* (1872); *Altenglisches Lesebuch* (2 vols., 1874–80); *Kleinere angelsachsische Dichtungen* (1882); *Grundriss zur Geschichte der angelsachsischen Litteratur* (1885); *Codex Vercellensis* (1894), *Geschichte der englischen Litteratur* (1896; 2d ed., 2 vols., 1906–07).

WULLENWEBER, vul'len-vā'bēr, JÜRGEN (1492–1537). A Hanseatic statesman, born at Hamburg. Having removed to Lübeck he acquired great influence there during the party conflicts attendant upon the establishment of the Reformation, and, becoming the leader of the democratic-Protestant faction, was elected one of the four burgomasters in 1533. In this position he made it his chief aim to restore the political hegemony of Lubeck on the Baltic Sea by the subjection of Denmark and Sweden and the propagation of Protestantism, but was thwarted by the unlucky turn which the campaign against Denmark took and the return to power of the aristocratic party at Lubeck. When, moreover, a writ of execution from the Imperial Chamber at Speyer, issued in June, 1535, threatened the city with the ban of the Empire if the old aristocratic constitution were not restored within 45 days, Wullenweber resigned his office. On a journey to Hadeln soon after, he was arrested by the Archbishop of Bremen and delivered to that prelate's brother, Duke Henry of Brunswick, a sworn enemy of Lutheranism, who imprisoned him. Put to the rack the most inconsistent self-accusations were extorted from him, whereupon he was condemned to death and executed in September, 1537. Consult G. Waitz, *Lubeck unter Jurgen Wullenweber und die europaische Politik* (3 vols., Berlin, 1855–56).

WÜLLERSTORF-URBAIR, vul'lērs-tōrf-ur'bār', BERNHARD, BARON VON (1816–83). An Austrian admiral, born at Triest. He entered the navy in 1833, and after a special course in astronomy at Vienna in 1837–39, was appointed director of the naval observatory and professor at the naval academy in Venice. In 1848 he was intrusted with the reorganization of the latter institution at Triest and made its commandant. In 1857, having in the meanwhile attained the rank of commodore, he was put in command of the Novara Expedition around the world, and after its return in 1859 superintended the publication of its reports. Sent to the North Sea with a squadron, during the Schleswig-Holstein campaign of 1864, he wrested from Denmark the North Frisian islands. In 1865–67 he was Minister of Commerce, and after his retirement was made a life member of the House of Lords. His publications include: *Ueber das Verhalten und die Verteilung der Winde auf der Oberflache der Erde* (1860); *Ueber die Wichtigkeit des Adriatischen Meers für Oesterreich* (1861); *Bemerkungen über die physikalischen Verhaltnisse des Adriatischen Meers* (1863). His *Vermischte Schriften* were published by his widow (1889).

WÜLLNER, vul'nēr, ADOLF (1835–1908). A German physicist, born in Düsseldorf. He studied in Bonn, Munich, and Berlin, and became docent in Marburg, 1858. In 1862 he was appointed director of the technological school at Aix-la-Chapelle, in 1865 professor of physics in the agricultural school at Poppelsdorf, and was also at the same time assistant professor of physics in the University of Bonn (1867–69). In 1869 he became professor of physics in the Polytechnic Institute at Aix-la-Chapelle. He carried on important investigations in all branches of physics and wrote: *Lehrbuch der Experimentalphysik* (2 vols., 1862–65; 6th ed., 1907); *Einleitung in die Dioptrik des Auges* (1866); *Kompendium der Physik* (2 vols., 1879).

WÜLLNER, FRANZ (1832–1902). A German composer, born at Münster, Westphalia. He studied in his native place, and at Frankfort, Berlin, Brussels, and Munich. In 1856 he was appointed instructor in pianoforte at the Munich conservatory. He held the position of town

musical director at Aix-la-Chapelle from 1858 to 1864. In 1867 he became director of the choral classes in the reorganized School of Music at Munich and wrote for them *Chorübungen der Münchener Musikschule*. In 1869 he succeeded Bülow as conductor of the Court Opera and the Academy Concerts. Here he conducted the first performances of *Rheingold* and *Walküre* (1869, 1870) before the production of the entire Ring cycle at the first Bayreuth Festival of 1876. He became court kapellmeister at Dresden and artistic director of the conservatory in 1877, and director of the Cologne conservatory and conductor of the Gurzenich concerts in 1884. After 1864 he appeared frequently as conductor of the Lower Rhenish Musical Festival (q.v.). He died at Braunfels. Among his works are: *Heinrich der Finkler*, a cantata for solo, male chorus, and orchestra, additional recitatives to Weber's *Oberon*, accepted by many of Germany's principal theatres; *Psalm 125*, for chorus and orchestra; *Miserere* for double choir; and *Stabat Mater* for double choir, besides masses, motets, songs, chamber music, and pianoforte pieces.

WÜLLNER, LUDWIG (1858–). A famous German lieder singer (baritone), born at Münster, Westphalia. He studied Germanic philology, receiving the degree of Ph.D at Strassburg in 1884. In 1887 he entered the Cologne conservatory, of which his father, Franz (q.v.), was director. In 1889 he joined the famous Meiningen company as an actor and won great success. The success of a tour as a reader in 1895 induced him to enter the field of the lieder singer, and since 1896 his tours (including two to the United States in 1908–09 and 1909–10) have been a succession of veritable triumphs. Although the quality of his voice is but mediocre, his extraordinary power of interpretation, coupled with the rare art of his assisting artist at the piano, Coenraad Bos, holds his audiences spellbound.

WULSTAN. See WULFSTAN.

WUNDERLICH, vụn'dĕr-lĭk, KARL AUGUST (1815–77). A German physician, born at Sulzam-Neckar. He was educated at Stuttgart, Tübingen, and Paris. In 1846 he was appointed professor in the University of Tübingen and director of its clinic, and in 1850 he accepted a call to Leipzig, where he carried on his important investigations of temperatures. The *Archiv für physiologische Heilkunde*, founded by him in 1841, became the organ of the most advanced medical thought. Wunderlich published *Nosologie des Typhus* (1839); *Versuch einer pathologischen Physiologie des Blutes* (1844); *Handbuch der Pathologie und Therapie* (1846–54); *Grundriss der speziellen Pathologie und Therapie* (1858); *Geschichte der Medizin* (1859); and *Das Verhalten der Eigenwärme in Krankheiten* (1868).

WUNDT, vụnt, WILHELM (1832–1920). A German physiologist, psychologist, and philosopher, born Aug. 16, 1832, at Neckarau, in Baden. He studied from 1851 to 1856 at Tübingen, Heidelberg, and Berlin, specializing in medicine. In 1857 he qualified as privatdocent in physiology at Heidelberg, where he became assistant professor in 1864. After serving one year as professor of philosophy at Zurich, he was called in 1875 to a similar position at Leipzig, where he was also rector of the university in 1889–90. In 1902 he was made an *Ehrenbürger* of Leipzig, and in 1907 of Mannheim. In 1905 he was given the degree of Doctor of Jurisprudence, *honoris causa*, by the University of Göttingen, and later he received the order *Pour le Mérite*. He published the following works. *Die Lehre von der Muskelbewegung* (1858), *Beiträge zur Theorie der Sinneswahrnehmung* (1862); *Vorlesungen über die Menschen- und Tierseele* (1863; 5th ed., 1911; Eng. trans., *Lectures on Human and Animal Psychology*, 3d ed., 1901); *Lehrbuch der Physiologie des Menschen* (1865, 4th ed., 1878), *Die physikalischen Axiome und ihre Beziehung zum Kausalprincip* (1866), *Handbuch der medizinischen Physik* (1867), *Untersuchungen zur Mechanik der Nerven und Nervencentren* (1871–76), *Grundzüge der physiologischen Psychologie* (1874, 6th ed., 1908–11, Eng. trans., *Principles of Physiological Psychology*, 1, 1904); *Der Spiritismus, eine sogenannte wissenschaftliche Frage* (1879); *Logik, eine Untersuchung der Principien der Erkenntnis und der Methode wissenschaftlicher Forschung* (1880–83, 3d ed., 1906–08); *Essays* (1885; 2d ed., 1906); *Ethik, eine Untersuchung der Thatsachen und Gesetze des sittlichen Lebens* (1886, 4th ed., 1912; Eng. trans., *Ethics: An Investigation of the Facts and Laws of the Moral Life*, 1897–1901); *Zur Moral der literarischen Kritik* (1887); *System der Philosophie* (1889; 3d ed., 1907); *Hypnotismus und Suggestion* (1892), *Grundriss der Psychologie* (1896; 12th ed., 1914; Eng. trans., *Outlines of Psychology*, 3d ed., 1907); *Völkerpsychologie, eine Untersuchung der Entwicklungsgesetze von Sprache, Mythus, und Sitte*, i (1900, 3d ed., 1911); ii (1905–06; 3d ed., 1912–14); *Einleitung in die Philosophie* (1901, 6th ed., 1914); *Sprachgeschichte und Sprachpsychologie* (1901); *Festrede zur fünfhundert jährigen Jubelfeier der Universität Leipzig* (1909); *Principien der mechanischen Naturlehre* (1910); *Kleine Schriften* (1910); *Probleme der Völkerpsychologie* (1911); *Einführung in die Psychologie* (1911; Eng. trans., *Introduction to Psychology*, 1912); *Elemente der Völkerpsychologie* (1st and 2d eds., 1912); *Reden und Aufsätze* (1913); *Psychologie im Kampf ums Dasein* (1913); *Anfänge der Philosophie und die Philosophie der primitiven Völker* (1913); *Sinnliche und übersinnliche Welt* (1914); *Ueber den wahrhaften Krieg* (1914); *Deutschland im Lichte des neutralen und des feindlichen Auslandes* (1915); *Die Nationen und ihre Philosophie* (1st and 2d eds., 1915). In 1881 Wundt instituted a periodical, the *Philosophische Studien*, for the purpose of publishing the work of the psychological laboratory at Leipzig. The *Studien* was followed in 1905 by the *Psychologische Studien*.

From the foundation of the Leipzig laboratory and of the *Studien* came the effective impulse which has led to the institution of many if not all of the other laboratories for the systematic investigation of experimental psychology in both Europe and America. Wundt is thus not only the leading German representative of what is ordinarily termed modern psychology, but, in a certain sense, its creator. He alone treated it in all its area; he alone had sufficient breadth of outlook, sufficient training, and sufficient sympathy to unite in one science the work of Herbart, Weber, Fechner, and Lotze. In his *Vorlesungen*, but more especially in his classical *Grundzüge*, the standard textbook of the science, he effected the union of the various disjointed movements then existing, the mathematical, the experimental, the psychophysical, and the physiological. Wundt defines psychology as the

"science of immediate experience"; the natural sciences are abstractions from experience. Nevertheless, his psychology starts from physiological facts, and seeks by variation of external condition to discover the elementary psychical facts which are correlated with them. It work from without inward. But the end is to construct psychology. Physiology, however valuable it may be as an avenue of exploration or as a basis for explanation, is held to be but a means towards this end. Consult: T. Ribot, *German Psychology of To-Day* (Eng. trans., New York, 1886); E. König, *Wundt, seine Philosophie und Psychologie* (Stuttgart, 1901); R. Eisler, *W. Wundt's Philosophie und Psychologie* (Leipzig, 1902); G. S. Hall, *Founders of Modern Psychology* (New York, 1912). See PSYCHOLOGY; PSYCHOLOGY, ETHNIC; SOCIAL PSYCHOLOGY.

WUNSCHE, vun'she, KARL AUGUST (1838–). A German theologian and Hebraist, born at Hainewalde, near Zittau. From 1869 to 1905 he was head master of the girls' high school at Dresden. During this period he published important works on biblical and Talmudic literature, among them *Der Prophet Hosea übersetzt und erklärt* (1868); *Die Leiden des Messias in ihre Uebereinstimmung mit den Lehren des Alten Testaments* (1870); *Jesus in seiner Stellung zu den Frauen* (1872); *Die Weissagungen des Propheten Joel übersetzt und erklärt* (1874); *Der lebensfreudige Christus der synoptischen Evangelien im Gegensatz zum leidenen Messias der Kirche* (1876); *Neue Beitrage zur Erläuterung der Evangelien aus Talmud und Midrasch* (1878); *Der Babylonische Talmud in seinen haggadischen Bestandteilen* (5 parts, 1886-89); *Der Midrasch Tehillim* (2 vols., 1892–93); *Aus Israels Lehrhallen* (2 vols., 1907–08); *Der Kuss in Bibel, Talmud, und Midrasch* (1911).

WURMSER, vurm'zĕr, DAGOBERT SIEGMUND, COUNT VON (1724–97). An Austrian field marshal, born at Strassburg. He entered the French service in 1741, and distinguished himself during the Seven Years' War. In 1762 he entered the Austrian army as colonel. At the outbreak of the wars of the French Revolution he was given command of the forces beyond the Rhine and prevented the French from relieving Mainz (1793). He took Mannheim (1795), and in the summer of 1796 became field marshal and succeeded Beaulieu in Italy. While attempting to relieve Mantua, which was besieged by the French, the two divisions of his army were successively routed by Napoleon and Wurmser himself was forced to take refuge in the beleaguered city. It fell in 1797 (February 2) after a siege of nine months, but Wurmser was permitted to go free.

WURTS, ALEXANDER JAY (1862–). An American electrical engineer, born at Carbondale, Pa. He graduated from Sheffield Scientific School (Yale) in 1883, and from Stevens Institute of Technology (M E) in 1884, and studied also, for two years, in the Polytechnikum at Hanover, Germany. From 1887 to 1898 he served on the technical staff of the Westinghouse Electric and Manufacturing Company, of which company he was general engineer in 1904–05. In the meantime he was manager of the Nernst Company (1898–1904). After 1905 he held the chair of applied electricity and was head of the electrical department of the Carnegie Technical Schools, Pittsburgh. For his invention of lightning arresters he was awarded the John Scott medal by the Franklin Institute in 1894. Wurts was the discoverer of the five non-arcing metals.

WURTTEMBERG, vurt'tĕm-bĕrk. A kingdom of the German Empire in southwestern Germany, lying between Baden and Bavaria. In the south Hohenzollern penetrates the country as an irregular tongue and Lake Constance separates it from Switzerland (Map: Germany, C 4). Württemberg has small enclaves in Baden and Hohenzollern, and incloses three enclaves of Hesse. The area is 7534 square miles.

Württemberg is in general a region of hills and mountains. It is a western part of the south German upland. A portion of the Black Forest borders the west, where the loftiest point of the kingdom is found at its extreme western point—3820 feet. The Swabian Jura or Rauhe Alb crosses the kingdom north of the Danube. Its highest elevation is 3327 feet. The Danube crosses the southern part of the country, flowing in a northeast direction and leaving it at Ulm. South of the Danube the upland gradually merges into the Alpine foreland. In the north of the kingdom is a fertile lowland country—hills, level valleys, and dales—descending gradually to the north with the Neckar and its numerous tributaries coursing through to the northwest, where the altitude falls as low as 500 feet. About one-quarter of the country is level land. The climate is moderate and agreeable, with a yearly mean of 40° in the mountains and 50°, or a little less, in the Neckar valley. There are nearly 75 mineral springs.

The mining output is not large. Salt and iron are obtained. Württemberg is essentially an agricultural country and about one-half of the population is connected with agriculture. Of the area, 64 per cent is tilled, and 31 per cent is in forest (conifers and beech), the forests being thoroughly exploited and forming a prominent part of the wealth. Most of the farms are between 2½ and 25 acres in size. The largest acreages are, in their order, hay, spelt, oats, clover, barley, and potatoes. Fruit raising and the live-stock interests are prominent. Co-operative dairying is extensively carried on. The manufactures have in recent years rapidly developed. There is a large output of sugar, iron, and textiles. Other products are gold and silver work, musical and scientific instruments, bells, chemicals, paper, and wood carving, and the products of celebrated machine shops at Esslingen. The kingdom leads in book publishing in southern Germany. Commerce is lively and is being actively fostered and developed. The transit traffic is important. Grain, cattle, wood, salt, fruit, and manufactured articles of many kinds are exported. The Neckar is navigable by steamboats to Heilbronn, and Ulm stands at the head of navigation on the Danube.

Württemberg is a constitutional monarchy. The constitution dates from 1819, but was extensively altered in 1906. The Landstände, or Parliament, consists of two Houses (estates), which assemble at least every three years. The members of the higher chamber, or House of Standesherren, are the royal princes, persons named by the King, and the representatives of 20 mediatized houses. Its president is appointed by the King. The deputies of the lower chamber consist of 13 nobles, 6 Evangelical and 3 Catholic dignitaries, the head of Tübingen University, 7 representatives from towns, and 63 from rural

districts. The deputies are chosen for six years without property qualification. Citizens voting must be above 25. The Ministry of State comprises six departments—Justice, War, Finance, Interior, Religion and Education, Foreign Affairs and the Royal House There is a privy or advisory council, composed of the ministries and councilors. Administratively the kingdom is divided into four circles—Neckar, Black Forest (Schwarzwald), Jagst, and Danube It sends 4 members to the national Bundesrat and 17 to the Reichstag. The budget of the kingdom for 1914–15 nearly balanced at $30,476,785. The chief items of expenditure were Imperial contributions, national debt, and religion and education, the chief sources of income were Imperial receipts, railway revenues, direct taxes, and forests, farms, and mines The public debt amounted in 1914 to about $159,853,000. However, the debt, with the exception of a small fraction, is for railways, and is accordingly offset by the railroad property of the kingdom. At the end of 1914 there were 1134 miles of railway in Wurttemberg, 1094 of which were owned by the government. Stuttgart is the capital.

The population in 1900 was 2,169,480; in 1910, 2,437,574, giving density per square mile of 323 2. Wurttemberg ranks fourth in population among the German states. The people are mostly Swabians About 70 per cent of the population is Protestant. The King is, under the constitution, the guardian and director of the Evangelical church. It is administered by a consistorium composed of a president, nine councilors, and six superintendents. The Catholics are under a bishop, who, however, can only act together with a Catholic council named by the government. The Jews are under a council appointed by the King. In educational matters Württemberg holds high rank. Instruction is compulsory. Practically every person above 10 can read and write. The University of Tubingen stands at the head of the educational system Among other institutions there are the great Polytechnic Institute at Stuttgart, a famous conservatory of music at the same place, and agricultural, industrial, and special schools of every variety, including a school of viticulture at Weinsberg. There are numerous scientific, art, and literary organizations.

History. The greater part of modern Wurttemberg was included in the mediæval Duchy of Swabia. About the beginning of the twelfth century history first speaks of a Count of Württemberg. An uninterrupted line of counts may be traced back to the middle of the thirteenth century, when they ruled a district in the valleys of the Neckar and its affluent, the Rems. The dominions of the house were steadily extended. Count Eberhard IV (1417–19), through his marriage with the heiress of Montbéliard, united that county with Württemberg. Count Eberhard im Bart (q.v.), an able ruler, who founded the University of Tübingen, was raised by the Emperor Maximilian in 1495 to the rank of Duke, with the title of Eberhard I. In 1519 Duke Ulrich, in consequence of arbitrary acts of oppression exercised upon the free Imperial city of Reutlingen, was forcibly ejected from Württemberg by the Swabian League and did not recover his throne till 1534. He became Lutheran and established the Reformed faith in his dominions. Duke Frederick, having taken part in the war against the French Republic, was compelled to cede part of his territory to France, but later, owing to his support of Napoleon, it was restored to him In 1803 this ruler received large accessions of territory, including Heilbronn, Reutlingen, and other free cities, and was raised to the dignity of Imperial Elector. He reluctantly joined Napoleon in the war against Austria in 1805, and at the Peace of Pressburg (Dec 26, 1805) Wurttemberg was further enlarged and erected into a kingdom On Jan. 1, 1806, Frederick I assumed the royal title. He joined the Confederation of the Rhine in the same year and received additional territory, and as an ally of Napoleon in the French-Austrian War of 1809 was rewarded with new possessions, including Ulm Wurttemberg was required to furnish a quota of 16,000 men for Napoleon's Russian campaign. On Nov 2, 1813, the King abandoned the cause of Napoleon, and joined the other German princes in their rising against the French power. King Frederick died Oct. 30, 1816, and was succeeded by his son, William I (1816–64). William reduced the public expenditure, and in 1819 promulgated a constitution. In the revolutionary movement which swept over Germany in 1848 William yielded at first to the demand of his subjects for political reforms, but ultimately the hopes of the Liberals were disappointed. William died on June 25, 1864, and was succeeded by his son Charles, who sided with Austria in the Seven Weeks' War. The troops of Wurttemberg were beaten and a war indemnity of $4,000,000 was levied by Prussia upon the kingdom In 1867 Württemberg formed an alliance with the North German Confederation. She supported Prussia against France in 1870, and in 1871 became part of the new German Empire. King Charles died on Oct. 6, 1891, and was succeeded by his nephew, William II.

Bibliography. *Das Konigreich Wurttemberg. herausgegeben vom Koniglich statistischen Landesamt* (Stuttgart, 1903 et seq.); Hirschfeld, *Württembergs Grossindustrie und Handel* (Leipzig, 1889); Gaupp, *Das Staatsrecht des Konigreichs Württemberg* (Freiburg, 1895); Chr F. von Stalin, *Württembergische Geschichte* (Stuttgart, 1841–73); Schneider, *Wurttembergische Reformationgeschichte* (ib, 1888); Belschner, *Geschichte von Wurttemberg* (ib., 1902); Heyd, *Bibliographie der wurttembergischen Geschichte* (ib., 1895); Schäfer, *Wurttembergische Geschichtsquellen* (ib., 1894–95); A Schliz, *Urgeschichte Wurttembergs* (ib., 1909).

WÜRTTEMBERG, vŭr'tem-bĕrk, DUKE OF. See EUGEN.

WURTZ, vŭrts, CHARLES ADOLPHE (1817–84). A French chemist. He was born in Strassburg, and studied chemistry there and at Giessen In 1845 he went to Paris as tutor of organic chemistry at the Sorbonne. Afterwards he became professor in the Agronomic Institute of Versailles (1851), professor of organic chemistry at the Sorbonne (1852), and professor of toxicology in the School of Medicine (1853). He was dean of the Sorbonne medical faculty from 1866 to 1875. Among Wurtz's principal discoveries were those on the compound ammonias (1849), on glycol (1856), on aldol ($C_8H_8O_4$), and the so-called process of "aldolization." His most important work, however, was on the theoretic side of chemistry in distinguishing the atomic relations of organic compounds. His publications include: *Mémoire sur les ammoniaquee composées* (1850); *Traité élémentaire de chimie médicale* (2 vols., 1864–65); *Dictionnaire de chimie pure*

et Appliquée, 3 vols., 1868–78, supplement, 1880–86, 2 supplement by Friedel, 7 vols., 1892–1904); *Progrès de l'industrie des matières colorantes artificielles* (1876); *Théorie atomique* (1878). Eng. trans., *The Atomic Theory*, 1894); and the important *Traité de chimie biologique* (1884).

WURTZITE. wûrts'it (named in honor of Charles Adolphe *Wurtz*). A mineral zinc sulphide crystallized in the hexagonal system. It has a resinous lustre, and is brownish black in color. It occurs in crystals or in massive fibrous varieties. It is found in Portugal, Bolivia, Peru, and in the United States, with sphalerite and quartz, at Butte, Mont. This mineral has been made artificially by fusing equal parts of zinc sulphide with calcium fluoride and barium sulphide.

WURZBACH, vurts'bak, ALFRED, KNIGHT VON TANNENBERG (1846–). An Austrian art historian. He was born at Lemberg, son of Constant Wurzbach. He studied jurisprudence in Vienna and entered the civil service, but resigned in 1876, and after extensive travel devoted himself to the study of art history. In 1881–86 he was art critic for the *Wiener Allgemeine Zeitung*. Among his chief works are *Martin Schongauer* (1881), *Geschichte der holländischen Malerei* (1885); and, most important of all, *Niederländisches Künstlerlexicon* (2 vols., 1904–11). He edited several editions de luxe and translated Houbraken's *Groote schouburgh der nederlandsche konstschilders* (1879). He became known as one of the foremost authorities on Dutch painting.

WURZBACH, CONSTANT, VON TANNENBERG (1818–93). An Austrian poet and biographer, born at Laibach. After studying jurisprudence at Graz, he served in the army from 1836 to 1844, when he obtained a position in the university library at Lemberg. In 1849 he was appointed librarian in the Ministry of the Interior at Vienna, and afterward Secretary in the Ministry of State. His writings include: *Die Volkslieder der Polen und Ruthenen* (1846); *Die Sprichwörter der Polen* (1852); *Die Kirchen der Stadt Krakau* (1853); *Joseph Haydn und sein Bruder Michael* (1861); *Glimpf und Schimpf in Spruch und Wort* (1864), *Historische Worter, Sprichworter und Redensarten* (1866); *Franz Grillparzer* (1871); *Ein Madonnenmaler unserer Zeit: E. Steinle* (1879); *Feldmarschall Erzherzog Karl* (1880). He also published several volumes of epic poetry. He is, however, best known for the *Bibliographisch-statistische Uebersicht der Litteratur des osterreichischen Kaiserstaates* (1856), and his valuable *Biographisches Lexikon des Kaisertums Oesterreich* (60 vols., 1855–91), a unique publication on a gigantic scale, containing about 25,000 critical biographies of notable personages in every walk of life and from all parts of the Austro-Hungarian monarchy.

WÜRZBURG, vurts'boork. The capital of Lower Franconia, Bavaria, 81 miles by rail northwest of Nuremberg (Map: Germany, D 4). It is situated almost wholly on the right bank of the navigable Main, which is here crossed by three bridges (1474–1607, 1887, and 1894). The old, or inner, city is separated from the modern and handsome suburbs by broad and agreeable promenades, into which the beautiful Hofgarten blends on the east.

The Hofgarten dates from 1729. The handsome law courts rise a short distance away on the south. The rococo palace (1720–44), formerly the episcopal residence, a splendid edifice, situated in the Hofgarten, is the centre of interest to the visitor. Here are the Residenzplatz, and the elaborate modern Luitpold fountain. West of the palace is the uninteresting cathedral, a Romanesque basilica, tracing its origin back to 862, the four towns date from 1240, the rococo facade from 1711–19, and the dome from 1731. The exterior was restored in 1882–83. Adjacent to the cathedral is the rococo Neumunster Church, with a red facade belonging to the eighteenth century. It has a tablet to Walther von der Vogelweide, who was buried in the ancient cloisters here. Near by on the west is the old market place with the beautiful Chapel of Mary. This graceful Gothic structure dates from 1377–1441, and was restored in 1856.

To the south, beyond the mediæval town hall, rise in the modern quarter the new buildings of the university (See WÜRZBURG, UNIVERSITY OF). The University Church, with Gothic features, belongs to the later sixteenth century, and the Seminary Church to the latter part of the eighteenth century. In the northern part of the city are the Ludwigshalle, where expositions are held, and the large Julius Hospital, founded in 1576. In the northwest corner of Wurzburg, near the river, are the anatomical, physical, pathological, and other institutes belonging to the university.

The fine old Main bridge (1474) leads from the central part of the city to the town on the left bank, where the Romanesque St. Burkard Church (1033–42), with its towers, and the Marienberg fortress command the attention. The Marienberg, which was an episcopal residence from 1261 to 1720, and is now used as a barracks, stands on the Leistenberg, a hill over 400 feet above the river. There are a royal music school, and schools of agriculture, horticulture, etc. Wurzburg is an active industrial town. Machinery, railway cars, pianos, scientific and musical instruments, and tobacco are among the principal manufactures. Famous brands of beer are produced in the city. The wine, fruit, coal, and timber trade is important. Pop., 1900, 75,497; 1910, 84,496.

Würzburg became an episcopal see in the middle of the eighth century. It early grew wealthy and important. The bishops of Würzburg were prominent in their capacity as temporal princes, their domain finally having an area of about 1900 square miles. They bore the title of Duke of Franconia. The bishopric was secularized in 1801 and assigned in 1803 to Bavaria. By the Peace of Pressburg, in 1805, the principality was transferred to Ferdinand III, the dispossessed Grand Duke of Tuscany. In pursuance of the acts of the Congress of Vienna (1814–15), it passed again to Bavaria. The Prussians entered the town on Aug. 2, 1866.

WÜRZBURG, vurts'burk, KONRAD VON. See KONRAD VON WÜRZBURG.

WÜRZBURG, UNIVERSITY OF. A German university, founded in 1402 by Bishop Johann von Egloffstein and confirmed by a bull of Pope Boniface IX in the same year. The institution was reorganized in 1582 by Prince Bishop Julius Echter von Mespelbrunn on the mediæval pattern, as a Catholic university. It soon became the Mecca for Catholic students not only of Germany, but of other European countries. The care of the faculties of theology and philosophy was left to the Jesuits, who carried on the in-

struction until the suppression of the Order in 1773. The faculty of law was reorganized in 1776 and that of medicine in 1807. With the union of Würzburg to Bavaria began a new era for the institution. It soon rose to an eminent position among German universities. Its medical faculty particularly stands high. It consists of the faculties of theology, law, and political science, medicine, and philosophy. It had in 1913 an attendance of 1456. The library, founded by Karl von Dalberg, which includes the original collections, contains over 390,000 volumes.

WURZEN, vōōrts'en. A town of the Kingdom of Saxony, 15½ miles northeast of Leipzig, picturesquely situated on the Mulde, here spanned by two bridges (Map: Germany, E 3). Its industries include iron casting, bleaching, weaving, and the manufacture of machinery, paper, wall paper, carpet, furniture, and hosiery. Pop., 1900, 16,614; 1910, 18,582.

WÜSTENFELD, vus'ten-fĕlt, HEINRICH FERDINAND (1808–99). A German Arabic scholar. He was born at Munden, Hanover, studied at Göttingen and Berlin and was librarian (1838–89) and professor (1842–90) at Göttingen. He published many important Arabic texts and valuable works on Arabic history and literature, including *Geschichte der arabischen Aerzte und Naturforscher* (1840), *Genealogische Tabellen der arabischen Stamme und Familien* (1852); *Vergleichungstabellen der mohammedanischen und christlichen Zeitrechnung* (1854; continuation by Mahler, 1887; later continuations, 1899); *Die Statthalter von Aegypten* (1875–76); *Geschichte der Fatimiden-Chalifen* (1881); *Die Geschichtschreiber der Araber* (1882), *Der Iman el Schāfi'i, seine Schuler und Anhanger* (1890–91).

WUSTMANN, vust'mân, GUSTAV (1844–1911). A German philologist and historian, born in Dresden, where he frequented the Kreuzschule, before studying philology at Leipzig in 1862–66. He then taught at the Nikolai Gymnasium in Leipzig until 1881, when appointed director of the municipal archives and city librarian. From 1879 he was also associate editor of the *Grenzboten* and in 1897 received the title of professor. He published *Apelles' Leben und Werke* (1870) and the valuable contributions to the history of Leipzig: *Der leipziger Baumeister Hieronymus Lotter* (1875), *Beitrage zur Geschichte der Malerei in Leipzig vom 51. bis 17. Jahrhundert* (1879), *Aus Leipzigs Vergangenheit* (1885), *Quellen zur Geschichte Leipzigs* (1889–95), *Leipzig durch drei Jahrhunderte* (1890), *Der Wirt von Auerbachs Keller, Dr. Heinrich Stromer von Auerbach* (1902). Much opposition was aroused by his publication *Allerhand Sprachdummheiten, Kleine deutsche Grammatik des Zweifelhaften, des Falschen und des Hasslichen* (1891; 4th ed., 1908). Besides a collection of poems, entitled *Als der Grossvater die Grossmutter nahm* (1886; 4th ed., 1905), he edited a new adaptation of Borchardt's *Die sprichwörtlichen Redensarten im deutschen Volksmund, nach Sinn und Ursprung erlautert* (5th ed., 1895).

WUTHERING (wŭTH'ĕr-ĭng) **HEIGHTS.** A novel by Emily Brontë, published in 1847 under the nom de plume of "Ellis Bell."

WU TING-FANG, wōō'tĭng'fäng' (1842–1922). A Chinese lawyer, diplomatic agent, and statesman, born at Singapore. At 13 he entered St. Paul's College in Hongkong, where he remained for seven years, when he entered the service of the colonial government as interpreter in the law courts. In 1874 he went to London to study law, entered at Lincoln's Inn, and was called to the bar in 1877. Returning to Hongkong, he practiced as a barrister. In 1882 he came under the notice of the Chinese government at Peking, was called north, and joined the official staff of Li Hung Chang, then Governor-General of Chih-li and the Grand Chancellor of the Empire. He was a member of the peace embassy at the head of which was Li Hung Chang, and assisted in negotiating the Treaty of Shimonoseki. On his return to Peking he was successively appointed vice president of the Imperial Clan Court, a senior vice president of the Board of War, and superintendent of Imperial railways; and in the following year (1896) was appointed Minister to the United States. He opposed the reenactment of the Chinese Exclusion Act without some modification, but was unsuccessful. In 1902 he was recalled to act as one of the commissioners engaged in negotiating commercial treaties with the United States and other foreign nations, and in 1903 was appointed vice president of the Board of Commerce, a new government department then established. He became a member of the permanent Court of Arbitration at The Hague.

WUTTKE, vut'ke, HEINRICH (1818–76). A German historian, born at Brieg in Silesia, and educated at the universities of Breslau, Berlin, and Leipzig. He became privatdocent in history at Leipzig in 1841, and was made full professor in 1848. In that year he was a member of the National Assembly at Frankfort, and one of the founders of the Greater-Germany party. His works include: *Polen und Deutsche* (1847); *Erdkunde und Karten des Mittelalters* (1854); *Die Volkerschlacht bei Leipzig* (1863); *Die deutschen Zeitschriften und die Entstehung der öffentlichen Meinung* (3d ed., 1875); and an unfinished but very valuable *Geschichte der Schrift und des Schrifttums* (1872).

WY'ANDOT (properly *Wandót*, or *Wendát*, of uncertain etymology), or HURON. An important tribe or confederacy of Iroquoian stock (q.v.). The original Wyandot were known to the French as Huron; this tribe was made up of the Wyandot proper or Huron and the neighboring and cognate Tionontati, who probably outnumbered the Wyandot when the two tribes united in 1650 and abandoned their country to escape the Iroquois. When first known to the French, about 1615, the Huron occupied a narrow territory between Georgian Bay and Lake Simcoe, Ontario, Canada. They had about 20 villages and a population conservatively estimated at 10,000. Their numbers, however, were greatly reduced about 1625 by smallpox and other pestilence. Adjoining them on the southwest were their kinsmen and allies, the Tionontati. On the invitation of the Huron, the French missionaries entered their country in 1623 and within a few years the Jesuit missions among the Huron became the most important in New France. The Iroquois had long been at war with the Huron and were equally hostile to the French. In 1648 began the final war, and within a year the Huron were compelled to abandon their country and seek shelter in different directions. Most of them fled to the Tionontati, who in turn were immediately attacked by the Iroquois in 1649, and after a short struggle the two tribes abandoned their country and fled to-

gether, first to Manitoulin Island in Lake Huron, then to Mackinaw and Green Bay, and finally to the Mississippi Driven back by the Sioux (q.v.), they halted for a time near the western end of Lake Superior and then returned to Mackinaw, where in 1677 they numbered about 500. In 1702 they removed to Detroit, in Lower Michigan, and were followed by the missionaries. In 1723 they were formally admitted to the friendship of the Iroquois In 1751 they built a new village at the present Sandusky, Ohio, and under the name of Wyandot soon acquired a new prominence in the Ohio country. They took an active part with the French in the Colonial wars and with the English against the Americans in the Revolution and War of 1812. At the treaty of peace in 1815 they were confirmed in possession of a large tract in Ohio and Michigan, most of which they sold three years later, reserving only two small pieces, near upper Sandusky, Ohio, and on the Huron River in Michigan In 1842 they removed to Kansas and in 1867 were again removed to a small reservation in the northeastern corner of Oklahoma, where in 1910 they resided to the number of 320. Consult Barbeau, *Wyandot Myths* (Ottawa, 1916).

WY'ANDOTTE. A city in Wayne Co., Mich., 12 miles south-southwest of Detroit, on the Detroit River, and on the Michigan Central, the Lake Shore and Michigan Southern, the Grand Trunk, and the Detroit, Toledo, and Ironton railroads (Map: Michigan, F 6) It has a public library and the Eilbert Memorial Hospital. Manufacturing is the leading industry, the most important establishments being chemical works, salt blocks, iron works, a steel shipbuilding plant, a trunk factory, breweries, and manufactories of fur coats, robes, sashes, doors, blinds, wagons, wheelbarrows, gasoline engines, automobiles and accessories, etc. Wyandotte has adopted the commission form of government. Pop., 1900, 5183; 1910, 8287; 1915 (U. S. est.), 9396; 1920, 13,851.

WY'ANDOTTE (from the North American Indian tribal name *Wyandot*). A breed of domestic fowls in high repute for general excellence It originated about 1875 from a mixture of dark Brahma, silver-spangled Hamburg, and French bred fowls, and possesses the good qualities of the Plymouth Rock breed, with a trifle less weight. Five varieties are recognized, differing in plumage. The silver-laced has a silvery-white plumage, with regularly marked white lacing on the breast and a generous distribution of white and black throughout the entire body. The cock has a silver-white head, rose comb, silver hackle, with a black stripe down the centre of each feather; back silvery white; breast black with white centre; tail black; wings black, edged with white, showing a bar when folded; shanks and toes unfeathered and yellow. The golden is golden-bay and black instead of white. The white is white throughout, and the most practical variety The buff is uniformly deep, clear buff in color, with a coppery bronze tail; and the black variety is wholly black with a greenish sheen. See FOWL; consult books mentioned thereunder; and see Colored Plate of DOMESTIC FOWLS with article POULTRY.

WYANDOTTE, or THE HULLED KNOLL. A novel by James Fenimore Cooper (1843).

WYANDOTTE CAVE. A remarkable natural formation in Crawford Co., Indiana, five miles northeast of Leavenworth. It is second in size to Mammoth Cave, being about 23 miles long, and consists mainly of a series of galleries and large chambers, whose greatest height is about 250 feet and greatest width about 300 feet It is remarkable for the number and beauty of its crystals, exceeding, it is said, even Mammoth Cave in that respect Among the most notable features are the Pillared Palace, with clusters of stalactites, and the Monument Mountain, 175 feet high, with three massive stalagmites at its top, standing on the floor of the Mammoth Hall, 350 feet long and 245 feet high Consult H C Hovey, *Celebrated American Caves* (Cincinnati, 1896).

WYANT, wī'ant, ALEXANDER H. (1836–92). An American landscape painter. He was born at Port Washington, Ohio, and was self-taught After practicing portrait painting in Cincinnati, in 1856, he went for a short stay to New York, where he came under the influence of Inness. In 1864 he returned to New York and in 1865 he went abroad, studying for some time under Hans Gude at Düsseldorf, but was more influenced by the works of Turner and Constable in London Returning to America he settled in New York, was elected to the National Academy in 1869, and was one of the founders of the American Water-Color Society. His landscapes, usually representing a sunny rolling country seen through a foreground of tall trees, are treated in a subjective manner, with soft, shimmering atmospheric effects, and refinement and delicacy of presentation. Among his paintings are a "View on Lake George" (1875); a "Scene in the Adirondacks" (1882); "An October Day" The Metropolitan Museum in New York possesses seven good examples of his work, including "Broad Silent Valley," "Forenoon in the Adirondacks," and "Landscape in the Adirondacks."

WY'ATT (**WYATE, WYAT,** or **WYET**), SIR FRANCIS (*c.*1575–1644). A Colonial Deputy Governor of Virginia, born in England. In 1621 he was chosen by the Virginia Company to succeed Deputy Governor Sir George Yeardley, and in October of that year arrived at Jamestown with a fleet of nine ships. With him he brought a written constitution, memorable as the first instrument of the kind ever in use in America With the first year of Wyatt's governorship 21 vessels bearing more than 1300 settlers arrived, but in 1622 occurred the great disaster of an Indian uprising. (See VIRGINIA.) When the charter was annulled in 1624, Wyatt remained Deputy Governor under a royal commission, but in 1625 he returned home He was again sent out in 1639, but after a stormy administration of about 18 months was succeeded by Sir William Berkeley. Consult E. D. Neill, *Virginia Governors under the London Company* (London, 1889).

WYATT, JAMES (1746–1813). An English architect. He was born at Burton Constable, Staffordshire, and at 14 accompanied Lord Bagot to Rome. He remained there for three or four years, and during the two following years studied with Antonio Vicentini at Venice. About 1766 he returned to England After rebuilding the old Pantheon in Oxford Street in 1772, he was constantly employed on important buildings, using first the Italian style, but after his appointment as surveyor to Westminster Abbey in 1776, the Gothic He was commissioned to restore Salisbury, Lincoln, Lichfield, and Hereford cathedrals; built Fonthill Abbey for Beckford

in 1795; and was employed by George III at Windsor Castle In 1785 he became a Royal Academician. He was the only man of his time who practiced in the Gothic style, which he sought with indifferent success to popularize But he wholly failed to master its fundamental principles either of construction or design; and his ruthless demolition of mediæval work in the course of his restorations fastened upon him the sobriquet of "The Destroyer"

WYATT, Sir Matthew Digby (1820–77) An English architect and writer on art. After his apprenticeship and his study for some time at the Royal Academy, he went in 1844 to the Continent and studied the architecture of Italy, France, and Germany, making an especial study of decorative art in its various applications. He returned to England in 1846, and in 1848 published *Geometrical Mosaics of the Middle Ages.* As secretary to the Royal Commissioners he took an important part in the arrangements of the 1851 exhibition In 1856 he was appointed architect to the East India Company In 1866 he received the royal gold medal of the Royal Institute of British Architects, and in 1869 he was chosen Slade professor of fine arts at Cambridge. His chief publications are *Metal Work and Its Artistic Design* (1852); *Industrial Arts of the Nineteenth Century* (1853); *Art Treasures of the United Kingdom* (1857); *Fine Art* (1870); and *Architect's Notebook in Spain* (1872)

WYATT, or **WYAT,** Sir Thomas (c.1503–42). An English poet and diplomatist, born on his father's estate of Allington, near Maidstone in Kent. His father, Sir Henry Wyatt, of a family originally of Yorkshire, stood high in favor with both Henry VII and Henry VIII. The younger Wyatt studied at St. John's College, Cambridge, from 1515 to 1520 In that year he married Elizabeth Brooke, daughter of Lord Cobham, but already he had been the lover of Anne Boleyn (q.v.), and for long after his marriage was still regarded as such. His boyish intimacy was ended only by her death. Through his father's influence and his own personality a career at court was open to him In this sphere, as one of the most accomplished men of his day, of noble presence and fine manners, of honor and integrity, and skillful in the management of affairs, he was thoroughly qualified to succeed. Wyatt visited Venice, Ferrara, Bologna, Florence, and Rome. In 1529 and 1530 he was high marshal at Calais. The favors of Anne Boleyn having now been sought by the King, Wyatt, it is said, confessed his relations and tried to dissuade the King on the ground that her character was not beyond reproach. In 1536 the scandal aroused by Anne Boleyn's adulteries threatened to overwhelm Wyatt. In May he was committed to the Tower, but after Anne's death he went free, was endowed with more honors, was made sheriff of Kent, and was sent on an embassy to Spain (1537–39). He was sent to Flanders in 1539. On the fall of his patron at court, Thomas Cromwell, Wyatt was sent to the Tower, accused of treason, but after explanation and confession, he regained the King's confidence and enjoyed it to a greater degree even than before the accusation. Granted lands at Lambeth by Henry VIII, named high steward of the King's manor of Maidstone, elected to Parliament for Kent, all in 1542, death overtook him in the same year.

Wyatt shares with Surrey the honor of introducing the sonnet into English verse, as he was the elder by some years, and a student of Petrarch, while Surrey was a mere child, the evidence seems to give him the preference Wyatt also tried his hand at the terza rima. He wrote (besides sonnets) rondeaux and miscellaneous verse forms, and satires and a version of the penitential psalms Love is the theme of most of his lyrics and Anne Boleyn is the mistress of his song. In his sacred poems Wyatt shows the influence of Dante and of Alamanni. More vigorous in thought and more robust in sentiment than Surrey, he was a ruder artist than his associate His poems, together with those of Surrey, who was his poetical pupil, were published in London, 1557, in *Songes and Sonnettes* (*Tottel's Miscellany*) A more elaborate edition prepared by G F. Nott, in two volumes, was issued in 1815–16 in London. This latter edition contained also the works of Surrey, and included an elaborate memoir. Consult: W. E. Simonds, *Sir Thomas Wyatt and His Poems* (Boston, 1889); F. M. Padelford, *Early XVIth Century Lyrics* (London, 1907); A. K. Foxwell, *Study of Sir Thomas Wyatt's Poems* (New York, 1912)

WYATT, Sir Thomas (?1521–54). An English soldier, son of Sir Thomas Wyatt, the poet, surnamed "the Younger." He did good service at the siege of Boulogne (1544), displaying considerable military talent, and continued in honorable service on the Continent till 1550 In 1554, when the marriage between Queen Mary and Philip of Spain was under consideration, Wyatt conspired to prevent it, and led the Kentish men to Southwark, after gaining considerable success over the royalists. He, however, failed to capture Ludgate, and, becoming separated from the main body of his followers, was taken prisoner, and soon afterward executed.

WYCHERLEY, wĭch'ẽr-lĭ, William (?1640–1716). An English dramatist, a founder of the school of artificial comedy, which reached complete development in the work of Congreve and his associates and later of Sheridan. Wycherley was born at Clive, in Shropshire, the son of a well-to-do cavalier squire, who sent him at 15 to be educated in France. On returning to England he was entered at the Inner Temple in 1659, but literature proved more attractive than law. His first comedy, *Love in a Wood, or St. James's Park,* was acted with great applause, and soon published, probably in 1672. *The Gentleman Dancing-master,* which appeared in 1673, was less successful, but two other comedies, *The Country Wife* (1675), and *The Plain Dealer* (1677), are his strongest works, though he is indebted to Molière for them. About 1680 Wycherley married a rich widow, the Countess of Drogheda. She soon died and left him her fortune; but his succession was disputed and a lawsuit ensued, the costs of which fairly broke him down. He was committed to the debtors' prison and languished there neglected for seven years. He was partly relieved by the bounty of James II, and upon his father's death he succeeded to the patrimonial estate in Shropshire. This, however, was heavily mortgaged and strictly entailed. He was on bad terms with the heir-at-law, his nephew; and to injure this relative, he married, at the age of 75, a young girl, on whom he settled a jointure. Eleven days afterward he died. Besides his comedies, Wycherley published a volume of wretched *Miscellany Poems* in 1704, and after

his death another volume, *The Posthumous Works of William Wycherley, Esq., in Prose and Verse*, appeared in 1728. His comedies reflect the literary taste, the manners, and the vices of his time. They are grossly immoral, but their dramatic construction is excellent, the language is clear and forcible, the dialogues are often witty, some of the characters are vigorously drawn, and the scenes are expressed in a terse, sententious style. Consult: The memoir published with the *Posthumous Works* (London, 1728), Lord Lansdowne, *Memoirs of the Life of William Wycherley, Esq; with a Character of His Writings* (ib., 1718); W. C. Ward, ed., *Best Plays of William Wycherley, with an Introduction and Notes* (ib., 1888); and William Hazlitt, *Lectures on the English Comic Writers* (ib., 1819; new ed. in "Everyman's Library," New York, 1910).

WYCHE'S (wĭch'ĕz) **LAND.** An island east of Spitzbergen, in about 79° N. lat., discovered and named by Edge in 1617. Its identity has been much discussed, without positive results, but it is probably part of King Charles Land.

WYCH (wĭch) **STREET.** A street in London, famous as the resort of thieves and loose characters during the seventeenth and eighteenth centuries. Jack Sheppard's special haunt, the White Lion, has long been demolished. In 1554, Bishop Hooper spent the night before his execution at another of its inns, the Angel. Wych Street leads from the Strand, near Clement's Inn, to Drury Lane, and contains the Olympic Theatre and an entrance to New Inn.

WYCKOFF, wī'kŏf, WALTER AUGUSTUS (1865–1908). An American sociologist, born in Mainpuri, India, where his father was a missionary. He graduated at Princeton in 1888, and studied in Europe (1889–90). For 18 months after July, 1891, he worked as a day laborer, making his way from Connecticut to California, in order to study the character and manner of life of the wage-earning class in America. The results of his studies appeared in three volumes: *The Workers—the East* (1897); *The Workers—the West* (1898); and *A Day with a Tramp and Other Days* (1901). These attracted widespread attention and show sympathetic insight and acuteness of observation. Wyckoff traveled twice around the world as a private tutor, in 1893–94; and at Princeton became lecturer on sociology in 1895 and was assistant professor of political economy from 1898 until his death.

WYCLIFFE. See WICLIF.

WYCOMBE, wĭk'ŭm, HIGH WYCOMBE, or CHIPPING WYCOMBE. A municipal borough in Buckinghamshire, England, surrounded by beech-clad hills, 28 miles west-northwest of London, on the Wye, a small affluent of the Thames (Map: England, F 5). It is famous for its Roman and Saxon antiquities. The church of All Saints, in the Norman and early English style, is a large and handsome edifice, dating from 1273. There are flour and paper mills, and manufactures of lace and furniture, beechwood chairs being a specialty. Pop., 1911, 20,390.

WYE, wī. A river of Wales and England. It rises on the south slope of Plinlimmon in Wales near the source of the Severn, and flows southeast into Herefordshire, England, then southward, in a deep trench emptying into the estuary of the Severn on the boundary between Monmouth and Gloucester (Map: Wales, D 5). It is 130 miles long, navigable for large vessels to Chepstow, near its mouth, and for small craft 70 miles to Hereford, whence a canal connects it with the Severn at Gloucester At its mouth the tide rises sometimes 46 feet, a height exceeded in few places on the globe. The lower course of the Wye is celebrated for its beauty, and here on its banks lie the ruins of Tintern Abbey.

WYET, SIR FRANCIS. See WYATT.

WY'ETH, JOHN ALLAN (1845–1922). An American surgeon, born in Marshall Co., Ala. He studied for a year at La Grange Military Academy, La Grange, Ala., and during the Civil War served as a private and was a prisoner for 15 months at Camp Morton, Indianapolis. He graduated in medicine at the University of Louisville (Ky.), in 1869, and at Bellevue Medical College (New York) in 1873. From 1880 to 1897 he was surgeon to Mount Sinai Hospital, New York. In 1882 he founded the New York Polyclinic, an important post-graduate school with hospital, and after occupying the chair of surgery in that institution for several years became, in addition, president of the faculty in 1893. He was president of the American Medical Association in 1902. His publications include: *A Text-Book on Surgery* (1888); *Bloodless Amputation at the Hip Joint* (1890); *Osteo-Plastic Operation for Correction of Deformities of the Nose and Palate* (1892); and a *Life of General Nathan Bedford Forrest* (1899). *With Sabre and Scalpel* (1915) is autobiographical.

WYKEHAM, WILLIAM OF. See WILLIAM OF WYKEHAM.

WYLIE, wī'lĭ, ALEXANDER (1815–87). An English missionary and sinologist, born in London. He was educated partly in Scotland and partly in London. With Premare's *Notitia Linguæ Sinicæ* and with a New Testament he learned to read Chinese fairly well. In 1847 he went to Shanghai as superintendent of the Mission Press of the London Missionary Society, and there, besides mastering Chinese, he carried through the press the new Delegates' Version of the Bible. In 1860 he became agent in China of the British and Foreign Bible Society. In the prosecution of his new work he traversed 17 of the 18 provinces of China, and naturally had less time for writing, but when in 1877 he retired, worn out with manifold labors and half blind, the list of his writings was a long one. In a year or two he became totally blind, but with the assistance of his daughter he continued his translation of the Han Dynasty history and the preparation of the catalogue of his library, which went to the Bodleian at Oxford. He died in London. His industry was enormous and his learning deep and wide. He published in Chinese, *A Compendium of Arithmetic*, with tables of logarithms, etc.; Euclid's *Elements*, books vii to xv, reprinted by Tsêng Kwoh-fan (in 1865); *A Popular Treatise on Mechanics* (1858); De Morgan's *Treatise on Algebra* (1859); Loomis's *Elements of Analytical Geometry* and his *Differential and Integral Calculus* (1859); and Herschel's *Astronomy*, with the original steel plate illustrations (1859). In 1855 he brought out an English version of a Chinese-Manchu *Grammar*, and in 1859 edited and published the Gospels of *Matthew* and *Mark* in Manchu and Chinese. His best known work in English is *Notes on Chinese Literature* (1867).

WYLIE, JAMES AITKEN (1808–90). A Scot-

tish theological writer, born at Kirriemuir, Forfarshire. He was educated at Marischal College, Aberdeen, at the University of St. Andrews, and at the Original Secession Divinity Hall, Edinburgh. In 1846 he became subeditor of the Edinburgh *Witness* and in 1852 (having joined the Free Church of Scotland) editor of the *Free Church Record*. In 1860 he was appointed lecturer on Roman Catholic and Protestant theology at the Protestant Institute, Edinburgh, and he held this position till his death. All his life he was a zealous upholder of Protestantism and wrote copiously on this topic and other religious subjects. His more important works were *The Modern Judea* (1841); *Ruins of Bible Lands* (1845), *The Great Exodus* (1863), *The History of Protestantism* (1874–77), *The Jesuits* (1881); *Over the Holy Land* (1883), *History of the Scottish Nation* (1886–90).

WYMAN, wī'man, JEFFRIES (1814–74). An American naturalist and anatomist, born at Chelmsford, Mass. He graduated at Harvard College in 1833 and at Harvard Medical School in 1837, and in 1840 was made curator of Lowell Institute, Boston. After studying in Europe, he was elected in 1843 professor of anatomy and physiology at Hampden-Sidney College, Richmond, Va. In 1847 he became professor of anatomy at Harvard, where he remained till his death. He made extensive and valuable collections in comparative anatomy and archæology, and he published nearly 70 scientific papers. His work as a comparative anatomist, a student of American Indian antiquities, and an early champion of evolution was of the first importance. Consult B. G. Wilder in *Leading American Men of Science*, ed. by D. S. Jordan (New York, 1910).

WYMAN, WALTER (1848–1911). An American surgeon and sanitarian. Born and educated at St. Louis (M.D., St. Louis Medical College, 1873), he joined the Marine Hospital Service in 1867, becoming surgeon general of the United States Public Health and Marine Hospital Service in 1902. He drafted several laws designed to result in improving the physical condition of sailors, furthered national quarantine, and was instrumental in the establishment of governmental laboratories for the manufactory of serums, toxins, and virus. He published many articles on public health and hygiene.

WYMORE. A city in Gage Co., Neb., 52 miles south of Lincoln, on the Blue River and on the Chicago, Burlington, and Quincy Railroad (Map: Nebraska, H 4). It has railroad machine shops and roundhouse. Grain and live stock are shipped in large quantities. Pop., 1900, 2626; 1910, 2613.

WYNANTS, or **WIJNANTS**, wī'nants, JAN (c.1605–c.1679). A Dutch landscape painter. He was born at Haarlem, and lived there and at Amsterdam. He was one of the earliest landscape painters in Holland, and is intrinsically interesting for his color, though his choice of subjects was poor. Wouwerman painted figures in his landscapes while he lived at Haarlem, and Van der Velde, Lingelbach, and others after he removed to Amsterdam. His work is well represented in many of the European galleries, especially in those of Amsterdam, The Hague, Munich, St. Petersburg, and the National Gallery and Wallace collection, London.

WYNDHAM, win'dam, SIR CHARLES (1837–1919). An English actor and manager. Educated as a physician, he came to America during the Civil War and was for a time a surgeon in the Union army. While in America, too, he made his appearance upon the stage; and after his return to England appeared in London (1868), where he soon became very popular in light comedy. His Charles Surface was much admired and another of his successes was made in an adaptation of Bronson Howard's *Saratoga*, called *Brighton*, in 1874, which he afterward played in German at Berlin. In 1876 he became connected with the Criterion Theatre, of which he assumed control in 1879. Among his productions were many of the best-known plays of Sir Arthur Pinero and Henry Arthur Jones. He made frequent visits to the United States, where he appeared in all his best rôles. In 1899 he opened the splendid Wyndham's Theatre in London, and in 1903 the New Theatre. In 1916 he married Miss Mary Moore (widow of James Albeny), who for 30 years had been his leading lady, and had also been associated with him as a manager. He was knighted in 1902. Consult Florence T. Shore, *Sir Charles Wyndham* (New York, 1908).

WYNDHAM, GEORGE (1863–1913). An English statesman. He was born in London, and was educated at Eton and at the Royal Military College at Sandhurst, where he graduated in 1882. In 1883 he entered the Coldstream Guards and served through the Suakim campaign, and in Cyprus (1885), when he resigned from the army. From 1887 to 1892 he was private secretary to A. J. Balfour. In 1889 he entered Parliament as a Conservative member from Dover, and in 1898 became Undersecretary of State for War. In 1900 he was advanced to the position of Chief Secretary for Ireland, and in 1902 was made a member of the cabinet. He first became a figure of international interest when, on March 25, 1903, he introduced the most important of Irish land purchase bills (See IRISH LAND LAWS.) His conciliatory attitude rendered the passage of the bill possible. He resigned in March, 1905, owing to the criticism directed by the Orange Unionists against his conciliatory policy in Ireland. He edited *North's Plutarch* (1894), and *Shakespeare's Poems* (1898), and in 1906 published *Ronsard and La Pléiade*.

WYNDHAM, WILLIAM. See GRENVILLE, LORD.

WYNDHAM-QUIN, WINDHAM THOMAS. See DUNRAVEN, EARL OF.

WYNKIN DE WORDE. See WORDE, WYNKIN DE.

WYNTOUN, win'tŭn, ANDREW OF (?1350–?1420). A Scottish chronicler, about whom very little is known except that he was a canon regular of St. Andrew's and was elected about 1395 prior of St. Serf's Inch in Loch Leven. His *Oryginale Cronykil of Scotland*, in verse, possesses great linguistic interest as a specimen of early English written in the North. Like Barbour's *Bruce*, the poem is composed in octosyllabic verse. The work was edited by David Laing for the "Series of Scottish Historians" (3 vols., Edinburgh, 1872–79). A new edition from the Wemyss manuscript prepared for the Scottish Text Society and issued in 1906 is incomparably the best.

WYOMING, wī-ō'ming *or* wī'ō-ming (named after Wyoming valley, Penn., q.v. for derivation). One of the Rocky Mountain States, lying between lat. 41° and 45° N. and long. 104° 3′ and 111° 3′ W. Its boundaries are straight lines

running along meridians and parallels. The length of the southern boundary line is 369 miles, the width of the State north and south is 276 miles, and the area is 97,914 square miles, making it eighth in size among the States of the Union.

Topography. The Rocky Mountain system crosses Wyoming from southeast to northwest in two chains of connecting ranges. While the general altitude is great, the relief is in many places so great that the general altitude is forgotten. Only a few small valleys lie below 4000 feet elevation; vast plateaus, between the ranges, lie between 6000 and 7000 feet, and many of the mountain peaks reach nearly 14,000 feet above sea level.

The more easterly of these chains enters the State a little west of the southeast corner, under the name of the Front Range or the Laramie Range, extends north some hundred miles to Laramie Peak, bends to the west and after flattening out and lowering to less than 7000 feet, turns sharply to the north, again increases in altitude, and extends to and into Montana as the mighty Big Horn Range. The second chain enters the State at the eastern third point of the southern boundary as the Medicine Bow and Sierra Madre ranges, being separated by the North Platte valley. They merge and swing to the west under the name of the Ferris, and farther west the Green Mountains, and again swinging to the north, rise as the great Wind River Range which joins with the Absaroka and Owl Creek mountains and becomes the great elevated plateau known as Yellowstone Park. The waters from the eastern slope of the Wind River Range flow north, then east towards the Mississippi and the Gulf of Mexico, those from the southern slope to the Gulf of California, and those from the northwestern slope go to the Columbia and thence to the Pacific.

Hydrography. Wyoming has six large rivers. The Green River and its tributaries drain the southwestern quarter. Its headwaters come from under the glacier on the north side of Fremont Peak in the Wind River Range. It leaves the State through the beautiful Ladore Cañon. The Snake River rises in Yellowstone Park, flows through Jackson Lake, receives tributaries from the Teton, Wind River, Gros Ventre, and Wyoming ranges in the famous Jackson Hole and flows into Idaho to become the Columbia.

All the other rivers are tributaries of the Missouri. The North Platte (q.v.) has the largest drainage area of the State. The Powder River has but few tributaries from the mountains. It flows northeasterly across a vast area of plains country, leaving the State near its northeast corner. The Big Horn River is formed by the union of several rivers which drain the eastern slope of the Wind River Range and the south slope of the Owl Creek Mountains and join under the name of Big Wind River, which, after roaring through the magnificent cañon of the Owl Creek Mountains, enters the Big Horn basin, and is then known as the Big Horn River.

Geology. Wyoming has rocks of every geological age. The mountain cores are Archean granites and Pre-Cambrian schists. Upon the flanks of the ranges lie the Cambrian, Paleozoic, and Mesozoic series, while the Tertiary and Quaternary appear far from the mountains in what were the old sea and lake beds, when these bodies of water were entrapped by the uprearing of the mountain ranges. In the sedimentary rocks are vast deposits of coal, petroleum, iron, phosphates, gypsum, and soda. Building stones are unlimited in quantity and extremely varied in quality. The coal-producing area of the State is estimated at 30,000 square miles, and some 4000 square miles of phosphate-bearing area has been surveyed. In the igneous rocks are found the various precious metals.

Climate and Soil. The climate is arid, the annual precipitation in some parts being as low as 6 inches. The high timber-covered mountains receive some 20 feet of snow during the winter months. This melts during the summer months, feeding the thousands of streams which are diverted to irrigation ditches in the foothill and plain parts of their courses. The dryness of the air results in a healthful climate. The soils vary from the gravelly, sandy loams of the glacial-drift areas, to the heavy clay (adobe) of the shale and limestone districts. Much of the State has a thin sandy grass-covered soil overlying a heavy blue-clay subsoil. This condition seems to be very favorable for irrigation, as the water does not escape as it does where the subsoil is sand and gravel.

Mineral Products. Wyoming in 1914 ranked thirtieth among the mineral-producing States. The most important minerals in order of importance are coal, petroleum, iron ore, and gypsum. The value of the coal produced in 1914 constituted about five-sixths of the total value of mineral products. The production of powder-mined coal was 2,204,762 tons. The machine-mined production amounted to 2,734,151 tons, the hand-mined coal amounted to 1,532,987 tons. The total production of coal in that year amounted to 6,475,293 short tons valued at $10,033,747. Remotely situated, the oil fields have been developed slowly, largely in response to the demand of certain railroads for liquid fuel. The petroleum comes largely from the Salt Creek and Shannon fields both in Natrona County. The production of petroleum in that year amounted to 3,560,375 barrels valued at $1,679,192. The State also produced gypsum in that same year valued at $86,196, clay products with a value of $64,942, and stone valued at $62,331. Other minerals produced are gold, sand and gravel, silver and mineral waters. The gross value of all mineral products in 1914 was $12,417,752.

Agriculture. Of a total land area of approximately 62,460,160 acres only 8,543,010 acres were in farms in 1910 and of which 1,256,160 acres were improved land. The total number of farms in that year was 10,987, and the average number of acres per farm was 777.6. The average value of farm land per acre was $10.41. The total value of all farm property including land, buildings, implements and machinery, domestic animals, poultry, and bees, was $167,189,081. Of the total number of farms in 1910 10,090 were operated by owners and managers and 897 were operated by tenants. The native white farmers numbered 9019, the foreign-born farmers 1903, the negro and other nonwhite 65. Of the foreign-born farmers 324 were born in England, 321 in Germany, and 252 in Sweden. Among the nonwhite farmers were 44 Indians and 19 negroes. The following table gives the acreage, production, and value of some of the leading crops as estimated by the United States Department of Agriculture in 1915.

Crops	Acreage	Prod in bu.	Value
Corn	25,000	625,000	$419,000
Wheat	125,000	3,315,000	2,586,000
Flaxseed	2,000	26,000	38,000
Oats	227,000	9,534,000	4,100,000
Rye	9,000	180,000	162,000
Potatoes	16,000	2,400,000	1,440,000
Hay	550,000	*1,210,000	9,438,000
Barley	17,000	612,000	337,000

* Tons

While the State still takes high rank as a grazing State, large areas are now being irrigated and cultivated with great success. The gross value of all crops in 1909 was $10,022,961. The leading crops are hay and forage, oats, wheat, and potatoes According to the thirteenth census the acreage of hay and forage was 585,386, and the production 853,515 tons valued at $6,077,354, the acreage of oats 124,035 and the production 3,361,425 bushels valued at $1,828,711; the acreage of wheat 41,968, the production 738,698 bushels valued at $664,251; the acreage of potatoes 8333 and the production 932,162 bushels valued at $524,489. The acreage of vegetables (other than potatoes) was 2933 and their value $332,000. To small fruits were devoted 106 acres from which the yield was 96,883 quarts valued at $13,984. Most important among the small fruits were currants and strawberries The production of orchard fruits was 18,586 barrels valued at $39,774 By far the most important of the orchard fruits is the apple. The production of sugar beets amounted to 13,418 tons valued at $61,398

Live Stock and Dairy Products.—The gross value of all live stock on the farms in 1909 was $65,384,559. According to the estimates of the United States Department of Agriculture there were on the farms on Jan. 1, 1916, horses, 180,000 valued at $14,760,000; mules, 2000 valued at $198,000; milch cows, 50,000 valued at $4,025,000; cattle, other than milch cows, 703,000 valued at $37,048,000; sheep 4,338,000 valued at $24,293,000; swine 70,000 valued at $658,000. The total value of milk, cream, and butter fat sold, and butter and cheese made was $539,423. The milk sold amounted to 1,377,607 gallons valued at $155,882, the butter made amounted to 1,192,122 pounds valued at $331,021. The total number of fowls of all kinds on the farms was 341,050 and their value $194,078.

Irrigation. Irrigation was reported from every county in 1909 There are three counties, Park, Bighorn, and Carbon, with more than 90 per cent of the farms irrigated, and two others Uinta and Sheridan, with more than 75 per cent irrigated. The number of farms irrigated in 1909 was 6297, the number of acres irrigated 1,133,302, and the number of acres existing enterprises were capable of irrigating 1,639,510 The acreage included in projects now under way is 2,224,298. The total cost of existing irrigation enterprises amounted to $17,700,980 and the estimated final cost of existing enterprises aggregated $20,425,890 The most important farm crops are almost altogether grown on irrigated land. Most important among such crops is alfalfa, of which the output from irrigated land in 1909 was valued at $2,526,657. Second in importance were the wild salt or prairie grasses with an irrigated crop valued at $1,384,269 Next came oats with an irrigated crop valued at $1,302,033

Forest Products. The lumber industry is the second in importance within the State. The rough lumber sawed in 1909 amounted to 28,602 M feet B M., the lath to 1224 thousands, the shingles 960 thousands. The rough lumber sawed in that year consisted almost altogether of soft woods, chiefly western pine and lodgepole pine. In addition to the figures cited above there were produced on the farms forest products valued at $104,259.

Manufactures. The manufacturing industries in Wyoming are not of great importance. The value of products per capita in 1909 was $42.81.

The following table gives the most important figures relative to the manufactures in the State.

SUMMARY OF MANUFACTURES FOR 1914, 1909, AND 1904
THE STATE — FIVE LEADING INDUSTRIES

INDUSTRY	Census	Number of establishments	PERSONS ENGAGED IN INDUSTRY: Total	PERSONS ENGAGED IN INDUSTRY: Wage earners (average number)	Capital	Wages	Value of products	Value added by manufacture
					Expressed in thousands			
All industries	1914	337	3,696	2,989	$29,270	$2,312	$11,223	$5,664
	1909	268	3,393	2,867	6,195	2,081	6,249	3,641
	1904	169	2,163	1,834	2,696	1,261	3,523	2,222
Butter, cheese, and condensed milk	1909	4	27	20	115	17	269	58
	1904	5	17	11	38	7	114	19
Cars and general shop construction and repairs by steam-railroad companies.	1909	9	1,806	1,690	2,046	1,309	2,337	1,629
	1904	9	1,288	1,212	901	884	1,640	1,107
Flour-mill and gristmill products	1909	13	45	29	440	21	746	163
	1904	11	31	16	222	11	284	65
Lumber and timber products	1909	63	766	648	1,075	314	751	553
	1904	32	370	305	345	151	465	401
Printing and publishing	1909	65	275	162	437	141	490	400
	1904	47	186	119	206	84	313	261

The average number of wage earners in 1909 was 2867, of whom only 45 were female. The wage earners under 16 years of age numbered only 12. For the great majority of wage earners the prevailing hours of labor were from 60 to 72 per week, only 16.9 per cent having hours less than 60 per week.

The only city with a population of 10,000 or more, Cheyenne, gave employement to 29.8 per cent of the total number of wage earners and produced 25.2 per cent of the total value of output, the respective figures being 853 and $1,577,023. Outside of the car repair shops the only industries are those necessary to meet local needs.

Transportation. There is no water transpor-

tation. Wyoming having no navigable streams. The rugged character of the terrain does not permit of extensive railway construction, and in 1914 the total mileage was 1821. The principal lines and the mileage in that year are the Union Pacific (617), the Chicago, Burlington, and Quincy (602), and the Chicago and North-western (279).

Banks. The condition of the various banks in 1915 as reported by the United States Comptroller of the Currency is as follows:

	National banks	State banks	Savings banks
Number	33	66	4
Capital	$1,900,000	$1,540,250	$210,000
Surplus	1,116,000	431,425	12,500
Cash, etc.	853,000	373,061	23,667
Deposits	14,195,000	6,497,509	1,161,992
Loans	13,135,000	6,524,941	1,205,438

Government. The present constitution was adopted by the people on Nov. 5, 1889. Amendments may be proposed by either branch of the legislature, and if agreed to by two-thirds of the members of each of the two houses they are submitted to the electors of the State at the next general election, and if ratified become a part of the constitution. On recommendation of two-thirds of the members of each branch of the legislature the question of constitutional convention may be submitted to the people.

Legislature.—The legislative power is vested in the Senate and House of Representatives. Senators are elected for a term of four and representatives for a term of two years. Senators must be at least 25, and representatives at least 21 years of age. Sessions of the legislature begin on the second Tuesday of January, biennially in odd years.

Executive.—The executive power is vested in the Governor, who holds office for four years. Other executive officers are Secretary of State, Auditor, Treasurer, and Superintendent of Public Instruction. They also hold office for four years. The Attorney-General, State Engineer, State Examiner, and other officers are appointed by the Governor.

Judiciary.—The judicial power is vested in a Supreme Court, district courts, justices of the peace, and such other courts as may be established by law. The Supreme Court consists of three justices, who are elected for a term of eight years. In each county is appointed one or more court commissioners who have authority to perform legal business in the absence of the district judges from the county. There are seven district judges. The State is divided into seven judicial districts, and a judge is elected in each district for a term of six years.

Suffrage and Elections.—Any citizen, male or female, of the United States of the age of 21 years and over, who has resided in the State for one year and in the county for 60 days preceding the election, is entitled to vote. All general elections are held on the Tuesday following the first Monday in November of each even year. Nominations for offices are made through primary elections.

Local and Municipal Government.—The county is the unit of local government. The towns are incorporated under a general law. Municipalities having a population of more than 4000 are cities of the first class, and may adopt the commission form of government.

Miscellaneous Statutory and Constitutional Provisions.—There is a workmen's compensation law. In regulation of the liquor traffic, Wyoming is under license and municipal council option in the incorporated towns and villages, while unincorporated sections of the State are under prohibition. The Yellowstone National Park, which is under the control of the Federal government, is also under prohibition. The initiative and referendum are in force among cities of the first class.

Finance. A bonded debt of $320,000, chiefly to meet expenditures for the capitol and other buildings, was incurred when Wyoming entered the Union in 1890. This amount had been reduced by Sept. 30, 1914, to $111,000, of which $90,000 was public bonds. The report of the State Treasurer for the biennial period 1913–14 shows a cash balance on Oct. 1, 1912, of $1,179,672. The receipts for the period were $2,643,268, while the disbursements amounted to $2,331,459, leaving a cash balance on hand Sept. 30, 1914, of $1,491,482.

Population. The population of the State at each of the Federal censuses was as follows: 1870, 9118; 1880, 20,789; 1890, 62,555; 1900, 92,531; 1910, 145,965; 1915, 141,705; 1920, 194,402; The number of persons to the square mile in 1910 was 1.5. The urban population—i.e., that in places of 2500 or more—was 43,221. The native whites of native parentage numbered 80,696, the native whites of foreign or mixed parentage 32,504, the foreign-born whites 27,118, the negroes 2235. Of the foreign born Austria furnished 14.6 per cent, England 11 per cent, Germany 9.7 per cent, and Sweden 9.2 per cent. Of the native whites 27.2 per cent was born in the State, 9.1 per cent in Iowa, 7.3 per cent in Nebraska, 6.3 per cent in Illinois, and 6.2 per cent in Missouri. By sex the population was divided into 91,670 males and 54,205 females. The males of voting age in 1910 numbered 63,201. There are three cities with a population of 8000 or more. These with their population in 1910 and 1915 (State census) follow: Cheyenne, 11,320 and 9661; Sheridan, 8408 and 8906; Laramie, 8237 and 4962.

Militia. The males of militia age in 1910 numbered 54,654. The organized militia in 1915 included 598 men and 34 officers. It comprised two battalions and a separate company of infantry, and a detachment of sanitary troops.

Education. The percentage of illiteracy in 1910 was 3.3. The percentage of illiterates among the native born of native parentage was 0.3, among foreign-born whites 9.7. The total school population in 1910 according to the thirteenth census was 32,334. Of these 24,584 or 76 per cent attended school in that year. The total enrollment in the schools in 1914 according to the reports of the State Superintendent of Schools was 29,301. Of these 29,155 were white and 146 were colored. The total number of schoolhouses was 879. There were 245 graded and 714 ungraded schools. The total number of teachers was 1488, of whom 1300 were women and 188 men. The average monthly salary of men teachers was $85.92, and of women $58.43. There were 44 high schools, in which there were enrolled 2697 pupils. The total disbursement for educational purposes in 1914 was $1,758,930.

Provision has been made for the teaching of agriculture in the State course of study. It is the duty of the State Superintendent of Edu-

cation to prepare a course of study for the elementary schools All teachers are obliged to attend the annual county teachers' institute, and must hold a valid Wyoming State certificate covering a period of services in public schools. Each county has a county superintendent.

Most of the schools are of course rural schools. The Legislature of 1915 amended the compulsory education law. Children from the ages of seven to 14 inclusive are obliged to attend school during the entire term. There is one State normal school in Wyoming. The only institution of collegiate rank is the University of Wyoming at Laramie (see WYOMING, UNIVERSITY OF), which is part of the educational system of the State. It is coeducational.

Charities and Corrections. The charities and corrections under the control of the State Board of Charities and Reform include the State Hospital for the Insane at Evanston, Wyoming State Penitentiary at Rawlins, Wyoming Soldiers and Sailors Home at Buffalo, Big Horn Hot Springs Reserve at Thermopolis, Wyoming General Hospitals at Sheridan, Rock Springs, and Casper, and Wyoming School for Defectives at Lander.

Religion. The combined membership of all religious bodies comprises a little more than one-fourth of the total population. The Roman Catholics outnumber the Protestants, who are followed by the Mormons. The leading Protestant denominations are the Episcopalian, Methodist, Baptist, and Congregationalist.

History. The territory included within the present State was a part of the Louisiana Purchase of 1803 with the exception of the southwest corner, which was a part of the Mexican cession of 1848. The Territory of Wyoming was directly created by Congress July 25, 1868, from Dakota, Utah, and Idaho. The stories of Spanish exploration have no foundation. The first white explorers were Sieur de la Verendrye and his sons, who passed through while looking out for situations for trading posts in 1734–44 White hunters visited the Yellowstone in 1804, and in 1807 fur-trading posts were established in Montana and the trappers began to range the country. The first permanent fort was built on the Laramie Fork of the Platte in 1834. It was sold to the American Fur Company in 1835, rebuilt by that corporation in 1836, and sold to the United States in 1842, and in the same year Fort Bridger was built on the Black Fork of the Green River, but was abandoned in 1835 on account of Mormon opposition. The streams of immigration both to California and Oregon passed through the Territory, but few or none of the immigrants settled permanently. A chain of forts was built by the Federal government to protect the travelers, however, from the Sioux and other Indians, who declared war against the military and the trappers in 1854. In 1867 the discovery of gold led to the founding of South Pass City, and the same year Cheyenne was laid out by the Union Pacific Railroad Company. The surrounding country, which was without government of any sort, was formed into Laramie Co., Dak., and a vigilance committee kept order. The Territorial government was organized in 1869, and the same year woman's suffrage was adopted and has been maintained to the present time. The Indians in 1866 refused to grant a right of way through their lands, and until after they had been punished for the massacre of Gen. George A. Custer (q.v.) in Dakota in 1876 they were constantly making trouble The State was admitted to the Union July 10, 1890, as the constitution adopted in November, 1889, had been approved by Congress. Fraudulent entries for public lands, especially the coal lands, made by the collusion of railroad and United States Land Office agents, led, 1903–06, to numerous convictions in the State In national politics the State voted first in 1892 for the Republican candidates. The free-silver agitation in 1896 carried it into the Democratic column, but in 1900, 1904, and 1908 the Republican electors were chosen. In the presidential election of 1908 Taft received 20,846 votes, and Bryan 14,918 In 1910, as the result of the division in the Republican party, the Democrats elected their candidate for Governor, Joseph M Carey, an insurgent Republican. In the presidential election of November, 1912, Wilson received 15,210 votes, Taft 14,560, and Roosevelt 9232. In the State election held in 1914 the Democrats elected John B Kendrick, Governor.

GOVERNORS OF WYOMING

TERRITORIAL

John A Campbell	1869–75
John M Thayer	1875–78
John W Hoyt	1878–82
William Hale	1882–85
Francis E Warren	1885–86
George W Baxter	1886
Thomas Moonlight	1886–89
Francis E Warren	1889–90

STATE

Francis E. Warren	Republican	1890
Amos W Barber (acting)		1890–92
John E Osborne	Democratic Populist	1892–95
William A Richards	Republican	1895–99
DeForest Richards	"	1899–1903
Fenimore Chatterton	"	1903–05
Bryant B Brooks	"	1905–11
Joseph M Carey	Democrat	1911–15
John B Kendrick	"	1915–17
Frank L Houx (acting)	"	1917–19
Robert D. Carey	Republican	1919–

Bibliography. Wyoming Territory, Department of State, *Resources of Wyoming* (Cheyenne, 1889); H. H. Bancroft, *History of Nevada, Colorado, and Wyoming, 1540 to 1888* (San Francisco, 1890); G. R. Hebard, *Government of Wyoming* (3d ed., ib., 1907); and Census of the State of Wyoming (Cheyenne, 1915), and United States Geological and Geographical Survey of the Territories, *Reports* (Washington, 1877 et seq.).

WYOMING. A borough in Luzerne Co., Pa., 5 miles north of Wilkes-Barre, on the Susquehanna River, and on the Delaware, Lackawanna, and Western, and the Lehigh Valley railroads (Map: Pennsylvania, K 4). Coal mining is the chief industry. Pop., 1900, 1909; 1910, 3010.

WYOMING, UNIVERSITY OF. A State institution for higher education founded at Laramie, Wyoming, in 1886. The university includes the following departments: the college of liberal arts, college of agriculture, college of engineering, and college of education. There are also departments of commerce, home economics, music, university extension, a teachers' training high school, a department of secondary education, and a summer school. With the university is included the State normal school. There is maintained in connection with the agricultural education the Wyoming Agricultural Experiment Station. In 1914 the graduate school of the university was discontinued. In the same year the college of education was created embracing a State normal school. In

1913 the legislature appropriated $5000 for agricultural extension work. The total enrollment in all departments in 1915–16 was about 450, and the faculty numbers about 70. The library contains approximately 35,000 volumes. The productive funds amount to about $60,000, and the annual income to about $200,000. The university is supported chiefly by State appropriations. The president in 1916 was Clyde Augustus Duniway, Ph.D., LL.D.

WYOMING VALLEY. A beautiful and fertile valley in Luzerne Co., Pa., along the north branch of the Susquehanna. It is about 21 miles long by 3 wide and is supposed to have derived its name from the Delaware Indian word *Maughwauwama*—large plains. Though early claimed by both Connecticut and Pennsylvania, in virtue of their charters of 1662 and 1681 respectively, it remained unsettled by the whites until 1763, when the Susquehanna Company of Connecticut, which had been formed in 1753, and had purchased the land from the Indians in 1754, sent out a number of settlers. In 1768 Pennsylvania also bought the tract from the Indians and established a settlement (1769) through two lessees, Ogden and Stewart. Almost simultaneously another party from Connecticut arrived, and there was an almost continual conflict, until in 1771, Connecticut's claim having been confirmed by the King, the Susquehanna Company was left in control. In 1773 the valley was erected by Connecticut into a chartered town under the name Westmoreland. In 1775 the militia of Northumberland Co., Pa., made an abortive attack on a small settlement along the west branch of the Susquehanna, and in the same year, the Revolutionary War having broken out, the settlers expelled a few of their number, who were Tories. The expelled Tories, assisted by an additional white force and 700 Indians—the total force numbering about 1100—marched against the isolated settlements in the summer of 1778. They were commanded by John Butler (q.v.), but his son Walter, who later directed the Cherry valley (q.v.) massacre, was partly responsible for the acts done there. The settlers, warned, took refuge in Forty Fort, near the present Wilkes-Barre, but on July 3, 400 of them—nearly all the males—attacked the invaders and were completely defeated, two-thirds of their number being killed or captured and the rest taking refuge in the fort. Many of the prisoners were tortured and killed, partly by the Indian squaws (among them Esther Montour, q.v.), and on the following day the fort surrendered. More lives were taken, but the settlements were thoroughly devastated, and the inhabitants, endeavoring to reach the nearest settlements, suffered terrible hardships, a hundred women perishing of fatigue and starvation. The settlers returned in small numbers, but after the war the old controversy between Connecticut and Pennsylvania was renewed. In 1782 Congress decided in favor of Pennsylvania, but conflicts continued among the settlers until 1788, when the Pennsylvania Legislature confirmed their various titles. The long conflict between Connecticut and Pennsylvania is sometimes called the Pennamite-Yankee War (or wars). A granite obelisk opposite Wilkes-Barre marks the site of the battle of July 3, 1778. Consult: Smith, *Story of Wyoming Valley* (Kingston, Pa., 1906).

WYSE, N. B. See PANAMA CANAL.

WYSS, vēs, JOHANN RUDOLF (1781–1830). A Swiss professor of philosophy and librarian at Bern, where he was born and died. Wyss is remembered chiefly if not solely as the author of *Der schweizerische Robinson* (*The Swiss Family Robinson*, 1813), a juvenile classic, still popular in many languages, the sole survivor of numerous imitations of Defoe's *Robinson Crusoe;* also of the Swiss national hymn "Rufst du, mein Vaterland!" Wyss wrote also *Idyllen, Volkssagen, Legenden und Erzahlungen aus der Schweiz* (1815–22); *Reise im Berner Oberland* (1808); and *Vorlesungen uber das hochste Gut* (1811).

WYTHE, wīth, GEORGE (1726–1806). An American patriot and jurist: a signer of the Declaration of Independence. He was born near Hampton, Va., was educated at William and Mary College, and was admitted to the Virginia bar. He was chosen to represent William and Mary College in the Virginia House of Burgesses, and drew up its remonstrance to the British Parliament against the proposed Stamp Act (q.v.) in 1764. In August, 1775, he was chosen a delegate to the Continental Congress. In the following year he was appointed on a committee with Thomas Jefferson, Edmund Pendleton, and others to revise the laws of Virginia. In 1777 he was Speaker of the Virginia House of Delegates, and shortly afterward was appointed a judge of the High Court of Chancery. From 1786 until his death he was Chancellor. He was professor of law at William and Mary College from 1779 to 1789, and in 1787 was a member of the convention which framed the Federal Constitution. Subsequently, as a member of the Virginia convention, he aided in securing its ratification by his native State. He published *Decisions in Virginia by the High Court of Chancery* (1795; 2d ed., with *Memoir*, 1852).

WYTHEVILLE, wīth'vil. A town and the county seat of Wythe Co., Va., 131 miles southwest of Lynchburg, on the Norfolk and Western Railroad (Map: Virginia, C 5). Knit goods, woolen goods, flour, and iron and lumber products are the principal manufactures. Pop., 1900, 3003; 1910, 3054.

WYTTENBACH, vit'ten-bäk, DANIEL ALBERT (1746–1820). A Dutch classical scholar, born at Bern, Switzerland. After studying at Marburg, Göttingen, and Leyden, he became professor of Greek at Amsterdam in 1771, and in 1799 professor of rhetoric at Leyden. Wyttenbach died of apoplexy in 1820. In addition to his chief work, a critical edition of Plutarch's *Moralia*, with copious notes, and an *Index Græcitatis in Plutarchi Opera* (1795–1830), he published: *Epistola Critica* (1769); *Præcepta Philosophiæ Logicæ* (1782; new ed., 1821); *Eclogæ seu Selecta Principum Historicorum Capita* (1793 and 1829); *Vita Ruhnkenii* (1800), a masterly biography of his former teacher, ed. by Frotscher, 1846; and an edition of Plato's *Phædo* (1810; new ed., 1825). Posthumously appeared *Opuscula Varii Argumenti* (1821). Consult Mahne, *Vita D. Wyttenbachii* (Ghent, 1823, ed. by Frotscher, Freiburg, 1846); also J. E. Sandys, *A History of Classical Scholarship*, vol. iii (Cambridge, 1908).—His wife, JOHANNA (died 1830), born at Hanau, was a woman of scientific education and author of *Théagène* (1815); *Das Gastmahl der Leontis* (1821); and of the novel *Alexis* (1823).

WYVERN, wī'vērn. See HERALDRY.

X

X The twenty-fourth letter and nineteenth consonant in the English alphabet. This form (X) had two different values in the alphabets of eastern and western Greece It is from the western Greek alphabet that the Latin form and value (*ks*) were derived. In native Latin words *x* never occurred initially, but it was employed internally as a representative of *cs, gs,* e g., *pax, pacis, rexi, regere.*

Sound and Philological Value. As a composite sound *x* has usually the value of *ks,* e g, in *fixture, Styx, excellent.* Between vowels, the second of which is accented, *x* becomes voiced (= *gz*), as in *exalt, exhilarate, exotic.* In *anxious, luxurious, x* is pronounced *ksh, gzh* Initially, where it usually indicates a word of Greek origin, its sound is *z,* as in *Xantippe, Xerxes, xylophone.* As a philological derivative, English *x* represents Indo-Germanic *ks* (Germanic *hs*), as in Sanskrit *uksan,* German *Ochse,* English *ox;* Greek ἕξ, Latin *sex,* German *sechs,* English *six.* X occurs in loan words from: (1) Latin, *exact, mix, noxious;* (2) from Greek *onyx, calyx, lynx.*

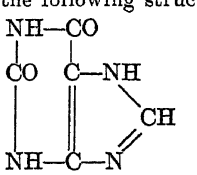
As a Symbol and Abbreviation. As a Roman numeral X = 10; ⋈ = 1000; $\overline{X}$ = 10,000; $\boxed{X}$ = 1,000,000. In algebra *x* represents an unknown variable quantity; in analytical geometry *x* indicates the abscissa or rectilinear point coördinate. Consult: Victor Gardthausen, *Griechische Palaeographie* (Leipzig, 1879; 2d ed., 1911); Philippe Berger, *Histoire de l'écriture dans l'antiquité* (Paris, 1892); Maurice Prou, *Manuel de paléographie latine et française* (2d ed., ib, 1910); Sir E. M. Thompson, *Introduction to Greek and Latin Paleography* (London, 1912).

XALAPA, hä-lä'pä. Another spelling for Jalapa (q.v.), a city of Mexico.

XALISCO, hä-lĕs'kō. Another spelling for Jalisco (q.v.), a state of Mexico.

XANTHI, zăn'tē. A town of Bulgaria, situated near an inlet of the Ægean Sea, 28 miles northeast of Kavala. It is chiefly important for its trade in a celebrated brand of tobacco. In the partition of European Turkey (1913) following the Balkan War (q.v.) the town was allotted to Bulgaria Pop., about 14,000.

XANTHINE, zăn'thĭn (from Gk *ξανθός, xanthos,* yellow), $C_5H_4N_4O_2$. An organic substance found in small quantities in urine and in the substance of the muscles, the liver, the spleen, the brain, etc. It is also found in urinary calculi, in certain vegetable tissues (i e, in tea), and in the soil. Somewhat large quantities of it are found in meat extract. It is usually prepared from guanine, a nitrogenous substance allied to xanthine and obtained from guano; as shown by Fischer in 1910, guanine is converted into xanthine by boiling with a 25 per cent aqueous solution of hydrochloric acid for 32 hours. Pure xanthine is a colorless substance, soluble in alkalies, sparingly soluble in water, and acting as a feeble base. By the action of methyl iodide on its lead salt, theobromine—a substance closely allied to xanthine—is obtained. The chemical constitution of xanthine has been shown by Fischer to be represented by the following structural formula.



When oxidized, xanthine yields urea and alloxan, which are also among the oxidation products of uric acid (q.v.). Xanthine may be identified by the Weidel-Kossel test, a reaction similar to the murexid test for uric acid: a little nitric acid is added and a gentle heat applied till a dry residue is obtained; if a drop of caustic soda is added to the latter and heat applied, a permanent reddish-violet coloration is produced, while in the case of uric acid the coloration disappears on warming.

Xanthine is in most cases accompanied by hypoxanthine, a similar substance, from which it may be separated by means of silver nitrate and nitric acid, xanthine silver nitrate ($C_5H_4N_4O_2 \cdot AgNO_3$) being more readily soluble in hot nitric acid than the analogous compound of hypoxanthine.

XANTHIPPE, zăn-thĭp'pē (Lat., from Gk *Ξανθίππη*). The wife of the Athenian philosopher Socrates (q.v.). Her name has become proverbial for a typical termagant, and many stories have come down to us illustrative of her shrewish temper. Several of these, however, may be of later invention, and, in judging her character, some allowance should perhaps be made for the unpractical and unconventional ways of Socrates, which could hardly have been other than exasperating. Her grief and solicitude at the time of Socrates's imprisonment were, it is recorded, great. Consult E. Zeller, "Zur Ehrenrettung der Xanthippe," in his *Vortrage und Abhandlungen,* vol. i (1875).

XANTHIUM, zăn'thĭ-ŭm. See COCKLEBUR.

XANTHOPHYLL, zăn'thō-fil (from Gk. ξανθός, *xanthos*, yellow + φύλλον, *phyllon*, leaf). The name is applied to a yellow pigment accompanying carotin and chlorophyll in the chromoplast and carotin in the etiolated plastid. It is an oxidation product of carotin (q.v.) and has the empirical formula $C_{40}H_{56}O_2$. Late work indicates that both xanthophyll and carotin acting with chlorophyll play an important rôle in photosynthesis. Xanthophyll, like carotin, has an absorption band in the violet and two broad bands in the blue and indigo blue.

XANTHOPSIA, zăn-thŏp'sĭ-a. See SIGHT, DEFECTS OF.

XANTHORRHŒA, zăn'thō-rē'ā. See GRASS TREE.

XANTHOXYLUM, zăn-thŏk'sĭ-lŭm. A genus of plants. See ZANTHOXYLUM.

XANTHUS, zăn'thŭs (Lat., from Gk. Ξάνθος). The capital of ancient Lycia (q.v.), situated on the river of the same name, about eight miles from its mouth. Its site is near the modern village of Gunik. When the Persians under Harpagus invaded Lycia, after the conquest of Cræsus (q.v.) and the Lydians, the inhabitants resisted with desperation, and finally burned their city and fell themselves in a last sally, only 80 families surviving the catastrophe (546 B.C. Consult *Herodotus*, i, 176). Though their country was reduced to a Persian satrapy, the Xanthians seem to have remained under their own princes, until the city was captured by Alexander the Great (q.v.) and shared the fate of Lycia during the wars of his successors and under the Romans. In 43 B.C. the city resisted Brutus, and few survived. It suffered severely by an earthquake in the reign of Tiberius. The site is now occupied only by a few wretched huts. The ancient ruins were first fully described by Sir Charles Fellows (q.v.), and later English excavations resulted in the transfer of an interesting series of sculptures to the British Museum. One is the Harpy Tomb, so called from figures which were once interpreted as the Harpies with the daughters of Pandarus. It is now recognized that they represent the carrying away of souls to the other world. The other reliefs seem to represent offerings either to the heroized dead or to the powers of the lower world. The sculptures, evidently Greek in origin, are good examples of Ionian art of the sixth century B.C. The other striking monument belongs to a later date. It was a tomb in the form of a lofty pedestal, on which was a cella, surrounded by an Ionic colonnade, with four columns in front and six on the sides. Around the base ran two friezes, another decorated the cella, and a fourth was carved on the architrave of the peristyle. The pediments also contained sculptures, and in the intercolumniations stood the statues of so-called Nereids, which have given the monument its name. The friezes represent battles, the storming of a city, sports, and banquets. It has been supposed that the monument was the tomb of Pericles and that the sculptures refer to his wars and especially the capture of Telmessus. It was formerly commonly held that the art of this monument belonged to the early part of the fourth century B.C., but recent opinion inclines to a date not many years after 425 B.C. The other sculptures in London as well as the remains in situ are chiefly connected with tombs; but there are a fairly well-preserved theatre, now much overgrown, remains of the Roman gate, and Acropolis walls of various dates. Of importance for the Lycian language is the inscription on the Harpagus stele, sometimes called the Columna Xanthiaca, which seems to relate to the exploits of a native ruler in the fifth century B.C. Consult Benndorf and Niemann, *Reisen in Lykien und Karien* (Vienna, 1884), and Smith, *Catalogue of the Sculptures of the British Museum*, vol. i (London, 1892).

XÁTIVA, hä'tē-va. A city in Spain. See JÁTIVA.

XAVIER, zăv'ĭ-ēr, *Sp pron* hä'vē-âr', SAINT FRANCIS. See FRANCIS XAVIER, SAINT.

XEBEC, zē'bĕk (Sp *jabeque*, It *sciabecco*, *zambecco*, xebec, from Turk *sumbeki*, sort of small ship). An armed vessel of great speed, formerly used by the Algerine corsairs. It carried three masts, on which square or lateen sails could be set. The bow and stern were remarkable for the small angle they made with the water. The sides were low, and the upper deck of great convexity, that the water might readily flow off through the scuppers.

XENIA, zē'nĭ-*a*. A city and the county seat of Greene Co., Ohio, 55 miles southwest of Columbus, on the Cincinnati, Hamilton, and Dayton, the Pennsylvania, and the Pittsburgh, Cincinnati, Chicago, and St. Louis railroads (Map: Ohio, C 6). It is the seat of the Zenia Theological Seminary (United Presbyterian), founded in 1794, and opened in Xenia in 1855, and of the Ohio Soldiers' and Sailors' Orphans' Home. Noteworthy also are the city hall and county courthouse. The public library occupies a handsome building, the gift of Andrew Carnegie. Xenia is especially known for the manufacture of twine and cordage, and has saw and planing mills, marble and granite works, and manufactories of furniture, ice, shoes, dairy products, machinery, canned goods, candy, powder, and fuses. Pop., 1900, 8696; 1910, 8706; 1915 (U. S. est.), 8711.

XENIA, zē'nĭ-ä. See XENY.

XENIEN, ksā'nĭ-*en* (from Gk. *xenia*, gifts for guests, used as a title for book 13 of Martial's epigrams). The name given, at Goethe's suggestion, to a series of epigrams by himself and Schiller, directed against the self-complacent mediocrity and perverse manifestations in contemporaneous German literature. They were published in Schiller's *Musenalmanach* for 1797, exciting much animosity and calling forth a torrent of rejoinders, but exercising a wholesome purifying influence upon letters. So completely were these couplets the production of a mental alliance, that in many cases the authors themselves were unable completely to determine their own part in the composition. The best edition with excellent commentary is that by E. Schmidt and B. Suphan, *Xenien 1796* (Weimar, 1893); this contains also many epigrams not in the *Musenalmanach*. An edition, with notes by Adolf Stern, entitled "Goethe-Schillers Xenien," was published in Reclam's *Universalbibliothek* (2d ed., 1895). Consult Boas, *Schiller und Goethe im Xenienkampf* (Stuttgart, 1851).

XENOCRATES, zē-nŏk'ra-tēz (Lat., from Gk. Ξενοκράτης) (396–314 B.C.). A Greek, born at Chalcedon. At an early age he attached himself to Plato. On the death of Speusippus he succeeded to the presidency of the Academy (339 B.C.). He is said to have been the first to distinguish the three parts of philosophy—dialectic, physics, and ethics; he also recognized three classes of essences, the sensible, the

intelligible, and the intermediate, which can be grasped by the intellect and perceived by the senses. The sensible, he taught, was within the heavens, while that which was intelligible lay beyond. The intermediate or heavenly essence was identical with the heavens themselves, for it was possible to perceive these and to contemplate them scientifically. The soul, he held, was self-moving number, and happiness consisted in the possession of that virtue which is proper to the individual. He introduced into the teachings of the Academy the mystic Pythagorean doctrine of numbers more fully than it had been employed before, and combined these numbers with the Platonic ideas. In person he was of irreproachable character, well balanced, and temperate in all things. His integrity was so universally known that an anecdote says that he was absolved from the necessity of taking oath when obliged to give evidence, and that Philip of Macedon said that Xenocrates was the only ambassador who had ever come to him whose friendship he was not able to purchase. Famous also were his resistance to the charms of Laïs, the celebrated Athenian hetæra, and his success in converting the young roué Polemo into an earnest and virtuous man. Consult E. Zeller, *Philosophie der Griechen* (4th ed., vol. i, Leipzig, 1901), and Ritter and Preller, *Historia Philosophiæ Græcæ* (9th ed., Gotha, 1913).

XENOGAMY, zē-nŏg'ă-mĭ. See POLLINATION.

XENON, zĕn'ŏn *or* zē'nŏn (Gk. *ξένον*, neut. sing. of *ξένος*, *xenos*, foreign, strange, host). A gaseous element found in the atmosphere, in quantities of one part in 170,000,000 parts of air. It was discovered in 1898 by Ramsay and Travers, who obtained it as a residue in the distillation of liquid argon. Its atomic weight is 130.2. According to Ramsay its boiling point is —109.1° C. (—164.4° F.), and its melting point —140° C. (—220° F.). The spectrum of xenon resembles that of argon. It is also analogous to argon in that its spectrum undergoes a remarkable change when a Leyden jar is put into the circuit, many new blue and green lines appearing, while other lines, mostly red, either disappear or lose much of their intensity. The symbol of the xenon atom is X, and its molecules are made up of single atoms.

XENOPHANES, zē-nŏf'*a*-nēz (Lat., from Gk. *Ξενοφάνης*) (second half of the sixth century B.C.) The founder of the Eleatic school of philosophy. He was born at Colophon, in Asia Minor, about 570, but early removed to Elea, in Lower Italy (a city founded between 536 and 533 B.C.). He brought over from his home, which had been for many generations the city of the Homeric school of poetry, the practice of rhapsodic recitation (see RHAPSODISTS); and after the manner of the genealogists he himself had composed a poem on the founding of Colophon (*Κολοφῶνος Κτίσις*), and a second on his removal to Elea (*Ἀποικισμὸς εἰς Ἐλέαν τῆς Ἰταλίας*). He also employed poetry to set forth his philosophic views in a work entitled *On Nature* (*Περὶ Φύσεως*). In this he zealously upheld the monotheistic view and charged Homer and Hesiod with ascribing to the gods actions which would be disgraceful for mortals. He seems to have held that whatever is existent must have always existed from eternity without being derived from any prior elements; and that all nature is one, unlimited, and that all the parts of this unity must be similar, otherwise we should have multiplicity; that therefore this unity, which is infinite and eternal and homogeneous, cannot change; and further that God is of the same nature, all-pervasive and comprehending all things within Himself. In another work, the *Satires* (*Σίλλοι*), he attacks the doctrines of other philosophers and poets. The fragments of his work are published by Bergk, *Poetæ Lyrici Græci* (5th ed., Leipzig, 1914). Consult also: Eduard Zeller, *Pre-Socratic Philosophy* (Eng. trans., London, 1881); Friedrich Ueberweg, *History of Philosophy from Thales to the Present Time;* Eng. trans. from 4th Ger. ed., by G. S. Morris (2 vols, New York, 1884), Eduard Zeller, *Die Philosophie der Griechen* (4th ed., Leipzig, 1900); H. Diels, *Poetarum Philosophorum Fragmenta* (Berlin, 1901); id., *Die Fragmenta der Vorsokratiker* (ib., 1906); Ritter and Preller, *Historia Philosophiæ Græcæ* (9th ed., Gotha, 1913).

XENOPHON, zĕn'ŏ-fŏn (Lat., from Gk. *Ξενοφῶν*) (c.434–c.355 B.C.). An Athenian historian, soldier, and philosophical writer, the son of Gryllus, born near Athens. His own writings and the account in Diogenes Laërtius (q.v.) are the chief sources for his biography. The story that Socrates saved his life at Delium in 424 B.C. is incompatible with his representation of himself as quite a young man in 401. Our first authentic glimpse of him is as a disciple or companion of Socrates, at the end of the Peloponnesian War. An opportunity presented itself through his friend Proxenos, a captain of Greek mercenaries, to accompany the military expedition which Cyrus the Younger was organizing against his brother, Artaxerxes, King of Persia, and Xenophon accepted the invitation. The historic significance of the expedition lies in the exploits of the 10,000 Greek mercenaries of Cyrus's army, who, encompassed by foes and betrayed by friends, after the assassination by Persian treachery of all their chief officers, made their way from the heart of a hostile empire to the shores of the Black Sea and so back to the Bosporus, thus demonstrating the weakness of the Persian Empire and preparing Greek public opinion for the conquests of Alexander the Great. The history of the expedition is given in detail by Xenophon in his *Anabasis* (q.v.), or *Upward March* of Cyrus, which in its last six books is rather a Catabasis or March Down of the 10,000. Xenophon takes virtual command and throughout plays the leading rôle, but the work was published some 30 years after the events, and we have no means of verifying his statements. On reaching the Hellespont (399) Xenophon and his comrades, after some more or less creditable adventures, entered the service of the Spartan Thibron and his successor Dercyllidas against the Persian satraps of Asia Minor. Because of this or his participation in the expedition of Cyrus the Athenians passed a decree of banishment against him. We next find Xenophon in the camp of the Spartan King Agesilaus (q.v.), who in 396 went out to infuse new vigor into the war against the satraps. When the Corinthian War summoned Agesilaus back to Greece Xenophon accompanied him and was present as an eyewitness, if not as a participant, at the battle of Coronea, in which the Spartan King defeated the allied Theban and Athenian forces (394). After Xenophon had resided a few years at Sparta, the Spartans bestowed upon him an estate on the road to Olympia in territory taken from Elis. Here he spent the next

16 years in the pursuits of literature and the chase. Here his two sons grew to manhood, and here his chief works were written

The defeat of the Spartans by the Thebans at Leuctra in 371 emboldened the Eleians to expel the Spartan protégé; but though the Athenians, now friendly to Sparta, repealed the decree of banishment, and though he sent his son Gryllus with the Athenian cavalry at Mantinea, Xenophon did not himself return to Athens, but made his home at Corinth, where he died about 355.

Besides the *Anabasis*, Xenophon's chief works are: (1) The so-called *Memorabilia*, or recollections of Socrates and Socratic conversations. This was probably called forth by the declamation against Socrates of the Sophist Polycrates (about 394). After 10 years of campaigning and adventure Xenophon could not possibly have remembered all the details which he professes to give, and a comparison with his other writings shows that much of the material of the book is Xenophontic rather than Socratic. Especially famous are the chapters on the evidences of design in nature, and the apologue of the choice of Herakles, borrowed, so Xenophon tells us, from the Sophist Prodicus (q.v.). Complementary to the *Memorabilia* are the representation of Socrates' table talk in the *Symposium* or *Banquet*, the relation of which to Plato's *Symposium* is much debated, and the *Œconomicus*, or dialogue on the management of a house and family, often quoted for its pleasing picture of the young Greek wife and her education by her husband. (2) The *Hellenica* begins abruptly in 411, as a continuation of Thucydides' unfinished history of the Peloponnesian War. The first two books bring the story down to the overthrow of the Thirty Tyrants in 403. The last five books are a general sketch of the history of Greece to the battle of Mantinea in 362. An allusion to the death of Alexander of Pheræ dates the publication after 357. The work suffers by contrast with the philosophic history of Thucydides and has been severely censured for lack of proportion, and for failure to appreciate the greatness of the Theban Epaminondas. (3) The *Cyropædia*, or education of Cyrus, is a philosophical romance embodying in the person of Cyrus the Elder, the founder of the Persian Empire, Xenophon's favorite notions of the sound training of mind and body and the art of commanding men and winning willing obedience. The love story of the wedded pair Abradates and Panthea and the dying speech of Cyrus on the immortality of the soul are often quoted.

Minor works are the *Lacedæmonian Polity*, the laudatory biography of Agesilaus, the tract on the *Revenues of Athens*, the *Hiero*, or dialogue on Tyranny, the (probably spurious) *Apology of Socrates*, and the special treatises on *Horsemanship*, *The Chase*, and the *Duties of a Cavalry Officer*.

Xenophon is the perfect amateur. As soldier, orator, philosopher, essayist, historian, he gives us the measure of the ability and versatility of an Athenian gentleman of extraordinary talent, but not of genius. He writes a simple unaffected style, but is not nicely scrupulous for the purity of Attic idiom or vocabulary.

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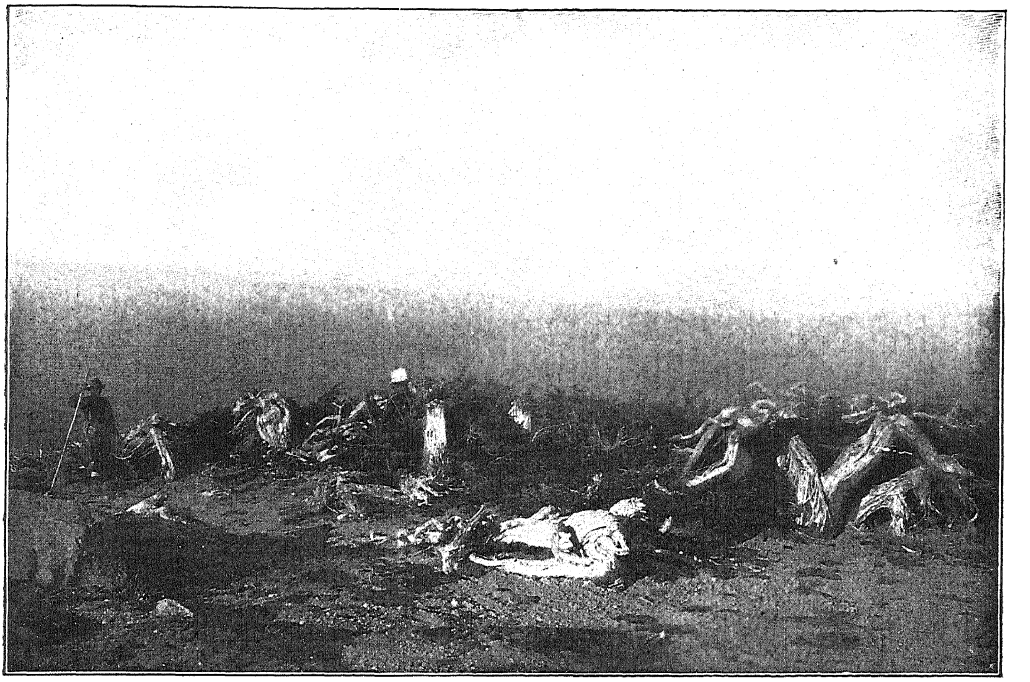
XENOTIME, zĕn'ō-tīm. An yttrium phosphate and an important source of yttrium, found in sands of North Carolina and Georgia.

XENY, zē'nĭ, or **XENIA**, zē'nĭ-à (Neo-Lat. nom. pl., from Gk. *ξένος*, *xenos*, host; so called because the fruit is modified by its host, the hybrid ovule). This term was proposed by Focke for certain alleged hereditary phenomena in plants which are analogous to telegony (q.v.) in animals. Darwin held that the action of foreign pollen on the mother plant is of the highest theoretical importance, and is in itself a remarkable and apparently anomalous circumstance, for the male element not only affects, in accordance with its proper function, the germ, but at the same time various parts of the mother plant, in the same manner as it affects the same parts in the seminal offspring from the same two parents. Eminent botanists, such as Focke and De Vries, have expressed doubt as to the interpretation given to xeny, though Romanes accepts Darwin's facts and interpretation. In maize (*Zea*) this phenomenon is said to occur regularly. The variety with white kernels, fertilized by a kind with yellow, brown, or blue kernels, bears kernels of these colors, the reverse never taking place. Gärtner found that white peas fertilized by colored peas bore colored seeds, and white and colored seeds have often occurred in the same pod. At present xeny is in the same unsettled state as telegony. Consult: Focke, *Die Pflanzen-Mischlinge: Ein Beitrag zur Biologie der Gewächse* (Berlin, 1881); G. J. Romanes, *An Examination of Weismannism* (Chicago, 1893); M. Y. Delage, *La structure du protoplasm, et les théories sur l'hérédité* (Paris, 1895); Charles Darwin, *The Variation of Animals and Plants Under Domestication* (authorized ed., 2 vols., New York, 1900). See HYBRIDITY.

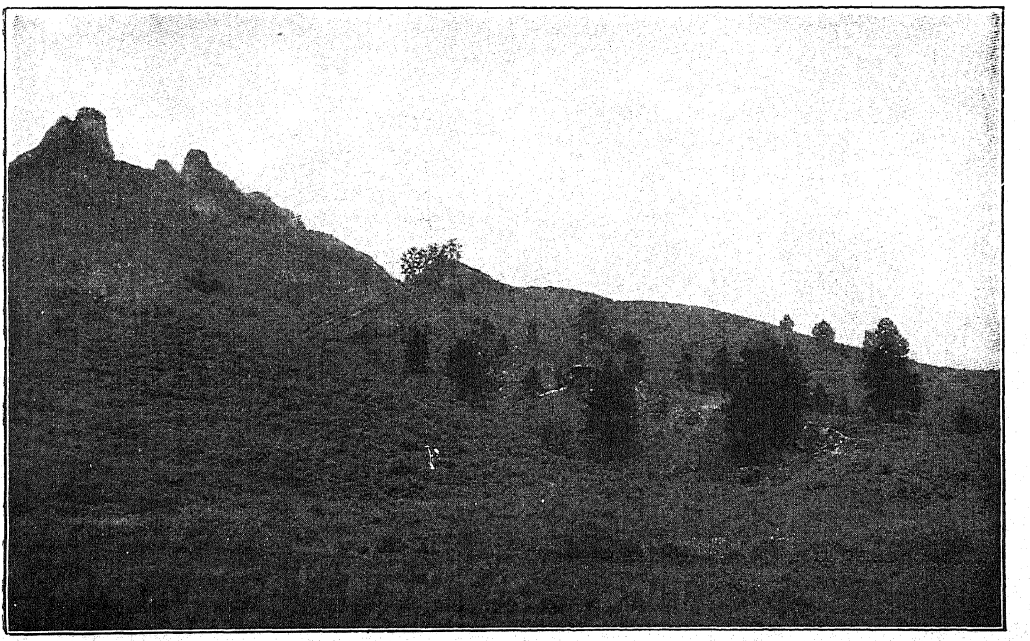
XÉREZ, hā'rāth. A city in Spain. See JÉREZ DE LA FRONTERA, and JÉREZ DE LOS CABALLEROS.

XÉREZ, hā'rās, FRANCISCO DE (1504–?). A Spanish historian, born at Seville. He became the secretary of Pizarro, and as such wrote an account of the conquest of Peru, *Verdadera relación de la conquista del Perú y de la provincia del Cuzco llamada la Nueva Castilla* (1534). This narrative, translated into French by Ternaux-Compans, and into Italian by Ramusio, is occasionally found appended to Oviedo's history of the Indies, where it made its second appearance (Salamanca, 1547), although mutilated.

XERODERMA, zē'rō-dĕr'mȧ, or **XEROSIS**,



1. ALPINE PLANTS. STUNTED HEMLOCKS ON MOUNT HOOD, OREGON



2. DESERT PLANTS. SEMI-DESERT, SHOWING SAGE BRUSH AND STUNTED PINES

zē-rō'sĭs (Neo-Lat, from *ξηρός, xēros*, dry, + *δέρμα, derma*, skin) A congenital skin disease, commonly appearing in the first year of life, and characterized by dryness, harshness, and roughness of the skin, together with a fine scaly desquamation The skin shows a yellowish dirt-colored hue, chiefly on the temples and extremities Later on there is malignant degeneration of the skin, and death occurs about the age of puberty Under this term Kaposi describes a form of diffuse atrophy of the skin of unknown origin.

XEROFORM, zē'rō-fôrm *or* zĕr'ō-fôrm A yellowish insoluble powder, known chemically as bismuth tribromphenolate, and used in surgery as a dusting powder. It is neither poisonous nor irritating and is practically without odor. The latter quality makes it superior to iodoform, which it has largely superseded as an antiseptic. It may be given internally, but it is chiefly valuable as a dusting powder in the treatment of foul ulcers, infected wounds, etc.

XEROMORPHS, zē'rō-môrfs *or* zĕr'ō-môrfs. Plants possessing xerophytic structures. The term is applied not only to those plants that grow in xerophytic habitats and possess structures which seem fitted to such surroundings, but also to plants that while growing in mesophytic conditions have the structure of xerophytes. For a discussion of xerophytic structures see XEROPHYTES and citations under that title.

XEROPHYTES, zĕr'ō-fīts (from Gk. *ξηρός, xēros*, dry + *φυτόν, phyton*, plant). Plants that are able to grow under conditions of high evaporating power of the air or whose structure specially fits them to withstand excessive transpiration, especially plants of deserts and sandy or rocky habitats, to which form the term was previously restricted. It is coming to be recognized that the term applies more correctly to those plants that are able to grow where the water supply is small compared with the demand made upon it by the aërial environment of the plants. Thus Schimper defines xerophytes as plants which inhabit physiologically dry areas, by which phrase the inability of the plant to get water from the soil is emphasized rather than the actual quantity of water present. For example, a frozen soil is physiologically dry, as may also be a salt marsh; the first self-evidently, the other because osmotically acting substances may partially inhibit the natural processes of absorption and conduction of water by plants. Further, it is known that there are plants that are able so to control the loss of water from their aerial parts that their transpiration is relatively low under conditions of high evaporation. Such plants form the vegetation of arid and semiarid regions. Some portion of this control of transpiration seems to be due to internal forces as yet not understood but the greater amount of it is due to various peculiarities of structure

The more prominent xerophytic structures may be defined as follows: (1) Reduction in surface as compared with plants of other areas—this reduction may be permanent, as in the case of cacti and desert shrubs, where leaves are entirely absent, or reduced to very small dimensions; or temporary, as illustrated by plants which shed their leaves at the beginning of a season, dry because of heat, as in deserts, or cold, as in high latitudes and altitudes; (2) vertical placement of the foliage organs, illustrated not only by the cacti, in which the chlorophyll work is done in the stems, but also by the so-called compass plants, where the leaves assume a profile or vertical position instead of the horizontal; (3) the annual habit as is typified by a short life cycle restricted to the rainy season, (4) bulb and tuber plants, in which the vegetative development is conspicuous during the rainy season, but ceases during the dry period, (5) ligneous tissue—in many xerophytic areas a very high proportion of the plants are trees or shrubs; (6) storage organs, as in succulent plants, such as cacti, various sedums, and aloes; (7) modifications of tissue; e.g., hairs as in some alpine plants, such as edelweiss; thick-walled epidermis due to cutinization; waxy deposits, varnish or mineral crusts on the epidermis; cork in woody plants, abundant palisade cells; reduction of air spaces, occurrence of stomata mainly or wholly on the lower surface, away from the light: below the surface, as in the carnation, and protection of stomata by hairs, as in the oleander.

It will be seen that most structures can be regarded as advantageous, since they protect plants against excessive transpiration For example, if the cork and cutin layers, which are relatively impermeable to water, be removed, the loss of water is tremendously accelerated. Some of these structures can be shown by experiment to be the direct result of xerophytic conditions, although in most cases the exact stimulating cause is not clear. Doubtless the most potent factor is a dry atmosphere. Experiments show that dry air as compared with moist air accelerates the development of cutin, cork, collenchyma, bast, waxy tissue, incrustations, and lignin These structures may at times be produced experimentally in mesophytes grown under xerophytic conditions Mesophytes which are transferred to xerophytic conditions approach normal xerophytes in the reduction of leaf and stem surfaces. This reduction, while of advantage to the plant, may also doubtless be referred to mechanical or climatic causes. For example, the available food materials may be less abundant in the xerophytic soil, the absorption may be less, and transpiration may be great. All of these conditions would probably tend to cause reduction. See LEAF.

The xerophytic formations of the world may be subdivided into two great classes: climatic, occurring over wide areas, and edaphic, occurring over limited areas. For examples of the former, see ALPINE PLANT; ARCTIC REGION; DESERT VEGETATION; FOREST; GRASSLANDS; PRAIRIE; TUNDRA. For examples of the latter, see BEACH PLANTS; DUNE VEGETATION; HEATH; ROCK PLANTS; SWAMP.

XERXES, zĕrk'sēz (Lat., from Gk. *Ξέρξης*, from OPer. *Xšayāršā*, mighty hero). Three kings of Persia, the first two of whom belonged to the celebrated Achæmenian dynasty.—XERXES I. (c.519–c.465 B.C.), commonly identified with the Ahasuerus of the Bible, was the son of Darius I Hystaspis and of Atossa, daughter of Cyrus. Born after the accession of his father, in 521 B.C., Xerxes seized that pretext to supersede three older brothers, and ascended the throne upon the death of Darius in 485. His first act was to subdue the revolt of Egypt. He then spent three years in preparing to punish the Greeks for the humiliations they had put upon his father. Collecting at Critalla, in Cappadocia, a huge army, he marched to Sardis (Lydia) and thence set out for the Hellespont

in the spring of 480. A fleet of 1200 sail had in the meantime assembled at Doriscus, in Thrace. The fate of this unwieldy expedition, successful at first at Thermopylæ, but crushed at Salamis (480) and at Platæa (479), is one of the most familiar stories in history. (See GREECE.) Xerxes, who had fled from Greece after the disaster to his fleet at Salamis, advanced against Babylon, where Samaserba the Chaldæan had usurped the royal power. After razing the temples of the city he returned to Persepolis and Susa. He was murdered with his eldest son, Darius, by Artabanus, captain of the guard.—XERXES II (c.450–c.425 B.C.) was the son of Artaxerxes I and Damaspia, and the grandson of Xerxes I. He ascended the throne upon the murder of his parents (c.425). After a reign of 45 days he was himself assassinated and was succeeded by his half brother Sogdianus or Secydianus.—XERXES III was the name given to Oarses, who reigned in 337–336 B.C. He was controlled by the eunuch Bagoas, by whom he was proclaimed.

XICAQUE, hē-kä′kā. An important Central American tribe, constituting a distinct linguistic stock, occupying the region of the upper Ulua River, in Yoro and Santa Barbara districts, northern Honduras. They are said to have a compact tribal organization under a head chief, who is elected for life. They number about 6000.

XIMANA, hē-mä′nä. A wild tribe in the forests between the Putumayo and Yapura rivers, northern affluents of the Amazon, in western Brazil. Although said to be industrious, they are entirely savage in their mode of life. They kill their first-born children, and burn the bones of their dead, mingling the ashes with their drink.

XIMENA, hē-mā′nä. The wife of the Cid in Spanish legend. In Corneille's tragedy she is known as Ximène.

XIMENA, or THE HEROICK DAUGHTER. A tragedy by Colley Cibber, first acted at Drury Lane Dec. 28, 1712, largely drawn from Corneille's *Le Cid*.

XIMÉNEZ (or **JIMÉNEZ**) **DE CISNEROS**, hē-mā′nāth dā thēs-nā′rōs, FRANCISCO (1436/37–1517), commonly spoken of as CARDINAL CISNEROS. A Spanish cardinal, statesman, inquisitor, and promoter of education. After studying at Salamanca, where at 20 he received the degree of Bachelor in Civil and Canon Law, he took orders and in 1459 went to Rome, whence he returned in 1465, bearing an expectative bull preferring him to the first benefice of a specified value that should become vacant in the diocese of Toledo. By virtue of this bull he took possession of the archpriestship of Uceda in 1473. He maintained his post despite the opposition of Archbishop Carillo, who had him thrown into prison. Released (1480) and restored to his benefice, Cisneros at once exchanged it for a chaplaincy at Sigüenza. Cardinal Mendoza, Bishop of Sigüenza, became his friend and soon made him vicar-general of the diocese, a position which he filled with distinction. He suddenly turned his back upon ecclesiastical preferment, entered the Franciscan monastery of San Juan de los Reyes, and from this time forward led a life of rigorous asceticism. Queen Isabella appointed him to the delicate post of confessor in 1492. In 1494 he was made provincial of his Order in Castile and set about making some drastic reforms, which were energetically opposed even by the general of the Order. Cardinal Mendoza died in 1495, and the Queen privately secured from the Pope the appointment of Cisneros as his successor to this the richest and most powerful see in the whole Church, in dignity second only to the papacy itself. Accompanying the court on its trip to Granada in 1499, Cisneros eagerly joined the work of pious Archbishop Talavera for the conversion of the Moors. But Talavera's methods seemed to Cisneros entirely too mild and slow. His own more vigorous policy speedily brought about numerous conversions, but they met with opposition from the unconverted masses of the Moors, who later broke out in open rebellion. This was quelled with difficulty, the Cardinal having meanwhile been besieged in his own palace. When the revolt was crushed baptism and exile were offered to the Moors as alternatives and the majority chose baptism.

Upon the death of Isabella, in 1504, Ferdinand at once resigned his title of King of Castile, in favor of their daughter Juana and her consort, Archduke Philip of Austria (known as Philip the Beautiful), and kept for himself only the title of Regent. Even this title offended the hypersensitive Philip, and Cisneros had much difficulty in bringing the two princes to an interview. Two years later Philip's sudden death completely crazed Juana. Their son and heir Charles was but a child, and Ferdinand was at Naples. The mutually jealous nobles of Castile placed affairs in the hands of Cisneros, who worked hard to have Ferdinand return and look after the interests of Castile. In 1507 Ferdinand did so, and brought with him the appointment of Cisneros as cardinal. Shortly thereafter Cisneros became Grand Inquisitor General of Castile and León.

In 1505, at his own expense, Cisneros had sent to Africa an expedition, which captured the port of Mers el Kebir; in 1509 a stronger expedition, likewise fitted out at his expense, was accompanied by the Cardinal in person, and in one day of brilliant fighting took the city of Oran. Thereupon he returned to Spain, and devoted himself to administering his diocese and trying to obtain from Ferdinand a reimbursement of his expenses at Oran.

On the death of Ferdinand in 1516 Cisneros became regent of Castile for Charles, who later in the same year required the Cardinal to proclaim him King of Castile, despite the fact that his mother Juana, through whom he obtained his rights to that throne, was still alive. Cisneros in the meanwhile had taken firm hold of affairs, transferring the Cortes to Madrid and establishing a standing army, by drilling the citizens of the principal cities and towns. In September, 1517, Charles, who had thus far been living in Flanders, entered Spain at an Asturian port, and Cisneros hastened to meet him. On the way he fell sick and at Roa he died, Nov. 8, 1517.

Despite the claims of his other great achievements, he will probably be remembered most enduringly for his creation of the great University of Alcalá de Henares. Founded in 1508, it took rank at once as almost an equal of Salamanca. It was at this university that the great Complutensian Polyglot Bible was made. In 1836 the University of Alcalá was transferred to Madrid, with the style of *La Universidad Central*.

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XIMÉNES (JIMÉNEZ) DE QUESADA, dā kā-sā′dhä, GONZALO (c.1500–c.1579). A Spanish adventurer, born probably in Granada. He came to South America in 1535 as judge of the Province of Santa Marta Two years afterward he led an expedition against the Chibcha Indians, and captured the districts of Bogotá and Tunja in New Granada, found a large amount of treasure, and broke the power of the Chibchas. He founded the city of Bogotá in 1538, visited Spain the next year, and received the title of marshal. In 1550 he returned to South America and (1569) went in search of El Dorado.

XINCA, hēŋ′kä, or **JINCA.** A Central American tribe occupying the coast region and valley of Rio de los Esclavos, in southeastern Guatemala. They are of low culture and appear to have occupied central Guatemala before the Quiché (q.v.) and Cakchiquel (q.v.) pressed them southward. Long supposed to have been a separate linguistic stock, the recent investigations of Dr. Lehmann indicate that they are possibly related to the Lenca and other tribes.

XINGÚ, shĕn-gōō′. A large tributary of the Amazon, formed by a number of headstreams on the plateau ridge which forms the watershed between the Amazon and the Paraguay, in the State of Matto Grosso, Brazil (Map. Brazil, G 5). Thence it winds northward about 1200 miles till it joins the Amazon near the estuary. The river is interrupted by a number of impassable falls and rapids, the last 110 miles above its mouth Near its mouth the Xingú spreads into a lakelike expanse, whence it communicates with the Amazon and its estuary, as well as with the estuary of the Tocantins, through a network of channels and backwaters.

XIPHILINUS, zĭf′ĭ-lī′nŭs. See DIO CASSIUS COCCEIANUS.

XIPHOSURA, zĭf′ō-sū′rä (Neo-Lat. nom. pl., from Gk. *ξίφος, xiphos,* sword + *οὐρά, oura,* tail). That division of the Merostomata which contains the modern representatives of this almost wholly Paleozoic group, viz., the genus *Limulus.* See MEROSTOMATA and KING CRAB.

XISUTHRUS, zē-zōō′thrŭs (Lat., from Gk. *Ξίσουθρος, Xisouthros*). The hero of the deluge according to the fragments of the Babylonian history of Berosus (q.v.). He is said to have been the tenth and last King of the first Babylonian dynasty, which reigned for a period of 432,000 years. Xisuthrus is identical with *Atra-hasis* (read *Hasis-atra*), as his father *Opartes* (misread *Otiartes*) is identical with Atra-hasis' father *Ubartutu.* He is mentioned already in a tablet from the time of Ammisaduga (1978–1963 B.C.) as entreating Ea in a terrible famine lasting for six years, which seems to have preceded the deluge In another Sumerian text he appears as the hero of the deluge. See DELUGE; NOAH.

X RAYS. A particular type of radiation proceeding out from the interior of a highly exhausted glass bulb through which a discharge of electricity is taking place. This radiation was discovered in 1895 by Professor Röntgen (q.v.) of the University of Wurzburg, who was performing some experiments involving the discharge of electricity through glass bulbs exhausted until they contained only traces of air. This radiation was discovered, and, as far as could be told, differed in all respects from light and other known radiations. To it Professor Röntgen gave the name of X rays, signifying that its mechanism was unknown.

Professor Röntgen discovered that the essential feature in its production was an exhausted bulb or Crookes tube (q.v.) into which entered two metal conductors serving to introduce and to withdraw the electric current. The conductor which introduces the current may be an ordinary wire or it may have at its end inside the bulb a small metal plate; it is called the anode The conductor by which the current leaves the exhausted bulb consists of a wire carrying at its end inside the bulb a concave metal surface; it is called the cathode. Professor Röntgen found that the centre from which the X rays proceeded was the points of the solid walls of the bulb which were struck by the cathode rays proceeding out from the cathode, and he therefore devised the plan of introducing in the bulb a disk of platinum so placed that it received practically all the cathode rays, and served, therefore, as the source of X rays for all outside points. The face of this disk was oblique to the cathode rays, so that the X rays might have a free field to escape from the bulb It was found later that the intensity of the radiation could be increased by joining the anode to this small piece of platinum, which is called the anticathode, or target Röntgen observed that as the electrical discharge was continued through such a tube the intensity and character of the radiation of X rays varied. This is owing in the main to a change in the vacuum, i.e., in the pressure of the traces of gas left in the bulb, occasioned by the electric current. In order, therefore, to maintain constant conditions in the tube it is necessary to keep the gas at a constant pressure, and some modern forms of X-ray tubes have such side attachments to the main bulb as will permit the evolution of minute amounts of gas whenever the vacuum in the bulb becomes too perfect. Bulbs satisfying all these requirements are furnished by instrument makers under the name of "X-ray self-acting tubes."

PROPERTIES

Optical. X rays do not experience regular reflection, refraction, diffraction, interference, or polarization when tested as light would be; they pass in straight lines through any noncrystalline medium which does not absorb them. See below for action of crystals.

Absorption. The most striking feature of X rays at first sight is the fact that they penetrate with great ease certain substances which are opaque to light, and, on the other hand, are absorbed by certain substances which are very transparent to light. Thus the X rays are absorbed largely by glass, but are transmitted mostly freely by aluminium, by wood, by human

flesh, etc. It is owing to these facts, combined with those stated in the preceding paragraph, that photographs may be obtained of many objects hidden from view, by allowing X rays to cast a shadow picture of them on a photographic plate. In this manner photographs of the bones of the body, or metal objects contained in wooden boxes, etc., may easily be obtained.

When a careful study is made of the absorption produced in X rays by various substances, it is found that there is a close connection between the intensity of absorption and the density of the absorbing body, and it is a general law that the greater the density of the body, the greater is its absorptive power. This fact is of the utmost importance in the interpretation of photographs of portions of the human body and of other objects taken by the X rays: the intensity of the photographic plate is in reality a measure of the density of the absorbing substance whose photograph is taken. The power of any substance to absorb X rays depends also upon the nature of the latter. It has been found that rays coming from a tube in which there is a nearly perfect vacuum are extremely penetrating, they and the tube are called hard. Whereas the rays from a tube in which the vacuum is not so good are easily absorbed, they and the tube are called soft.

Photographic and Fluorescent Action. X rays are observed to affect a photographic plate in the same manner as ordinary light, and this fact is made use of in nearly all applications of these rays. It was found also—in fact, it was the fundamental observation of Röntgen—that X rays excite the fluorescent action of certain substances, so that when excited by the rays they emit light. A careful study has been made of various substances which are affected in this way, and certain of them are used in making so called fluorescent screens, which may be used to receive the shadows cast by an X-ray tube instead of receiving them on a photographic plate.

Physiological Action. Rontgen himself observed that if the X rays were allowed to enter the eye of an observer who is situated in a room entirely dark, the retina of the eye received a stimulus and light was perceived. It is extremely probable that this is due to the fluorescent action of the X rays on certain portions of the eye. It was observed, a few months after the discovery of the X rays, that if the radiation is too intense its action on the skin of an observer might produce most serious changes and cause what are known as X-ray burns. Some years later it was found, as a result of careful experiments, that in the case of certain kinds of cancer and of a limited number of skin diseases the action of X rays was extremely beneficial. See *Medicine and Surgery* below.

Ionization. Röntgen made the important observation that if an electrified body were placed near an X-ray tube, so that the radiations fell upon it, the electrical charge disappeared. This was found to be true of both positively and negatively electrified bodies. It was later shown, however, by Prof. J. J. Thomson of the University of Cambridge, England, that the real explanation of this phenomenon was not any direct action of the X rays on the electrified body itself, but was that in their passage through the air around the electrified body the X rays ionized the gas, i.e., made it a conductor for electricity. (See IONIZATION and RADIOACTIVITY.) This discovery of Professor Thomson's was, from a scientific point of view, the most important one in regard to the properties of X rays, for it led at once to a study of the conditions under which ionization can be produced and to the discovery of other methods of causing it. (When a gas is ionized, experiments show that its minute parts are broken up into smaller ones, some charged positively and some negatively, and that it is owing to this fact that the gas becomes a conductor.)

Diffusion. It has been stated above that X rays do not experience ordinary reflection, but many experiments have shown that they are able to penetrate into regions behind obstacles which are opaque to them and where they could not come by any direct path. This led many observers to believe that the rays were reflected diffusely in the same manner that ordinary sunlight is reflected from a white wall. The true explanation, however, seems to be that under the action of X rays those bodies which absorb them have the power of emitting others, so that they become, as it were, new sources of X rays. This is called secondary radiation. There has been much important work on X rays dealing with the nature of these secondary radiations from different bodies. Barkla has shown that each substance has its own characteristic secondary radiation, quite distinct from what may be called the scattered radiation from the primary beam. Each characteristic radiation has its definite hardness and can be excited only if the primary incident X rays are harder than itself. These characteristic X rays may also be excited directly if the incident cathode rays have a sufficient velocity.

When Röntgen made his first observations on X rays there seemed no obvious explanation of these varied phenomena. The possibility of there being waves at all was not settled at first owing to the lack of knowledge in the first few months in regard to interference and diffraction; and for some time the prevalent idea was that they were due to longitudinal waves in the ether. Another explanation, however, which was much more satisfactory, was advanced almost simultaneously by Professors Stokes and Thomson of the University of Cambridge, England, and by Professor Wiechert of Göttingen, Germany. According to this, X rays are disturbances in the luminiferous ether of the nature of wave motion, but not consisting of trains of waves. It is exactly as in the similar phenomena of sound. A musical note is due to a long continued train of waves produced by the regular vibrations of some musical instrument, while a noise is produced by a series of short disconnected pulses in the air. It was shown mathematically by Stokes that pulses, or extremely short disturbances, in the ether would travel in straight lines and would not exhibit refraction, diffraction, polarization, or interference. The explanation of the origin of these pulses is extremely simple. The cathode rays are known to consist of streams of minute material particles which are electrically charged and which are moving at a rate as great in many cases as 40,000 miles a second. If these rapidly moving electrified bodies are suddenly brought to rest by impact on a solid wall, there will be necessarily a great change in the electrical and magnetic properties of the ether at the point where one of the particles of the cathode rays strikes the wall, and this point will therefore serve as a centre of disturbance from

which a pulse will be sent out into the ether. It follows also that, since there is no regularity in the cathode rays, there can be no regularity in the emission of these pulses It is thus seen that all the main properties of the X rays, at least from a physical point of view, are explained. The above statements refer to the "general" X rays, not to the "characteristic" ones

A new epoch in the knowledge of X rays was made in 1913 by a discovery by Dr. Laue of Zurich. A test of the nature of light is offered by allowing it to fall upon a diffraction grating (q v), or by looking through an umbrella at a strong arc light. As a result of diffraction, regular colored patterns are formed, depending upon the fineness of structure of the grating or umbrella and upon the nature of the light If, as was probable, X rays were similar to light of extremely short wave lengths, it should be possible to demonstrate this if one could obtain a dispersing device—such as a grating—of sufficient fineness. The idea occurred to Laue to use for this purpose a thin crystal plate, because crystals evidently consist of molecules (or atoms) in an exact orderly array, exceedingly close together. When tested in this manner, X rays were found to undergo diffraction; and thus their nature was proved definitely. The investigation was continued by W. L. Bragg at the Cavendish Laboratory, Cambridge, England, by his father W. H. Bragg of Leeds, and by many others, notably Moseley. The two Braggs (to whom jointly the Nobel prize in physics was awarded in 1915) devised methods by which the actual wave lengths of X rays could be measured and the innermost structure of the crystals used could be studied, i.e, the shape and size of the fundamental lattice and the distribution of the atoms in this. They showed, further, that each characteristic secondary radiation, e.g., that from tungsten, was made up of a small number of rays, each having a definite wave length. Moseley studied most successfully the relations between the X-ray spectra characteristic of different elements.

Great progress has been made in X-ray tubes, Coolidge developing the tube known by his name. Its characteristic feature is that in it there is a vacuum as complete as possible, the supply of cathode rays being furnished by the emission of corpuscles from a wire maintained at a high temperature by an electric current. (See IONIZATION.) This hot wire is directly in front of the cathode, and by varying the electric intensity in the bulb almost any velocity may be imparted to the corpuscles; these then strike the target, and X rays are produced. If the velocity imparted is great, the rays are hard and are those characteristic of the metal of the target; if the velocity is not so great, the resulting rays are soft.

Medicine and Surgery. The usefulness of this radioactivity to the physician depends on the power of the X rays to penetrate various substances of different density and opacity, and the absorptive power of the different tissues of the body. X-ray pictures of parts of the body as seen on the screen, or when photographed, are due to the fact that substances of different chemical composition, molecular grouping, and thickness absorb different amounts of the rays. In experiments or observations with the X rays the physician needs the following outfit: some service of high potential such as a transformer, induction coil, a static machine, a vacuum tube and holder, and a fluorescent screen or a fluoroscope. In order to preserve records of his work, he will need, further, a photographic outfit. During an X-ray examination the patient must be properly supported He must either lie flat on a canvas stretcher or special table or be seated on a stool with his back against a vertical canvas screen The sitting or the recumbent position is chosen in accordance with the part of the body to be examined. In certain cases he may be examined standing Examinations with a fluoroscope or screen must be made in a dark room An open fluorescent screen may be used, or a fluoroscope may be held, as in using a stereoscope, against the body of the patient. If a radiograph is to be taken, all metal (such as buckles and buttons) and all bone articles, glass, etc., must be removed from the clothing of the patient. While ordinary dressings of gauze and cotton covering a wound do not interfere, iodoform, plaster of Paris, adhesive plaster, and ordinary wooden splints cast shadows that obscure the results It is customary to take two views of fractures, new growths, and foreign bodies, from different points, to avoid errors.

The physician must first study radiographs of normal structures under normal conditions, before he can hope to interpret properly X-ray appearances on the screen or when photographed. When proficient, the observer may, in most cases, recognize the presence and extent of tuberculosis, pneumonia, pleurisy, hydrothorax, emphysema, and empyema, and the presence of bronchitis may be inferred in some instances from the shortened excursion of the diaphragm and the restricted movement of the lower part of the chest, as well as from collections of secretion when found. Much can be judged concerning the heart, and the inaccuracy of percussion may be corrected, as to size and position. If the heart be displaced, as, e g., by fluid or gas in the pleural cavities, pneumonia, pleurisy, tuberculosis, aneurysm or tumor, or if the heart be attached or unusually placed or malformed, the condition may be ascertained by the X-ray examination. Effects of treatment of the organ may be watched. Aneurysms may be clearly defined in many cases, or recognized when no other method is of service. All new growths as well as enlarged glands within the thorax are within the scope of the diagnosing X ray.

Similar information may be gained concerning the œsophagus, stomach, and other abdominal organs and viscera. The conditions in the stomach and the intestines—in fact all their motions—may be studied by feeding the patient large doses of bismuth, which is very opaque to X rays and affords a fluid cast of the stomach In this manner sets of moving pictures of the various portions of the digestive tract have been taken. In the pelvic cavity, measurements of the uterus may be made, extra-uterine pregnancy may be diagnosed.

Therapeutically, the X ray is serviceable in the treatment of lupus, eczema, syphilitic lesions, nævus, sycosis, favus, acne, and psoriasis. In many cases of new growths, such as cancer (both carcinoma and epithelioma) and sarcoma, it has produced amelioration and actual cure. Pain and itching may be permanently removed by X-ray treatment in certain cases. It is possible that the X ray offers greater capabilities than Finsen's light. (See PHOTOTHERAPY.) The serious X-ray burns to which both operator and subject were exposed in the early

use of X-ray apparatus are now known to be due to soft rays, i.e., to the rays coming from a tube in which the vacuum is not very good. These rays are easily absorbed, and it is now not difficult to guard against them.

In surgery, the Röntgen rays were first used to detect the position or presence of foreign bodies, such as bullets, and to recognize fractures. Development of the methods of their application has led to their successful use in diseases of bone, rachitis, subperiosteal abscess, dental and orthopædic surgery, and the detection of calculi. Much has been added to the anatomist's knowledge of the skeleton, especially of the joints. Latterly in dental surgery the use of the X rays to study diseased conditions of teeth and jawbone have been found invaluable and are frequently made. The value of X rays in cases of fracture remains preëminent, both to confirm diagnosis and to decide if a fracture has been properly reduced, after it has been put into a retaining apparatus. In military surgery, authorities earnestly advocate the use of X-ray apparatus in the general base hospital or in the hospital ship and in the military surgery of the great war they were constantly employed. The X ray is a valuable adjunct in life insurance examinations, and also in medico-legal cases. In the latter, radiographs, it must be remembered, can be interpreted only by those who are skilled in the use of the Rontgen ray and in the reading of the pictures.

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XUREL, hōō-rĕl'. A fish. See JUREL.

XYLEM, zī'lĕm (from Gk. *ξύλον, xylon*, wood). One of the two regions of the vascular system characterized by water-conducting vessels (tracheids and tracheæ). See BARK; CAMBIUM; CONDUCTION; PHLOEM.

XYLENE, zī'lēn (from Gk. *ξύλον, xylon*, wood), or XYLOL, C_6H_{10}. A name applied in chemistry to three compounds of carbon and hydrogen, similar to benzene and found along with it in coal tar (q.v.). The three xylenes have the same chemical composition; the differences in their physical and chemical properties are due to differences in the arrangement of the atoms within their molecules.

XYLOGRAPHY, zī-lŏg'rā-fĭ. See WOOD ENGRAVING.

XYLOÏDIN, zī-lō'ĭ-dĭn (from *xyloid*, from Gk. *ξυλοειδής, xyloeidēs*, like wood, from *ξύλον, xylon*, wood + *εἶδος, eidos*, form). A substance produced by the action of nitric acid on starch. It is a constituent of certain explosives.

XYLOPHONE, zī'lō-fōn (from Gk. *ξύλον, xylon*, wood + *φωνή, phōnē*, sound, voice). A musical instrument composed of a diatonically graduated series of wooden keys arranged horizontally upon two cords. It has a compass of about two octaves, and is played by two little mallets held in the musician's hands. It is a very ancient and widely used instrument.

XYS'TUS, zĭs'tŭs. The name of two early popes, taken as equivalent to Sixtus (q.v.), so that the later popes named Sixtus are numbered consecutively from them.

X Y Z CORRESPONDENCE. In American history, the name applied to dispatches sent to the United States Government by three special envoys in France in 1797–98. In May, 1797, C. C. Pinckney, John Marshall, and Elbridge Gerry were named as commissioners to the French Republic, between which and the United States strained relations then prevailed. The commission arrived in Paris in October, and attempted to open negotiations with the Directory. Official recognition was refused them; but the secretary of Talleyrand, French Minister of Foreign Affairs, informed the commissioners that, although the Directory was much incensed by certain passages in the President's recent message, some agents would be sent to them to conduct negotiations. On October 18 one of these agents, M. Hottinguer (X), informed Pinckney that in order to gain the favor of the Directory, a loan must be made the French Republic, with private *douceurs* for the Directors: that the sum of 1,200,000 livres would be necessary, which should be placed at Talleyrand's disposal. A few days later two other agents, M. Bellamy (Y) and M. Hauteval (Z), engaged in the negotiations, and it was then explained that if the United States would buy at par certain stock amounting to 32,000,000 florins (its market value was about half that sum), which France had extorted from the Dutch Republic, the transaction would be considered as equivalent to a loan. The envoys were also given to understand that unless money was forthcoming nothing could be accomplished and a war might result. The commissioners rejected the proposals, and, though they remained, accomplished nothing. Gerry, the only Republican member of the commission, remained for some time after the departure of Marshall and Pinckney and thereby incurred much criticism. (See GERRY, ELBRIDGE.) After seeing the dispatches sent home by the commissioners, President Adams on March 19, 1798, informed Congress that no terms "compatible with the safety, the honor, or the essential interests of the nation" could be obtained. At the request of Congress copies of the dispatches were communicated to that body. In the copies, however, the letters X, Y, and Z were substituted for the names of the French agents, hence the name X Y Z Correspondence. As a result of the affair the President and his party were for a time exceedingly popular, but soon lost public favor through the Alien and Sedition acts and through the President's sending to France a new commission, composed of Chief Justice Ellsworth, William R. Davis, and William Vans Murray. This commission, however, in September, 1800, arranged a convention that once more put the two nations upon friendly terms. The so-called X Y Z Correspondence may be found in *American State Papers, Foreign Relations*, vol. ii (Washington, 1832). Consult: *Works of John Adams*, edited by C. F. Adams (10 vols., Boston, 1850–56); J. S. Bassett, *Federalist System* (ib., 1906); J. T. Morse, *John Adams*, in "American Statesmen Series," vol. vi (ib., 1908).

Y

Y The twenty-fifth letter in the English alphabet. Its form is derived from the Greek upsilon (Υ), which in turn was borrowed from the Phœnician *vau*. (See ALPHABET.) Of like derivation are U, V, W. The Romans adopted Y to transliterate the Greek upsilon, which they had represented by V previous to the reign of Augustus.

Phonetic Character and Philological Value. As a phonetic character *y* is both consonantal and vocalic. Its vowel usage (like *i*) is seen in such words as *holy, lady, handywork, y-clept* (where it stands for an older palatalized *ig, ge*, cf. Anglo-Saxon *hālig, hand-geweork, ge-clept*), and in *my*, etc, where it was chosen by scribes instead of *i*, and again for upsilon in words of Greek origin, as *myth, syntax* (Greek *μῦθος, σύνταξις*). As a palatalized consonant *y* is found generally in words of Germanic origin, *yield* (Anglo-Saxon *gieldan*), *yard* (Anglo-Saxon *geard*). As a consonant English *y* (through palatalization of Anglo-Saxon *g*) may represent (1) Indo-Germanic *i*, for example, English *young*, Anglo-Saxon *geong*, Latin *juvenis*, Sanskrit *yuvan;* (2) Indo-Germanic *gh*, as English *yesterday*, Anglo-Saxon *giestra*, Latin *hesternus*, Greek *χθές*. In the archaic form *ye olden time*, the peculiar character is really not *y* by origin, but is a substitute for the Anglo-Saxon rune þ (thorn), and it should be pronounced the.

As a Symbol and Abbreviation. In chemistry Y is the symbol for *yttrium*. In algebra *y* stands for the second variable or unknown quantity, and in analytical geometry *y* = the ordinate of the rectilinear coördinate. As a mediæval Roman numeral Y = 150; $\overline{Y}$ = 150,000. Consult: Philippe Berger, *Histoire de l'écriture dans l'antiquité* (2d ed., Paris, 1892); Maurice Prou, *Manuel de paléographie latine et française* (2d ed., ib., 1910); Sir E. M. Thompson, *Introduction to Greek and Latin Paleography* (London, 1912).

Y or **IJ**, ī (*het Ij*). An arm of the Zuyder Zee immediately north of Amsterdam (Map: Netherlands, C 2). It is now almost wholly drained and reclaimed, except the central portion, which has been dredged to form a part of the North Sea Canal, and is connected through a lock with the Zuyder Zee.

YACHT (MDutch *jacht*, Dutch *jaxt*, yacht, chase, from *jagen*, OHG. *jagōn*, Ger. *jagen*, to hunt, chase) AND **YACHTING.** A yacht is a boat used for pleasure. Pleasure ships were built and sailed in the days of Homer, and at Rhodes Ptolemy, the son of Lagus (283 B.C.), had 800 *thalamegi* (pleasure boats), of which some were more than 300 feet long, and were propelled by oars and sails In origin modern cruisers are *thalamegi;* modern racers are yachts.

The first British yacht of which there is record (though it is doubtful if the word yacht was in use at that time) was the *Rat* of Wight, built at Cowes in 1588. In July, 1660, a Dutch yacht arrived in the Thames and created such interest in pleasure ships that the King and the Duke of York each built one The first formal British yacht race on record was held between these two on the lower Thames course, Oct. 1, 1661. The Water Club of the Harbor of Cork, first of all yacht clubs, was established in 1720. The Royal Yacht Squadron was founded at Cowes in 1812. But yacht racing was not universally popular until after 1843, when Queen Victoria began to encourage it by giving cups as racing prizes.

In America a Boston yacht built in 1774 by Lord Percy to demonstrate the value of a centreboard on vessels of shoal draft was one of the first on record, though the word yacht, as applied to dispatch boats, was in use much earlier. From the earliest times people living along shore in America used various kinds of small boats for pleasure, but yachts fit for a venture beyond headlands are not recorded until the nineteenth century. In 1801 George Crowninshield, of Salem, Mass., had built for him a sloop of 22 tons, called the *Jefferson*, which he used as a yacht for some years, and this was probably the first vessel of any size built for yacht use in America. In 1816 the same Crowninshield had a larger yacht, 83 feet long on the water line, built for him. She was named *Cleopatra's Barge*, and in her he made a voyage to Spain and the Mediterranean in 1817. This is said to be the first American yacht to visit a foreign country. The first American yacht to gain fame as a racer was the schooner *Wave*, built by John C. Stevens of Hoboken, N. J., in 1832. She was 65 feet long and had a wide V-shaped cross section.

The schooner *Gimcrack*, also a Stevens yacht, is notable because she had a plate of iron 12 feet long and 4 feet deep fastened to her keel as a fin, to serve as ballast and give lateral plane—the first fin-keel yacht. On July 30, 1844, the New York Yacht Club was organized in her cabin. This is called the first American yacht club, and while there were one or two earlier attempts to organize boating clubs, none of them survived. The New York Yacht Club began with eight yachts. Its first home was a wooden structure on the Elysian Fields, Hoboken, N. J. Its

first races were sailed on New York Bay. In 1916 its home was in the finest yacht club house in the world, and its fleet numbered 585, of which several were steamers nearly twice as large as any merchant ship afloat in 1844. Its record is illustrative of the growth of yachting in America. In 1850 an English merchant wrote to friends in America suggesting that one of New York's famous pilot boats be sent to England to take part in certain yacht races that were to be sailed during the time of a great international exposition to be held in London in 1851. In answer to this invitation a syndicate of members of the New York Yacht Club built the schooner *America*, of 170 tons measurement. The *America* arrived at Cowes, England, on July 31, 1851, and on August 22 sailed against 14 yachts belonging to the Royal Yacht Squadron in a race around the Isle of Wight. The fleet included cutters of from 47 to 193 tons and schooners of from 75 to 392 tons, and there was no time allowance for either rig or size. The prize, a silver cup, valued at £100, which the Royal Yacht Squadron had offered for a race free to the yachts of all nations, was won by the *America*. The owner of the *America* presented this cup (July 8, 1857) to the New York Yacht Club, to be held thereafter as a world trophy.

The *America* was designed by George Steers. She had a sharp, vertical-wedge bow that showed slight hollows in its lines; the centre of buoyancy well aft; the turn of the bilges high. The sections showed great deadrise with straight lines from the bilges to the garboards; her heel was low under water, and her toe well up; her sails were cut to set flat and were laced to booms to keep them so. The British yacht of the day had a "cod's head and a mackerel tail"; the centre of buoyancy was well forward; the under-water body was round like a barrel; the sails were of loose-woven flax that bagged like a purse net. Thomas Waterman, a British designer, had built a yacht, the *Mosquito*, on lines somewhat like those of the *America*, but his countrymen had ignored him. When the *America* had beaten every yacht they matched against her, however, the British yachtsmen at once began lengthening the bows of their racers and flattening their canvas. But before the improvements then begun could be fully carried out by British yachtsmen, an arbitrary rule of measurement was adopted that greatly influenced designers.

Because large yachts had obvious advantages in races with small ones, unless the wind was light and variable, the British yachtsmen agreed to handicap the big ones by a number of seconds for each ton of difference in custom-house measurement. The rule for obtaining this measurement was: Subtract the breadth of the hull from the length of the keel, multiply the remainder by the breadth of the hull, that product by half the breadth, and divide the final product by 94.

The rule was fair enough then, because the hull was usually half as deep as it was wide, and the length of the interior space that could have been conveniently used for storing cargo was about equal to the length of the keel less the breadth of hull. But a way to evade the rule and build a large ship that should show the tonnage of, and be classed with, a small one, had been found before the rule was adopted. The cutter *Cygnet* (1846) had a water-line length of 51 feet, but, because her sternpost raked forward and her stem aft, her keel was less than 43. The *Cygnet* method of maintaining size and reducing tonnage became popular. The rule was therefore changed, and the length of the yacht was measured from stem to sternpost on deck. Since 1878 the length has been measured on the water line. But while the length was measured on deck, the designers began to build an extension to the hull beyond the sternpost, thus obtaining a long ship that would yet show a small measurement, and that overhang is still popular.

Because the rule assumed the depth to be one-half the beam, and thus taxed beam twice and left depth untaxed, the designers, in their efforts to produce large ships that would class with small ones, pinched the beam and added to the depth and length. Thus the 5-ton *Doris* (1885) was 33 feet 8 inches long on the water line, 5 feet 7 inches beam, and 7 feet draft, she spread 1116 feet of canvas and her displacement (the true measure of size) was 12.55 tons. Yet she was classed with the *Diamond* (1873), that was only 25 feet 3 inches on the water line, spread 671 feet of canvas, and displaced 4.92 tons. Models like that of the *Doris* wrought an improvement in ballasting. The designers first substituted iron ore for the shingle of the old times, and then used lead, bolted under the keel. As the centre of gravity of the hull was thus lowered it was possible to increase the sail area —a step in advance. In America the racing model came from the small boat, usually a sloop or catboat, formerly called a sandbagger, as they carried bags of sand, which could be readily shifted, for ballast, or "skimming dish." This had great width in proportion to its length, and extremely shoal draft. A centreboard (a plank on edge that could be moved up and down through a slot in the keel) gave lateral plane.

When the first challenger for the America's Cup—James Ashbury's schooner *Cambria* · met a fleet of 23 yachts of the New York Yacht Club (Aug. 8, 1870), many of the defenders were yachts developed from the broad and shoal hulls of the sandbagger sloops. The schooner *Magic* led the fleet. She was 79 feet long on the water line, 20.5 feet beam, drew 6.25 feet of water, and measured 92.2 tons. The *Cambria* was 98 feet long on the water line, 21 wide, drew 12 feet of water, and measured 248 tons. Each was a type of its nation, and the race therefore had no direct influence on American racing models, though it did have a tremendous influence on American yachting. This was the only race for the America's Cup where the challenger was called upon to meet the whole racing fleet of the challenged club, and the next year, when Mr. Ashbury challenged again with the schooner *Livonia*, he only met one boat in each race of the series that had been arranged; and subsequent to that but one yacht of the New York Yacht Club was named to meet the challenger in any one series of races. Within ten years after the defeat of the *Cambria* there were three series of races for the *America's* Cup without changing the conditions influencing the American type of model. Keel yachts were built in America for cruising and rough water use, and the *Vindex*, the first American yacht that was laid down without a whittled model, and the first American iron yacht, was built at Chester, Pa., on lines similar to the British *Mosquito*. But for racing the skimming-dish model retained its popularity.

In 1881, however, a British cutter of deep and narrow hull was imported—the *Madge*. She was 46 feet 1 inch long over all, 38 feet 9 inches on the water line, 7 feet 9 inches wide, and 8 feet 8

draft She had an enormous displacement in proportion to her sail area, but she won seven races out of eight starts against smart American yachts The influence of this yacht was great and lasting and she did much to popularize the keel boat in America, though for many years following her advent there was a heated discussion over the comparative merits of the keel and centreboard types Many yachts of similar design were built in America, or imported The *Genesta* and the *Galatea*, two British cutters of the extreme narrow design, came as challengers for the America's Cup (1885 and 1886). They were defeated by the centreboard sloops *Puritan* and *Mayflower*, but their failure did not immediately injure the popularity of the plank-on-edge model In fact, after the fashion of the British model, the *Puritan* and the *Mayflower* both carried lead on their keels, and both were of greater depth and displacement than the type of American racer of previous years, from which they were radical departures. They and the *Volunteer* were designed by Edward Burgess (q.v.) and did much to revolutionize yacht design. Edward Burgess's predilections were towards the stanch and able yacht and in his designs he strove to combine the best points of the English cutter and American centreboard types. The *Volunteer*, that defended the cup when the *Thistle* came (1887), was still deeper and of greater displacement, while the *Defender*, built to meet the America's Cup challenger *Valkyrie III* (1895), was much like the British type of the day. The *Defender* was designed by N G. Herreshoff (q.v.) of Bristol, R I. She was an out-and-out keel yacht instead of a centreboarder and was narrower than the challenger. She was 88.5 feet long on the water line, 23 25 wide, and 19 33 draft. She displaced 143 tons. *Valkyrie III*, designed by G L. Watson, was 26 17 feet wide, to a water-line length of 88.9. She displaced 158 tons Although her draft was 20 feet, the cross section of her hull, exclusive of her fin keel, was something like that of the American *Vigilant*. These facts are important because the *Defender* was designed to the narrow model through the influence which British cutters had had on American yachtsmen, while the *Valkyrie* was built to the wide model for two reasons: it had become apparent that increase of sail area (or driving power) could be obtained more advantageously by adding to the width of the hull than by increasing the cargo of lead on the keel; the British Yacht Racing Association, seeing the advantage of wide beam, had abolished (1886) the old rule of measurement altogether, and substituted the simple rule that considered the water-line length and sail area only—Rating $= L \times S \div 6000$ This freed the hand of the British designer.

Meantime (1891) an epoch-making yacht appeared—the *Gloriana*, designed by N. G. Herreshoff. The memorable features of her model include a long overhang at each end, and a straight-line bow in place of the hollow vertical wedge. Where the *America* had shown hollow lines the *Gloriana* had convex. The *Gloriana* started in eight races her first year and won them all. She was 45.25 feet long on the water line and 70 over all. The advantages of overhangs at each end were: They added to the initial stability; lengthened the fore and aft lines of the hull, thereby refining the angle presented to the water, and thus the heaping up of water under the lee bow in windward work was avoided. As the racer heeled, the overhangs were pressed into the water, lengthening the water-line length and increasing the lateral plane for windward work

The absurd knife-blade model had been slowly dying since the defeat of the *Genesta* and the *Galatea* With the advent of the *Gloriana* the illusion that a racer must necessarily have a sharp, vertical-wedge bow with hollow lines vanished

The *Vigilant*, built (1893) to meet the *Valkyrie II*, in races for the America's Cup, was the last of the big American centreboard racers. She was, in fact, a keel boat with the addition of a weighted centreboard working through her keel to increase her lateral plane when going to windward, but in some of her races the board became jammed and could not be used, and her sailing qualities were hardly impaired. Large racers with centreboards have been built since then, but they have been virtually keel yachts with very small boards to allow the draft to be cut down or to enable the yachts to fit the requirements of some rating rule. Both the *Defender* and the *Valkyrie III* demonstrated the value of the fin keel, and they confirmed the good opinion of overhangs that had been created by the *Gloriana*. As there was no tax on beam in the international races, the line of development which followed was inevitable By successive steps through the *Columbia* and the *Constitution*, the model of the *Reliance*, built in 1903 to defend the America's Cup, came as a natural growth. The *Reliance* was 25.58 feet broad to a water-line length of 89.9, an over-all length of 143, and a draft of 19.58. She was the largest racing sloop that has ever been built, spreading 16,160 square feet of sail on her single mast, or over three times as much as the schooner *America* which won the cup and was approximately the same water-line length.

In smaller American racers these proportions have been carried much further. The *Outlook*, a Boston model, was 53 feet long over all to a water-line length of 21 feet, while her beam was 15 feet and her draft was 6 inches. She had the marvelous record of 13 knots an hour and was an example of the extreme to which designers had gone in the "scow" type of racing yacht. Even in yachts of this type the tendency is towards much more normal proportions.

While the international races for the America's Cup have had great influence on yacht design in both America and Great Britain, the various rating rules of the two countries, which were intended to furnish a basis of handicapping or equalizing boats of different size when racing, have been even more of a factor on the types of boats that have been produced. In America the rule adopted in 1882 and most generally used until 1905 was known as the "length-and-sail-area rule," and was as follows.

$$\text{Rating} = \frac{\text{L (water line)} + \sqrt{\text{Sail Area}}}{2}.$$

This rule, while good in a way, only took into account two of the factors that govern a boat's speed, viz, length and driving power (sail area). The third factor, displacement, or the weight of the vessel, was not regarded in any way. The consequence was that under this rule the tendency was to shorten the water line, lengthen the overhang, and cut down displacement to a minimum, and resulted in the flat, light-displacement, scow-like boat, often with a

for load, the boats were of no use for anything except racing in smooth water. The development of racing boats, therefore, under this rule was not along beneficial lines.

In 1903 the New York Yacht Club adopted a rating rule that sounded the death knell of speed, in fact displacement, scow-like boats. This rule took into account displacement as well as length and sail area, and by putting a premium on the first named, encouraged a deeper, fuller bodied hull instead of the flat sections that had grown up under the old rule. At a conference of most of the leading yacht clubs and racing associations of the East, held in 1905, this rule was pretty generally adopted, until it stood as the racing rule in force in the United States, and, while it is generally called the "universal rule," it was only used in the United States, England and the other European yachting countries having accepted (in 1906) a rule intended to bring about the same desired results, and known as the "international rule." Under these two rules a very fine type of racing craft has been produced—able, seaworthy, safe, and yet fast. Boats built under these rules were of some use other than for mere racing, and had a value as cruisers even when their racing days were over.

This universal rule now generally used in America is as follows.

"Yachts shall be rated for classification and time allowance according to the following formula:

Eighteen per cent of the product of length (water line) multiplied by the square root of sail area divided by the cube root of displacement.

$$\text{Measurement} = 0.18\,\frac{L \times \sqrt{SA}}{\sqrt[3]{D}}.$$

The result is the measurement and rating for classification and time allowance of sloops. Yawls shall be rated at 93 per cent and schooners at 90 per cent of their measurement by above formula."

There are besides other limitations provided, all tending to abolish extreme types and to produce a sane, healthful type of yacht. The following classifications of yachts are provided under this rule:

SCHOONERS

First class		
100-foot class	A	All over 100 feet, rating
88-foot class	B	Not over 100 feet and over 88 feet, rating
76-foot class	C	Not over 88 feet and over 76 feet, rating
65-foot class	D	Not over 76 feet and over 65 feet, rating
55-foot class	E	Not over 65 feet and over 55 feet, rating
46-foot class	F	Not over 55 feet and over 46 feet, rating
		Not over 46 feet, rating.

SLOOPS AND YAWLS

First class		
100-foot class	G	All over 100 feet, rating
88-foot class	H	Not over 100 feet and over 88 feet, rating
76-foot class	J	Not over 88 feet and over 76 feet, rating
65-foot class	K	Not over 76 feet and over 65 feet, rating
55-foot class	L	Not over 65 feet and over 55 feet, rating
46-foot class	M	Not over 55 feet and over 46 feet, rating
38-foot class	N	Not over 46 feet and over 38 feet, rating
31-foot class	P	Not over 38 feet and over 31 feet, rating
25-foot class	Q	Not over 31 feet and over 25 feet, rating
20-foot class	R	Not over 25 feet and over 20 feet, rating
17-foot class	S	Not over 20 feet and over 17 feet, rating
15-foot class	T	Not over 17 feet and over 15 feet, rating
		Not over 15 feet, rating.

In adopting the international rule Great Britain endeavored to have the United States become a party to it, but that country believed that its own universal rule would better fulfill its own individual needs.

After the last America's Cup race in 1903, between the *Reliance* and the *Shamrock III*, there was no challenge for the America's Cup that was acceptable to the New York Yacht Club until 1913, when Sir Thomas Lipton, owner of *Shamrocks I, II,* and *III*, again sent a challenge for a race, naming a sloop 75 feet on the water line, and a race was arranged for September, 1914, under the universal rule of measurement, the first America's Cup race to be held under this rule. To meet the challenger, the *Shamrock IV*, three 75-foot sloops were built in the United States, the largest sloops to be built under the present universal rule. These three yachts, the *Resolute*, designed by N. G. Herreshoff, the *Vanitie*, designed by William Gardner, and the *Defiance*, designed by George Owen, raced in the summer of 1914 to see which should have the honor of defending the cup, but the great war breaking out while the *Shamrock IV* was on her voyage to America, the race was abandoned and the *Shamrock* laid up in New York.

In the early days of yachting sails were made to bag like a purse net. Now they are made as flat as possible save for a slight hollow in the luff, and are of closely woven material instead of soft, loosely woven stuff.

Lug sails, that were common 50 years ago, have disappeared, except in some very small boats; so have square topsails set on yards above the fore and aft sail of schooners, sloops, and cutters. Where the *Maria* (in 1845) set a single jib forward of the mast, modern racers may carry two or three in moderate weather. Instead of a great square sail spread from a yard when running before the wind there is now a spinnaker, a triangle of canvas that extends from the topmast head to the deck and out along a boom rigged broad off on either side.

Among other trophies that have had an influence on American yachting is one provided in 1895 by the Seawanhaka-Corinthian Yacht Club for an international challenge cup for racers not smaller than the 15-foot class nor larger than the 25-foot class—from a half rater to a two and a half rater, according to the British nomenclature. A British challenger, Arthur Brand, brought the *Spruce IV*, a yacht 15.83 feet long on the water line and spreading 197 feet of canvas. The *Ethelwynn*, designed by W. P. Stephens, defended the cup successfully. She

was 23 feet 4 inches over all, 14 feet 6 inches on the water line, 6 feet 7 inches broad, and 7 inches draft She carried a metal centreboard that dropped five feet below the keel and weighed 55 pounds. In 1896 the Royal St. Lawrence Yacht Club won this cup, with a half rater called *Glencairn* Since then the size of the yachts has increased to the limit allowed by the original conditions, and the cup returned to America in 1905, and was retained in the races of 1906 and 1910. In addition there are many cups for ocean races and on the Great Lakes for small boats, the longest being from New York to Bermuda.

On the steam-yachting side of the sport, Capt. R F Loper, of Philadelphia, built the first American steam pleasure boat, the *Colonel John Stevens*. She was 92 feet long and carried two low-pressure engines with cylinders 18 by 14 inches. The paddle-wheel *Firefly*, built by the Aspinwalls in 1854, was the first American steamer to be properly classed as one of a fleet belonging to a recognized yacht club. In Great Britain, the paddle-wheel *Victoria and Albert*, launched for the Queen, April 6, 1843, was the first notable steam yacht. She was 225 feet long, and had a record of 11 5 knots—something remarkable for that period. Nevertheless the introduction of compound engines (see STEAM NAVIGATION), with their economy of space and fuel, marks the real beginning of steam yachting, and since that time steam yachts have had a wonderful development. The list of the New York Yacht Club alone shows steamers of which 11 register about 1000 tons

Because of their speed, steam yachts have come into use for fast ferry service, carrying business men between their country homes and town. The *Stiletto*, built by the Herreshoffs, was the first notable high-speed steam yacht in America. Though but 86 feet long and in use for 20 years, she was able (1903) to make 18 knots an hour. The *Miranda*, built by Thornycroft (1872), though but 50 feet long, had a record of 19 land miles an hour.

The limit in this class was reached in the *Arrow*, designed by Charles D. Mosher (1900). She is 139 33 feet long and displaces 66 tons, but her record, as given by her designer, is 40 knots. She is fitted with quadruple-expansion engines that take steam at a pressure of 400 pounds from water-tube boilers.

In early steam-yacht design America was far behind Great Britain and the early yachts designed were defective, the boats being built mostly from models made by men familiar only with sailing yachts In the early eighties steam yachting began to assume definite proportions and efforts were made to improve the type of boats. From 1885 on, Americans bought in England and brought to the United States steam yachts of British design and build, and these boats had a great influence on subsequent American design, though the boats built in America were, of course, especially adapted to meet local conditions. The Herreshoffs originated a certain type of high-speed steam yacht which made that firm famous and which it developed to a high state of perfection, while the demand for higher speed in steam yachts than was usual in the English models led to the development of another type that offered good accommodations, fair seagoing ability, and speeds up to 21 miles an hour. This was a purely distinctive type, of which such yachts as *Kanawha II, Hauoli, Kismet*, and the like were exponents This type later gave way to steam yachts of still higher speed, up to 30 to 35 miles, used almost entirely for fast ferry service between the owner's country home and the city, and where the accommodations were sacrificed to speed. This type may be said to be represented by such boats as the *Sovereign*, the *Little Sovereign*, the *Winchester*, etc. While this latter type is in demand for fast ferry service, the older English type is still adhered to for seagoing, cruising yachts. In the faster boats turbine engines are generally being used instead of reciprocating engines, while a number of them have furnaces burning oil instead of coal, and it is probable that in the future steam turbines will have the call for boats of extremely high speed. See MOTOR BOAT. Consult: N L Skene, *Elements of Yacht Design* (New York, 1904); A H. Clark, *History of Yachting, 1600 to 1815* (ib., 1904), *Dixon Kemp's Manual of Yacht and Boat Sailing and Yacht Architecture* (11th ed., 2 vols., London, 1913); *Lloyd's Register of Yachts, containing Particulars and Distinguishing Flags of Yachts and Motor Boats, an Alphabetical List of Owners . . .* (ib, annually); *Lloyd's Register of American Yachts* (New York, annually).

YAD'KIN RIVER. See PEDEE RIVER.

YAGUARONDI, yä'gwa-rŭn'dē. See JAGUARONDI.

YAHGAN, yä'gän, or **YAPOO,** yä'pōō. A South American tribe apparently constituting a distinct linguistic stock, occupying the shore of Beagle Channel, in Tierra del Fuego. They are represented as very low in the scale of culture, building only rude shelters, having no government and little conception of numbers. They are of good physique, expert hunters and fishers, with bow, bola, lance, and various nets, skillful canoe builders and weavers of water-tight baskets. The race is now nearly exterminated, although about 90 are gathered in the two missionary stations of Ushnaia and Tekenika. The Yahganan language is polysyllabic and agglutinative, with prefixes and suffixes, and is rich in expressions for the ordinary needs of their life. Consult Lucien Adam, *Grammaire de la langue Jagane* (Paris, 1885), and D. G. Brinton, *The American Race* (New York, 1891).

YAHOOS, yä-hōōz'. The slaves of the noble Houyhnhnms or horse-folk, in Swift's *Gulliver's Travels*. They possess the form of man and are intended as a satire on the human race.

YAHWE, yä'wĕ. The name of the national deity of Israel. As before the eighth century B.C. the Hebrew alphabet had no vowel signs, the exact pronunciation could not be indicated, and after that time the consonants YHWH were supplied with points showing that *Adonai*, "Lord," or *Elohim*, "God" should be read instead of the name men were not permitted to use. The Samaritans, however, continued longer than the Jews to employ it In the fifth century they said Yahwe, and this pronunciation is still known to them. The *Yāwĕ* of an Ethiopic text suggests that the Falashas may have been acquainted with it, and the *Iaoue* of the Paris magical papyrus that even pagans occasionally heard it in this form. A misunderstanding of the Masoretic directions led Christian scholars at least as early as the fourteenth century to create the hybrid form *Jehova*, consisting of the consonants of one word and the vowels of another. Génébrard in 1567 recognized the true

pronunciation. It is sometimes written Yahweh in order to preserve the four consonants, but as the final *h* is inaudible, it is common and proper to leave it out. It is not known how old the name is. Its earliest datable appearance seems to be on the Moabite stone (q.v.). It is never used in theophorous names. In Ex. iii 14 it is apparently explained as "he who brings into existence," "the Maker." This may be a learned interpretation. R. H. Kennett thinks it comes from the seventh century and the Assyrian province of Samaria (art. "Israel" in Hastings, *Encyclopædia of Religion and Ethics*, New York, 1915). If the name is of Aramaic origin this etymology may indeed be correct, but that is uncertain, as is also the relation of Yahwe to Yahu, Yaho, Yah, Yau, Yao, and Yo found on inscriptions at Samaria and Jericho, in the Elephantine papyri, in Assyrian texts, and in numerous Jewish theophorous names. See JEHOVAH; TETRAGRAMMATON.

YAHWIST, yä'wĭst. See ELOHIST AND YAHWIST.

YAJNAVALKYA, yäj'nyä-väl'kyä. A Hindu sage, the author of a legal work entitled *Yājñavalkyadharmaśāstra* and cited as the chief authority in the *Satapatha-Brāhmaṇa* (see VEDA), where he is mentioned as the pupil of the renowned teacher Aruni. According to tradition, Yajnavalkya traced his lineage back to Viśvāmitra (q.v.). He seems to have held a position of influence at the court of King Janaka in Mithila, the capital of Videha, the modern Turhut, northern Behar. (See BEHAR AND ORISSA.) In importance his code is second only to Manu (q.v.), which it resembles in many ways. It comprises 1009 slokas, or couplets, and is divided into three books. The date of its composition is about 350 A.D., when the author is believed to have lived. The *Yājñavalkyadharmaśāstra* was edited and translated by Stenzler (Berlin, 1849), and with Vijnanesvara's commentary by B. P. Moghe (3d ed., Bombay, 1892). Consult: G. B. Beaman, *On the Sources of the Dharmaśāstras of Manu and Yājñavalkya* (Leipzig, 1895); Naraharayya and Srisa Chandra Vasu, *The Sacred Laws of the Aryas*, vol. iii (Allahabad, 1913).

YAJUR-VEDA, yä'jur-vā'dà (Skt., Veda of sacrifice). The name of the third Veda (q.v.).

YAK (Tibetan *gyak, gyag*). A species of ox (*Poephagus grunniens*) found domesticated in Tibet. The wild yak of Central Asia is found only near the limits of perpetual snow, descending into the higher wooded valleys in winter, and ascending in summer to the pastures of short grass and sedges, some of which are 17,000 feet above the sea. It is hunted by large dogs, and is fierce, falling upon an adversary not only with its horns, but with its chest, and crushing him. It is generally black. The yak has been domesticated for ages, and forms a great part of the wealth of the inhabitants of the cold regions of Central Asia. The domesticated yak is about the height of an ordinary ox, which it resembles also in figure of body, head, and legs. It is covered with a thick coat of long silky hair, falling like the fleece of a sheep. The head is rather short; the eyes large and beautiful; the horns not very large, spreading, tapering from the base, a little turned back at the tips, a space between them on the forehead covered with a mass of curling hair. The neck is short; the withers high and arched; the rump is low; the legs are short. Over the shoulders there appears a bunch somewhat like that of the zebu, but it consists only of long hair. The tail has long flowing hair, descending to the hock. Black and white are usual colors.

The yak does not low like an ox, but utters a short grunting sound, as the expression both of uneasiness and of satisfaction. Its milk is rich, and the curd is much used by the Tibetans, both fresh and dried. The butter is excellent, is preserved for a long time in the dry and cold climate of Tibet in bladders, and becomes important in commerce. Its flesh is of fine quality, and is often dried and eaten raw. The yak is never used for tillage or draft, but is employed as a beast of burden, and travels at a slow pace, 20 miles a day, where no other beast could well be employed. The hair is spun into ropes, and made into coverings for tents. The soft fur on the hump and shoulders is woven into a fine and strong cloth. Caps, jackets, cloaks, and blankets are made of the skin with the hair on. The tails are the *chowries*, or fly-flappers, used in all parts of India, and which are to be seen particularly on all occasions of state and parade. Consult Richard Lydekker, *Wild Oxen, Sheep, and Goats* (London, 1898). See PACK TRANSPORTATION; Plate of CATTLE, WILD.

YAKIMA, yä'kĕ-mà (runaway, applied to them in derision by another tribe). An important tribe of Shahaptian stock (q.v.), formerly occupying a considerable territory on the Yakima and Columbia rivers, eastern Washington, and now gathered with other tribes on the Yakima Reservation in the same country. They call themselves Waptailmim, "people of the narrows," in allusion to their principal village, formerly situated at the narrows of the Yakima River, near the present Union Gap. They were called Cutsahnim by Lewis and Clark, who visited them in 1804. They came in contact with traders and missionaries at an early period, and in 1855, with other tribes, made a treaty with the government by which they ceded most of their territory and agreed to come upon the present reservation. In their original condition the Yakima were salmon fishers, root diggers, berry pickers, hunters, and active traders between the tribes east of the Rocky Mountains and those west of the Cascades. Although outside the buffalo range, they sometimes crossed the mountains in large parties to hunt buffalo in the plains. They used both the skin tepee and the mat-covered lodge. They now number 1362. See SHAHAPTIAN STOCK.

YAKOBA, yä-kō'bà. A large city in Northern Nigeria, British West Africa, the chief town of the tributary State of Bautshi, situated in an elevated and salubrious region about 150 miles south-southeast of Kano (Map: Africa, E 3). It consists of a number of villages surrounded by a wall and has an estimated population of 50,000. The city was founded by the Fulbe at the beginning of the nineteenth century.

YAKSHA, yŭk'shà (Skt. *yakṣa*). In later Hindu mythology, the name of a class of fairies, who attend on Kubera (q.v.), the god of riches, and are employed in the keeping of his treasures. In Sanskrit literature they are generally represented as inoffensive, but in some Buddhist legends they are described as demons, who feast on serpents and human corpses. Consult W. J. Wilkins, *Hindu Mythology* (2d ed., London, 1900).

YAKUB KHAN, yä-kōōb' kän' (1849–1923). An amir of Afghanistan. At an early age he

was made Governor of Herat by his father, the amir Shere Ali, against whom he rebelled in 1870 He was imprisoned by his father in 1874, but when the latter fled before the British in 1878 Yakub was left in charge of the government. Upon succeeding his father as amir, in February, 1879, he made peace with the British, but his troops revolted in September, 1879, and murdered the British resident and staff Lord Roberts (then Sir Frederick) defeated the Afghans, whereupon Yakub abdicated and took refuge with the British

YAKUTAT, ya-kōō'tat The most northern tribe of Kolushan stock (see TLINKIT), occupying the coast about the bay of the same name, south of Mount St. Elias, Alaska. They resemble the other Tlinkit in general characteristics They numbered about 300 in 1910

YAKUTS, ya-kōōts'. A people of Turkic stock They number some 200,000 and inhabit a territory of over a million and a quarter square miles in northeastern Siberia Their language gives evidence of being the oldest of the Turkic tongues. It has been a sort of *lingua franca* over portions of Siberia. The Yakuts have a somewhat extensive mythology. Although they were (nominally, in great part) converted to Christianity in the beginning of the eighteenth century, their original Shamanism still colors their religious life, particularly in the north. They are polite, hospitable, and industrious, but dislike to hire themselves for wages and are very fond of independence. The Yakuts were formerly polygamous, with not infrequent incest Upon their conversion they gave up polygamy. The Yakut marriage system is exogamous, but there are traces of an earlier endogamy. Consult: Böhtlingk, *Ueber die Sprache der Jakuten* (St Petersburg, 1848); Muller, *Unter Tungusen und Jakuten* (Leipzig, 1882); Radloff, *Uebersicht der Türkenstamme Sibiriens und der Mongolei* (ib., 1883), Sumner, "The Jakuts," in *Annals of the Anthropological Institute* (London, 1901).

YAKUTSK, ya-kutsk' A vast territory in east Siberia (Map: Asia, N–S 2). Area, 1,533,397 square miles. The southern part consists largely of elevated plains, thickly wooded and bordered on the south by the Stanovoi Mountains. Several mountain ranges also run through the interior. North of the elevated plains begins the region of tundras which extends to the coast. The chief rivers are the Lena (q.v.) with its great tributaries, the Olenek, the Yana, the Indighirka, and the Kolyma—all flowing into the Arctic Ocean. The climate of Yakutsk is very severe. Verkhoyansk is regarded as the coldest spot in the world. Agriculture is impossible, but Yakutsk possesses abundant resources in its forests and mineral deposits. The latter are found principally along the Vitim and the Olekma (tributaries of the Lena), where gold is mined on a large scale. There are also deposits of silver and lead, copper, iron, coal, kaolin, and amber. Ivory derived from mammoth tusks is exported to Moscow and European markets. Stock raising, hunting, and fishing are the main occupations of the inhabitants. Pop., 1897, 269,880; 1909, 309,900; 1912, 325,600.

YAKUTSK. The capital of the Territory of Yakutsk, in east Siberia, situated on a tributary of the Lena (Map: Asia, O 2). It is poorly built and unhealthful on account of frequent inundations. It has a cathedral. Yakutsk was founded by Cossacks in 1632 Pop., 1897, 6534; 1910, 8209.

YALE, ELIHU (1648–1721) An English colonial official, the early patron of Yale College. He was born in or near Boston, Mass, the son of David Yale, of Denbighshire, Wales, who emigrated to New England in 1638, lived for a while in New Haven, and then settled in Boston David Yale's family returned to England in 1652, and lived in London, where Elihu was educated In 1672 he entered the service of the British East India Company, and proceeded to India, where he rose at length in 1687 to be Governor of Fort St. George (Madras). In 1692 he returned to London with a large fortune acquired in private trade. In 1699 he became a governor of the East India Company. He became widely known for his philanthropy and the liberality of his gifts for religious and educational objects. One of the institutions in which he became interested was the collegiate school founded in 1700 at Saybrook, Conn., to which, between 1714 and 1721, he gave books and money to the amount of about £900 After the removal of the school from Saybrook to New Haven in 1718, the new college building was named after him, and in 1745 his name was applied to the whole institution. He lived during the latter part of his life at Wrexham, North Wales, and his body is there buried Consult F B. Dexter, *Biographical Sketches of the Graduates of Yale College* (new ed., New Haven, 1913).

YALE, LINUS, JR. (1821–68). An American inventor, born at Salisbury, N. Y. His father was an inventor and maker of bank locks, and the son at first turned his attention to portrait painting, but inherited mechanical tastes and aptitude led him also to become an inventor. He devised several locks, notable among which was the combination or dial lock for safes and banks, a type that has survived in essentially the form developed by Yale. The flat key or pin tumbler lock was invented in 1861, and immediately acquired a wide vogue. The name Yale instead of being applied to the locks of this inventor, of which there were many, soon was applied to any lock with a flat key. Consult R. H Yale, *Yale Genealogy and History of Wales* (Beatrice, Neb, 1908). See LOCK.

YALE UNIVERSITY. One of the leading institutions of learning in the United States, situated in New Haven, Conn. The plans of the first settlers of New Haven in 1638 included the establishment of a college, but Massachusetts objected, because there was at that time not enough population in the Colonies to support the college already founded at Cambridge, and for 60 years the people of Connecticut sent their sons to Harvard. In 1700–1701 10 of the principal ministers of the Colony, all but one of whom were graduates of Harvard, at a meeting at Branford, formally founded a collegiate institution by a gift of books for a library, and on Oct. 9, 1701, the Colonial Assembly granted a charter making the 10 ministers and their successors trustees of the Collegiate School of Connecticut. The trustees elected one of their own number, Abraham Pierson, of Killingworth, rector of the school, and, in order to secure the support of the towns on the Connecticut River, voted to establish it at Saybrook, "as the most convenient town for the present" Until the death of Rector Pierson, however, the students and the one tutor lived at Killingworth, prob-

ably in the house of the rector. Under the second rector, Samuel Andrew (1707-19), the undergraduates were instructed by him at Milford, and by other classes by two tutors at Saybrook. In 1716, however, on account of much dissatisfaction, the college was removed to New Haven and permanently located there. A wooden building was erected where Osborn Hall now stands, and was ready for occupancy at commencement in 1718, when the name of Yale College was adopted in honor of Elihu Yale (q.v.), who had made large gifts to the school. This building, besides chambers for students and a library, contained a kitchen and dining hall, and for more than 120 years from this time students were required to board together in commons. Timothy Cutler (q.v.) was rector from 1719 to 1722, when, on account of a change in his religious views, he was removed by the trustees. Elisha Williams served from 1726 to 1739, and was succeeded by Thomas Clap (q.v.), who had greater business qualifications than any of his predecessors. He drew up and published in Latin the first code of laws, catalogued the library, and drafted a new charter which was approved by the General Assembly in 1745. By this Act the former trustees were incorporated under the name of "the President and Fellows of Yale College in New Haven." Clap erected Connecticut Hall (South Middle), then "the best building in the colony," and a chapel (the Athenæum). President Clap also successfully defended the college against attempted interference in its management by the Legislature. Naphtali Daggett, professor of divinity, served as president from 1766 to 1777, when he was succeeded by Ezra Stiles (q.v.). President Stiles succeeded in overcoming the opposition to the college which had long existed in the Legislature, and in 1792, by joint action of the Legislature and corporation, certain State funds, valued at $30,000, were applied to the improvement of the college, and the Governor, Lieutenant Governor, and six senior Senators became members of the corporation.

The administration of Timothy Dwight (q.v.), from 1795 to 1817, begins a new era in the history of the institution. At his accession there were about 100 students, and the instructors consisted of the president, one professor, and three tutors, each of the lower classes being instructed in all branches by one tutor. President Dwight established permanent professorships and filled them with recent graduates of unusual ability and promise. Among the young men appointed at this time were three who served the college together for more than half a century and brought it great honor—Jeremiah Day (q.v.), in mathematics; Benjamin Silliman (q.v.), in chemistry, and James L. Kingsley (q.v.), in language. President Dwight, anticipating the growth of the college, extended the college square, by purchase, so as to include the whole front of the present campus, and continued the brick row to Berkeley Hall (North Middle). He also planned the organization of professional schools under distinct faculties, but the medical school only was established before his death. Jeremiah Day, who became president in 1817, had been selected by Dr. Dwight as his successor, and continued to carry out his plans. The divinity and law schools were organized, and the brick row completed. Under President Day the responsibility for the government of the students was placed upon the faculty, and out of the stricter discipline now enforced grew two unsuccessful revolts known as the Conic Sections Rebellion and the Bread and Butter Rebellion. In 1831 a fund of $100,000 was raised to meet the general expenses of the college, the total productive funds before this time having been less than $20,000. When President Day resigned in 1846 the college had 587 students, of whom about one-fifth were from the Southern States. Under President Theodore D. Woolsey (q.v.), 1846-71, the corps of instructors was greatly enlarged, and the standard of scholarship raised, the Scientific School was established, and the foundation laid for the School of Graduate Instruction, the professional schools were reorganized and the School of Fine Arts was founded. During President Woolsey's 25 years of service the number of students increased to 809. Dr. Woolsey proposed the plan, which became effective in 1872, by which six graduates of the college took the place of the State Senators in the corporation. The administration of Noah Porter (q.v.), 1871-86, was one of great material prosperity. At this time a most important change was made in the course of instruction and the modern system of elective studies was adopted. On the resignation of Dr. Porter the student body numbered 1079. He was succeeded in 1886 by Timothy Dwight (q.v.), grandson of the elder President Dwight, under whose administration (1886-99) the growth of the institution was unprecedented. In five years the number of students increased more than 50 per cent, and at the end of President Dwight's term they numbered over 2500. The title of Yale University was authorized by the Legislature in 1887. Under the last three presidents the productive funds were greatly augmented, and more than 20 buildings were erected at a cost of above $2,000,000. Upon the retirement of President Dwight, Professor Arthur Twining Hadley (q.v.) was made president and inaugurated on Oct. 18, 1899. The corporation as now constituted is composed of the president and 18 fellows, viz., 10 successors by election of the original trustees, the Governor and Lieutenant Governor of Connecticut, who were made members ex officio in 1792, and six representatives elected by the graduates from their own number, one every year for a term of six years.

The courses of study offered in the university are comprehended in nine schools, each school being under the administration of a distinct faculty of instruction: the college with courses leading to the degree of B.A.; the Sheffield Scientific School with an undergraduate course leading to the degree of Ph.B., a graduate course leading to the degree of M.S., and graduate courses in engineering leading to the degrees of M.E., C.E., E.M., and E.E.; the Graduate School with courses leading to the degrees of M.A. and Ph.D.; the School of Medicine with courses leading to the degree of M.D.; the School of Religion with courses leading to the degree of B.D.; the School of Law with courses leading to the degrees of LL.B. and B.C.L., and graduate courses leading to the degrees of M.L., D.C.L. and Jur.D.; the School of Fine Arts with courses leading to the degree of B.F.A.; the School of Music with courses leading to the degree of Mus.B.; and the School of Forestry with courses leading to the degree of M.F. The library, the Peabody Museum of Natural History, and the Observatory are organized independently of the several schools.

The college, the eldest school of the university

and the one from which the university and its several departments have sprung, requires for admission the passing of entrance examinations on specified subjects covering the entire course of a high school or preparatory school. A candidate for the degree of B.A. must complete studies aggregating 60 hours per week through a year. Although the choice of courses is wide, there must be completed during the junior and senior years a major subject and a correlated minor subject, insuring intensive study in some special field

The college campus faces the New Haven Green and occupies one-half of one of the original nine squares in which the city was laid out, as well as additional land on adjoining squares. The campus is arranged in the form of a rectangle, 850 feet long and 400 feet wide.

The dormitories include Connecticut Hall, erected in 1750, Farnam (1869), Durfee (1870), Lawrance (1884), Welch (1891), Berkeley (1893), Vanderbilt (1893), White (1893), Pierson (1896), Fayerweather (1902), Haughton (1909), and Wright (1912)

Other buildings of the college are Battell Chapel, Dwight Hall—the home of the Y. M C. A.—Kent Laboratory, and the following halls used for recitations and lecture purposes: Sloane, Osborn, Phelps, and Lampson.

The Sheffield Scientific School is devoted chiefly to instruction in the mathematical, physical, and natural sciences, and furnishes both graduate and undergraduate courses. It was established in 1847 as a school of applied chemistry. In 1860 Joseph E. Sheffield of New Haven provided it with a building and a permanent fund, and the next year the school was reorganized and called by its present name. In 1863 it received from the Legislature $135,000, being the proceeds of the congressional land grant of 1862, and thus became the College of Agriculture and Mechanic Arts of Connecticut. In 1892 this Act was revoked and the special relation of the school to the State ceased. The undergraduate course occupies three years. Admission is on the basis of examination covering as thorough preparation as that required for the college though in somewhat different subjects. The courses of study are arranged in specific groups, as the mechanical engineering course, the chemistry course, the course of selected studies, etc. The specific course once selected there is small opportunity for choice by the student of specific electives within the course. The Sheffield buildings include South Sheffield Hall, the school administration building and lecture hall, North Sheffield Hall, Winchester Hall, the Sheffield Chemical Laboratory, Kirtland Hall, the Sheffield Laboratory of Physiological Chemistry, Leete Oliver Memorial Hall, all of these devoted largely to lecture halls and laboratories; the Electrical Engineering Laboratory, the Mason Mechanical Engineering Laboratory, the Hammond Laboratory of Metallurgy and Mining Engineering, Byers Hall, the home of the Sheffield Y. M. C. A. and other student interests. The Vanderbilt Halls, dormitories erected on Vanderbilt Square, are the only dormitories maintained by this school.

The Graduate School was formally organized in 1847, and is therefore the oldest of the regularly established graduate schools in this country. The only degrees conferred on recommendation of the Graduate School are those of Doctor of Philosophy and Master of Arts. The former degree normally requires a minimum of three years of resident graduate study, with successful examination and an approved dissertation evidencing capacity to make some real contribution to scholarship. The latter degree presupposes the completion of a minimum of two years of resident study and a satisfactory essay. Instruction is given in 15 departments, by 70 professors, 42 assistant professors, and 23 instructors. A number of fellowships and scholarships in aid of students are provided.

The earliest professional school organized at Yale was the Medical School. Four professors in medicine were appointed in 1813 and medical degrees were given the following year The school was aided in the beginning by a grant of $30,000 from the State, and for 70 years was under the joint control of the college and the State Medical Society, until in 1884 the university authorities assumed full control of the school. The course was extended in 1896 to four years and the present requirement for admission is at least two years of college study. A campaign carried out in connection with the centennial of the Yale School of Medicine assured an endowment to this school of not less than $2,500,000. The buildings of the school include Medical Hall, the Laboratory Building, the Clinical Laboratory, and the University Clinic An agreement between the university and the New Haven Hospital gives the university the power to nominate the hospital staff, and thus provides for thoroughly continuous clinical instruction.

The School of Religion, originally called the Divinity School, was organized in 1822, but instruction in theology had been given at Yale since its foundation, and the first professorship in the college was that of divinity, established in 1755 This school, originally Congregational in doctrine, is now undenominational. Its courses are partially elective. A three-year course, admission to which is based upon the completion of four years' college work, leads to the degree of B.D. There is also regular provision for graduate study. The buildings of the school comprise Edwards and Taylor halls, dormitory and recitation buildings, the Marquand Chapel, and the Day Missions Library.

The School of Law became a part of the college in 1824, though no degrees were conferred until 1843. Its course of instruction, covering three years, leading to the LL.B. degree is designed to fit the student for the practice of law in any State. Admission to the course is based upon the completion of four years' college work. A graduate course leading to the degrees of M.L., or Jur.D., or D.C.L. is also offered. The special law library of some 40,000 volumes and 11,000 pamphlets is particularly strong in Roman law and in Sessions' laws of the various States and Territories of the United States. The Law School is housed in Hendrie Hall The School of Fine Arts was established in 1866. Thorough instruction is offered in the Arts of Design, viz., drawing, painting, sculpture, and architecture, supplemented with courses of lectures on related subjects and the history of art.

The School of Music, founded in 1890, aims to provide instruction for those who intend to become professional musicians, either as teachers or composers, and to afford a course of study for such as intend to devote themselves to musical criticism and the literature of music. A gift provided for the erection of an adequate

new building to be used for the teaching and other activities of the school and to contain a concert hall seating over 700 auditors.

The School of Forestry was founded in 1900 as a graduate department of the university. It is engaged in instruction and research in the various branches of forestry It has its separate funds, teachers, and regulations but is governed by the corporation of Yale University. In addition to the two years' graduate course leading to the degree of Master of Forestry advanced courses and research work are offered in silviculture, lumbering, management, and other branches of technical forestry. Field and research work are conducted at the school camp at Milford, Pa., at New Haven and Union, Conn., in the Adirondack Mountains, New York, and in the Southern States. The School Forest of 1000 acres is at Keene, N. H.

The University Library, housed in Chittenden and Linsly Halls and in the group of buildings adjoining these, contains about 850,000 volumes with annual accessions exceeding 30,000 volumes, and with 5000 periodicals and publications of learned societies on file.

There are many special libraries connected with the various departments of the university, numbering in all about 150,000. The library of the Elizabethan Club contains a remarkable collection of Tudor and Stuart rarities, including a fine collection of Shakespeare quartos and folios.

In addition to the regular university courses, a large number of lecture courses under the auspices of the various university departments and organizations are carried on. Among the latter are the Lyman Beecher Lectures, the Silliman Memorial Lectures, the Dodge Lectures, Harvard Lectures, and others.

The Peabody Museum of Natural History was founded in 1866 by a gift of $150,000 from George Peabody, the London banker, and the first wing of the museum was completed in 1876. It contains the collections in mineralogy, geology, paleontology, and zoölogy, with several laboratories and workrooms.

The buildings of the Observatory stand on Prospect Street, about a mile from the college. The principal astronomical instruments are a 6-inch heliometer by Repsold of Hamburg, an 8-inch equatorial by Grubb of Dublin, and a 15-inch photographic telescope with a 10-inch follower and with a plane mirror to be used for star photography. The late Prof. Elias Loomis (q.v.) bequeathed to the observatory a fund of more than $300,000, the income of which is to be used for the promotion of astronomical observations and investigations.

The Gymnasium, completed in 1891 at a cost of $200,000, is under expert supervision. Near the gymnasium and connected with it are the Carnegie swimming pool and indoor baseball cage and a running track. The athletic grounds of the university have been greatly enlarged in accordance with plans worked out in coöperation with a committee of graduates. Across Derby Avenue is the new playing field of some 80 acres of land. Upon this is located the Yale Bowl, a football coliseum which accommodates about 60,000 people. Upon this new field several football fields and baseball diamonds have been laid out and provision has been made for soccer and lacrosse.

The university, under the control of the corporation, is directed by the president, who has the assistance of two executive officers, the secretary and the treasurer.

The buildings which are held by the university generally as distinct from any of the separate schools or affiliated institutions are Woodbridge Hall (the administration building) and the group of buildings erected at the time of the bicentennial, including Memorial Hall, Woolsey Hall (the university auditorium), and the University Dining Hall. The large new laboratories in physics and in the biological sciences are held for the common use of the college, the Sheffield Scientific School, and the Graduate School

The total student enrollment in 1915–16 was 3260, divided among the several schools as follows: Graduate School, 346, College, 1479; Sheffield Scientific School, 1020; School of the Fine Arts, 49, School of Music, 99; School of Forestry, 25; School of Religion, 106, School of Medicine, 58; School of Law, 119. The officers of instruction and administration include 494, divided as follows: professors, including other university officers, 141; assistant professors, 75; instructors, including lecturers, etc., 162; assistants in instruction, 116. The president in 1916 was Arthur T. Hadley. Consult E. E. Slosson, in *Great American Universities* (New York, 1910), and A. P. Stokes, *Memorials of Eminent Yale Men* (2 vols., New Haven, 1915).

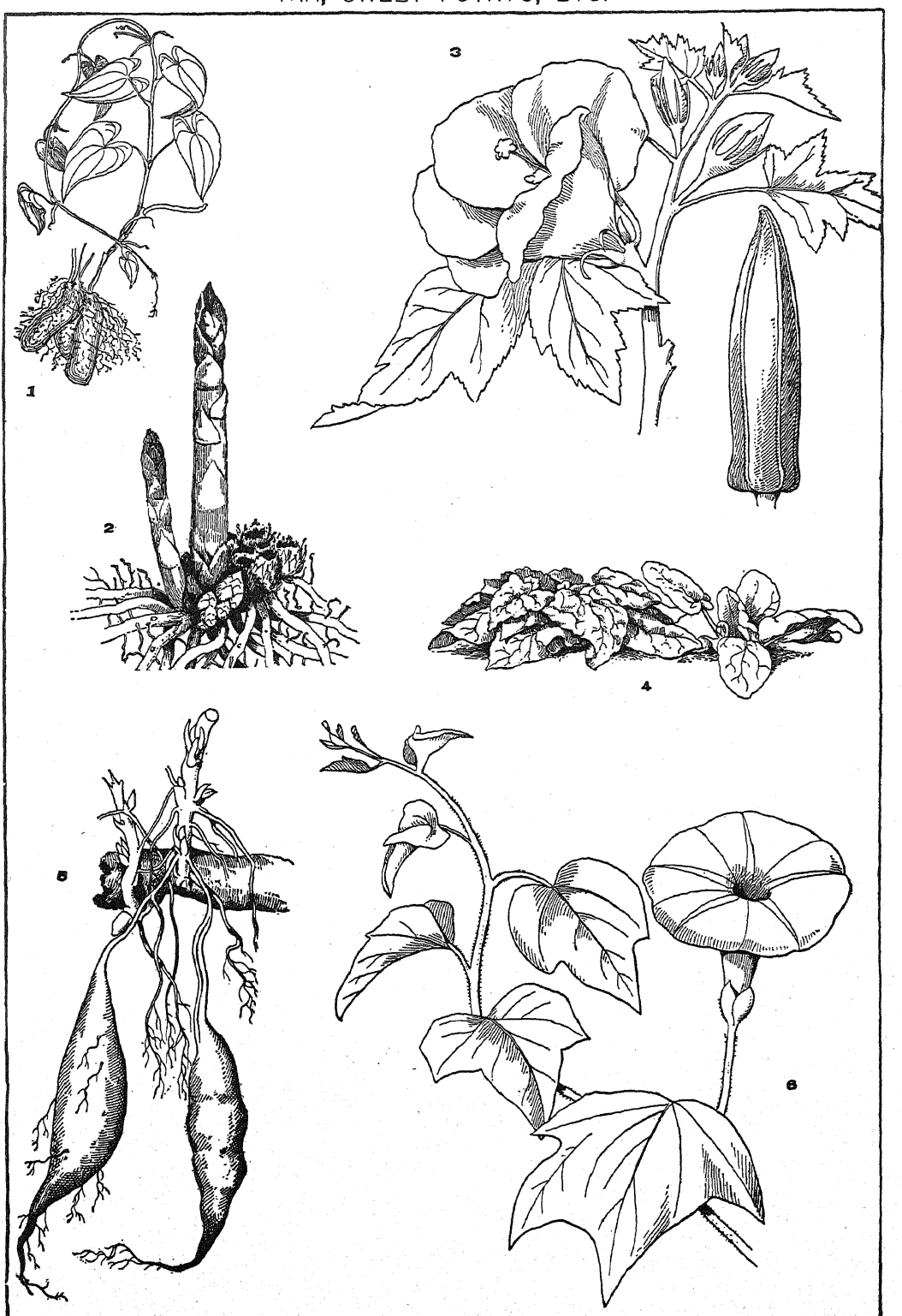
YALTA, yäl'tä. A district town in the Government of Taurida, South Russia, on the south coast of the peninsula of the Crimea, 60 miles south of Simferopol. It is a well-known sea bathing resort. Pop., 1911, 23,498. Yalta is identified with the Galita or the Yalita of the Arabs. It was held by the Genoese in the fifteenth century.

YA-LU-KIANG, yä'lōō'kyĭng' (Yalu River). A river of Korea, also called Amnok or Apnok, and by the Japanese renamed Oryoku (Map: China, N 3). It rises in the Paik-tu-san (8900 feet high), the highest of the Shan-a-lin or Chang-peh-shan system of Manchuria, and flows in a generally southwest direction into the Yellow Sea near the city of Wiju, forming in its course the northwest boundary of the country. It is navigable by seagoing junks for 30 miles from its mouth, and by smaller craft as far as the vicinity of Wi-wŏn, 145 miles farther up. In its upper course it is obstructed by dangerous rapids, yet rafts of timber are floated down to the sea. Off the mouth of the Yalu a great naval battle between the Chinese and the Japanese was fought in 1894, resulting in the destruction of the Chinese fleet. The crossing of the Yalu by the Japanese, May 1, 1904, was marked by the first great battle of the Russo-Japanese War (q.v.). See KOREA.

YA-LUNG-KIANG, yä'lōōng'kyĭng'. A river of west China, rising on the south slope of the Bayan-kara, an eastern extension of the Kuen-lun Mountains in eastern Tibet, near the headwaters of the Yellow River. It flows under different names south through deep gorges parallel with the Kin-sha-kiang or Yang-tse, which it joins after a course of several hundred miles. It is a very swift stream, much impeded by rapids, and is not navigable except in local stretches.

YAM (from Sp. *ñame, iñame, igname, ignama*, Port. *inhame*, yam, from African *nyame*, yam), *Dioscorea*. A genus of mostly East and West Indian plants of the family Dioscoreaceæ, distinguished by an inferior ovary and membranous

YAM, SWEET POTATO, ETC.



1. YAM (Dioscorea alata).
2. ASPARAGUS (Asparagus officinalis).
3. OKRA (Hibiscus esculentus).
4. SPINACH (Spinacia oleracea).
5 and 6. SWEET POTATO (Ipomœa Batatas).

winged fruit. They have herbaceous twining stems, and fleshy roots in some species used as food, like potatoes They contain much starch, and generally become somewhat mealy and pleasant to the taste when boiled. The tubers of all the yams contain an acrid substance, which, however, is dissipated by boiling, except in the species with compound leaves. The winged yam (*Dioscorea alata*) has roots 1½ to 3 feet long, and often 30 pounds in weight, with a brownish or black skin, juicy and reddish within. They vary exceedingly in form. Small tubers are generally found in the axils of the leaves. This species is the original of most, or perhaps all, of the yams cultivated in tropical Asia, Africa, and America. the common yam of the West Indies (*Dioscorea sativa*), which has a round stem and heart-shaped leaves, *Dioscorea bulbifera*, in which the tubers in the axils of the leaves attain the size of apples, the prickly yam (*Dioscorea aculeata*), which has a prickly stem and a fasciculated, tuberous root, *Dioscorea globosa*, the most esteemed yam of India, which has fragrant flowers and roots white internally; *Dioscorea rubella*, another Indian kind, with tubers sometimes 3 feet long, tinged with red below the skin. The Chinese yam (*Dioscorea divaricata*) is a hardy sort. Its edible club-shaped roots descend perpendicularly into the ground from 2 to 3 feet, and on this account it is little cultivated. See SWEET POTATO.

YAM, WATER See LATTICE LEAF.

YAMA, yä'mȧ (Skt *yama*, Av. *yima*, twin, but in later Sanskrit literature erroneously regarded as restrainer, punisher, from *yam*, to restrain). In Hindu mythology, a deification of the first mortal that died, who thus became king of death and ruler of souls hereafter. In the Veda Yama is the lord of the blessed dead. His abode is in the highest heavens, near the sun. Agni (q.v.), the god of fire, is his friend and conducts the souls to his presence. Yama, moreover, has two dogs as messengers, and past these all the spirits of the dead must go. As a king in the Veda he is the child of Vivasvat, a personification of the sun and of Saraṇyū, a sun maiden. He has also a twin sister named Yamī, who desires to seduce him, and a hymn of the *Rig-Veda*, which gives a dialogue between them, contains evidently a protest against incest.

In later Hindu mythology, especially in the epic poems and in the *Purānas* (q.v.), Yama is the judge of the dead and regent of the lower world. His realm is in the south, where he has a number of hells. His messengers go about the earth, drawing the souls out of the dead with a noose, although he sometimes performs this office himself.

In Iranian mythology Yima or Jamshid answers in part to the Indian Yama, but is also the ideal ruler of the golden age of the world. Consult: Ehni, *Die ursprüngliche Gottheit des vedischen Yama* (Leipzig, 1896); A. A. Macdonell, *Vedic Mythology* (Strassburg, 1897); W. J. Wilkins, *Hindu Mythology* (2d ed., London, 1900); Alfred Hillebrandt, *Vedische Mythologie* (Breslau, 1902); L. D. Barnett, *Antiquities of India* (London, 1913).

YAMACRAW, yä'mȧ-krą. A refugee band from the Creek confederacy (see CREEKS), formerly occupying a village on the south side of the Savannah River at Yamacraw Bluff, now included within the limits of the city of Savannah, Ga. A treaty was made in 1733 between the Georgia colonists and the Lower Creek towns. The Yamacraw afterward retired to the Chattahoochee River, from which they had originally come. See YAMASSEE.

YAMADA, yȧ-mä'da See UJI-YAMADA.

YAMAGATA, yȧ'ma-gä'ta. The capital of the Prefecture of Yamagata, in Japan, situated in the northern part of the island of Hondo, about 40 miles north of Fukushima (Map Japan, G 4). It is a former castle town, and has a considerable trade. Pop, 1908, 42,234

YAMAGATA, ARITOMO, PRINCE (1838–1922) A Japanese general and statesman He was born in the Province of Choshu, the son of a Samurai Having distinguished himself in the suppression of the Shoguns, he was given a place in the Ministry of War under the new régime in 1870. He was made Minister of War in 1873, and as author of the conscription bill of this period became known as the father of the Japanese army. At the outbreak of the Satsuma rebellion in 1877 he defeated Saigo and was rewarded with the command of the Imperial Guard and the direction of the general staff. In 1885 he was given the portfolio of the Interior, in 1889 succeeded Kuroda as Premier, and in 1892 became Minister of Justice. In the Chinese War of 1894–95 he swept the enemy out of Korea, crossed the Yalu, and was marching upon Mukden when ill health forced him to retire. He was elevated to the marquisate in 1895, and appointed field marshal in 1898. In the latter year he was again Premier. He was a member of the group of so-called Elder Statesmen, whose influence with the Emperor was a powerful force in parliamentary Japan, especially during the Russo-Japanese War of 1904–05. Yamagata served as chief of the general staff in 1904, in 1905 served as president of the Privy Council, in 1907 was created a prince, and later again became president of the Privy Council.

YAMAGUCHI, yä'mȧ-gōō'chē. The capital of the Prefecture of Yamaguchi, in Japan, situated in the southwest end of the island of Hondo, a short distance from the coast (Map: Japan, B 6) It was formerly the seat of the famous lords of Choshu. A Christian mission was established here by St. Francis Xavier in 1550. Pop., 1908, 21,100.

YAMAJI, yä'mȧ-jē, MOTOHARU, VISCOUNT (c.1840–1903). A Japanese soldier, born in the Province of Tosa (Shikoku). He was popularly known as the One-eyed Dragon. He won recognition in the Satsuma rebellion, was promoted to be lieutenant general, and after the reorganization of the nobility in 1884 was created a baron. During the Chinese campaign of 1894–95 he made a brilliant attack on Port Arthur. In acknowledgment of his military services he was created a viscount in 1895.

YAMAMAI (yŭm'ȧ-mī') **MOTH.** See SILKWORM.

YAMANOUCHI GUN. See MACHINE GUN.

YAM'ASSEE (peaceable, hospitable). A tribe of Muskhogean stock (q.v.) formerly holding both sides of the lower Savannah River and extending as far as the Salkiehatchee in South Carolina, with some villages southward almost to Florida. At the time of the settlement of South Carolina they were one of the most important tribes of the coast region and were friendly to the colonists until the exactions of the traders and the raids of slave dealers provoked them to war. They enlisted the Catawba, Cherokee, Congaree, and others almost to the

Virginia leader in a rising against the whites, and began the war on April 15, 1715, but were defeated. Groups of Creeks a year afterward also moved from South Carolina, retiring to Florida. They were finally incorporated into the Seminole Creeks and Seminole, but returned the greatest name up to the Creek War

YAMBOLI, yam'bō-lē', or **JAMBOLI**. A town in eastern Rumelia, 40 miles west of Burgas, on the Tunja River, here spanned by two bridges (Map: Balkan Peninsula, F 3). The remains of an old mosque and the old fortifications are of interest. There are prominent wine and wool interests. Pop., 1905, 15,768.

YAMBU, yam'bōō, or **YEMBU**. The port of Medina, in Arabia, situated on the Red Sea, about 120 miles west-southwest of that city (Map: Turkey in Asia, C 6). Pop., estimated at from 5000 to 7000. Yambu is important for its pilgrims' caravans, being on the route from Cairo to Mecca. It is called the Gate of the Holy City. It carries on a considerable trade with the ports of the Red Sea.

YAMEL, yä'mel. See KALAPUYA.

YAMEO, yä-mā'ō. An important tribe, with several subtribes and apparently constituting a distinct linguistic stock, along the Marañon (Amazon) from the Huallaga to the Javary and along the lower courses of those two streams, in northeastern Peru. They are also known as Llameo, Lama, and Lamista, and a part of them were anciently known as Motilon, but are not to be confounded with another tribe of the same name formerly living upon Lake Maracaibo in Venezuela (See MOTILON.) They are small and Mongoloid in appearance, contrasting with other tribes of the region. They were formerly very warlike, but are now agricultural and industrious. A part were civilized by the Franciscans and settled at Moyobamba and other stations on the Huallaga, where they are now farmers and cotton weavers. Those farther to the east were also visited by missionaries later, but retain their original character. Consult D. G. Brinton, *The American Race* (New York, 1891).

YANAM. See YANAON.

YANAON, yä'na'ōn', or **YANAM.** A French possession in India, on the east coast of Madras, near the mouth of the Godavari River (Map: India, E 6). It is an administrative dependency of Pondicherry (q.v.). Area, about nine square miles. Pop., 1913, 5135.

YANCEY, WILLIAM LOWNDES (1814–63). An American orator and political leader, born at Ogeechee Shoals, Ga. He studied law at Greenville, S. C., was admitted to the bar in 1834, and besides practicing his profession edited a Unionist paper, the Greenville *Mountaineer*, and spoke against nullification. In 1836 he removed to Oakland, near Catawba, Ala. His slaves having been accidentally poisoned, he reëntered law and journalism, was prominent as an anti-Whig orator in the presidential campaign of 1840, and from 1841 to 1844 was a member of the State Legislature. From 1844 to 1846 he was a member of Congress, and soon attracted national attention by his participation in a bloodless duel with Representative Clingman of North Carolina. Resigning from Congress, he became a bitter opponent of compromise between the North and South, was the author of the famous "Alabama Platform" of 1847 which demanded Federal protection for slavery in the Territories, fought vigorously against the compromise measures of 1850, anticipated the coming conflict between the sections, and became the recognized leader of the radicals in the South. He led the seceders from the national Democratic Nominating Convention at Charleston in 1860, and then made a canvass of the North, speaking in many States. "It was he more than any other," says Woodrow Wilson, "who taught the South what Douglas really meant, he more than any other who split the ranks of the Democratic party at Charleston, made the election of Douglas impossible, and brought Mr. Lincoln in." Just before the Civil War, Yancey was sent by the Confederate government as the head of a commission, consisting besides himself of P. A. Rost and Dudley Mann, to secure recognition for the Confederacy by various European governments, but after vain attempts in London and Paris, he returned in 1862, and thereafter until his death was a member of the Confederate Senate. Consult J. W. Du Bose, *Life and Times of William Lowndes Yancey* (Birmingham, 1892), and W. G. Brown, in *The Lower South in American History* (New York, 1902).

YANG-TSE-KIANG, yäng'tsĕ'kyäng' (the Yang-tse River). The longest and most important river of China, having a length of over 3000 miles and a drainage area of between 650,000 and 700,000 square miles (Map: China, J 5). It has its origin in a number of small rivulets which at a height of over 16,000 feet above the level of the sea dash down the northern slope of the snow-covered Tang-la Mountains of Tibet, near latitude 33° 45′ N., and longtitude 90° E. Under the name of the Murui-usu or Tortuous Stream it flows in a general east direction for some distance, receives two important affluents—the Napchi-tai and the Toktonai—from the Kuenlun Mountains in the northwest, and takes the name of Di-chu or Dré-chu. At about 98° E. longitude it enters Sze-chuen flowing in a southeasterly course but soon turns southward and under the name of Kin-sha (Golden Sand) it enters the Chinese Province of Yun-nan, bursts through its rocky barriers on the east, and after a great double bend, receives from the north the turbulent waters of the Ya-lung in latitude 26° 35′ N. and the name of Pei-(or *Pai-*)shui (white waters), forms in part of its course the boundary between Yun-nan and Sze-chuen, and again enters Sze-chuen, which it traverses in a northeasterly direction. Here it receives from the south the waters of the Hêng or Ta-kwan, the Nan-kwang, the Yungning, the Chih-shui, the Ki-kiang, and from Kwei-chow the Wu or Kung-tan at the city of Fuchow, 72 miles east of Chung-king. From the north it receives the Min at Hsu-chow or Sui-fu (taking the name of Min-kiang), the To at Lu-chow fu and the Kia-ling at Chung-king (q.v.) in latitude 29° 34′ N. and longitude 107° 2′ E., all navigable by native craft for hundreds of miles. Between 500 and 600 miles farther east, at a point 15 miles west of I-chang (q.v.), it escapes from the mountains, and with slackened pace and many a bend and detour pursues a generally east and east-southeast course through the heart of China, receiving the drainage of the provinces of Hu-peh, Hu-nan, Ngan-hwei, Kiang-si, and Kiang-su, and in latitude 31° 25′ N., and longitude 122° 14′ E., split by Chung-ming Island it pours into the Yellow Sea 770,000 cubic feet of water per second, and annually deposits in it about 6,000,000,000 cubic feet of suspended matter.

From the city of Fu-chow, in Sze-chuen, as far east as Ngan-hwei and beyond, it is known as the Ta-kiang or Great River, the Chang-kiang or Long River, or simply as Kiang or The River. From Ngan-hwei—the old Province of Yang—to the sea, it is properly known as the Yang-tse, but foreigners are in the habit of applying the name to the whole river. With its numerous tributaries and feeders the Yang-tse provides an unrivaled system of internal communication, which is now practically open to foreign commerce. Hankow, 680 miles from the sea, may be reached by the largest ocean steamships trading with the East, and I-chang, nearly 500 miles farther up, by light-draft steamboats. Above this the river presents a succession of gorges and rapids, with a very strong and swift current up which native craft (up to 60 or 70 tons burden) are hauled at great risk and expense, and frequent loss of life, by large crews of native trackers, at the rate of a few miles a day. All attempts to use steam as far as Chung-king have resulted in failure. Ping-shui-hien, 200 miles above Chung-king, is the limit of native navigation. Towards the end of summer the river frequently rises as much as 50 feet, flooding the fields and towns on its banks over a vast area, and sometimes causing terrible destruction of life.

YANINA, yä'nē-nä. See JANINA.

YANKEE, yăn'kē (of uncertain etymology). The popular name given to a native or citizen of New England, and by foreigners often applied indiscriminately to the entire population of the United States. One explanation of its origin, which is, perhaps, the most plausible, is that it is a corruption of the word English as pronounced by the Indians (Yenghies, Yanghies, Yankees). As a term of reproach to the New Englanders (who afterward adopted it themselves), the word seems first to have been used by the British soldiers about 1775. The South applies it to the North generally.

YANKEE DOODLE. A national air of the United States, the origin of which is unknown. The words, which were in derision of the ill-assorted provincial troops, were probably written by Edward Bangs some time between 1775 and 1777. The original title of the song, not the tune, was *The Yankee's Return from Camp*, and several versions are extant. The tune passed through various changes. The melody is shallow and shrill. It has been ascribed to various countries, but is probably of English birth. That it must have been generally known before 1767 seems likely, as in Barton's opera *The Disappointment* (1767) one of the lyrics is to be sung to the tune of *Yankee Doodle*. Consult O. G. Sonneck, *Report on the Star Spangled Banner, Hail Columbia, Yankee Doodle* (Washington, 1909).

YANK'TON. A city and the county seat of Yankton Co., S. D., 65 miles northwest of Sioux City, Iowa, on the Missouri River, and on the Chicago, Milwaukee, and St. Paul, the Chicago and Northwestern, and the Great Northern railroads (Map: South Dakota, G 5). It is the seat of Yankton College (Congregational), opened in 1881, and of the South Dakota Hospital for the Insane. The city is known for its large cement works and flouring mills. There are also grain elevators, brick yards, and breweries. The commission form of government has been adopted. Yankton was the capital of the Territory of Dakota until 1883. Pop., 1900, 4125; 1910, 3787; 1915 (State census), 4780.

YANKTON. See SIOUX.

YANKTO'NAI, or **PABAK'SA SIOUX.** See SIOUX.

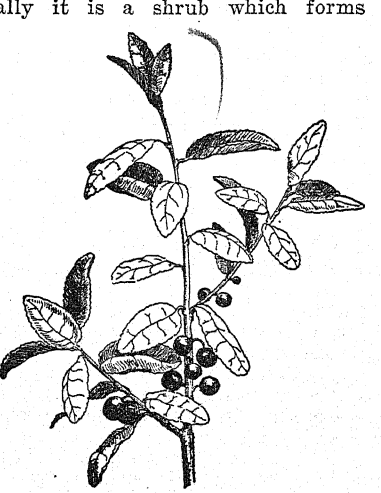
YANTIA, yän'tĭ-ä. See COCCO.

YAO, you. One of the ancient sovereigns of China. The Shu-King or Book of History—the oldest historical record the Chinese possess—begins with the reign of Yao (2357 B.C.), and shows him at the head of an elaborate, well-organized governmental system, carefully searching out able and virtuous men to be placed at the head of the different departments, and appointing astronomers to regulate the seasons. In the sixty-first year of his reign (2296 B.C.) occurred the great inundation commonly known among foreigners as the Chinese Flood, whose regulation taxed the energy of one engineer for nine years and his successor for 13. In the seventieth year of his reign (2287 B.C.), wishing to retire, Yao, passing over his own son, selected Shun, noted for his filial piety, as his colleague and successor. He died in 2258 B.C. Very little more is known regarding him, except that he was the son of one of the kings who had succeeded Hwang-ti (q.v.). He is the first of the ancient kings of China so much lauded by Confucius for their virtues. Consult Friedrich Hirth, *Ancient History of China* (New York, 1911).

YAP. See VOLUME XXIV.

YAPOK, yä-pŏk' (from the Oyapok River, between French Guiana and Brazil). An aquatic opossum (*Chironectes palmatus*) of Central and South America, rather larger than a rat, and differing from true opossums mainly in its webbed hind feet and aquatic habits. It has cheek pouches, in which it stows away crustaceans, mollusks, and aquatic insects, until it can reach a comfortable eating place. Its marsupial pouch is perfect.

YAPON, yą'pon, or **YAU'PON** (*Ilex cassine*). An evergreen holly native in the coastal States from Virginia to Texas and Arkansas. Generally it is a shrub which forms dense



YAPON.

thickets from its suckering roots, but in the Southwest it sometimes becomes arborescent. Its abundant scarlet berries are valued for winter decoration. Popularly it is known as cassena, and South Sea, Carolina, and Appalachian tea.

YAPOO, yä'pōō. A tribe of Tierra del Fuego. See YAHGAN.

YAPURÁ, yä′pōō-rä′, or **JAPURÁ.** One of the two largest north tributaries of the Amazon, rising in the Colombian Andes, where it is known under the name of Caquetá (Map: America, South, C 3). It flows through the Territory of Caquetá in a southeastern direction and then enters the Brazilian Province of Amazonas, where, after flowing east for some distance, it divides into a large number of arms which join the Amazon at various points, the western and easternmost mouths being 500 miles apart in a straight line. The central and principal arm enters the Amazon opposite the town of Teffe, about longitude 64° 40′ W. The total length of the Yapurá is estimated at nearly 1800 miles, of which about 900 are navigable. Much of its course is unexplored and the region is sparsely inhabited.

YAQUI, yä′kē. An important and warlike tribe of Piman stock (q.v.), with villages along the Yaqui River in central Sonora, Mexico. They are robust, industrious, enterprising, and of determined bravery. The men are stock raisers and cultivate corn, cotton, beans, tobacco, and the maguey from which mescal liquor comes. The women are expert weavers. Their houses are light structures. Each village has its own chief, the clan system prevails, and they have ceremonial societies resembling those of the Pueblo tribes. In the outlying country the men are employed as miners, cattlemen, teamsters, and pearl divers. They make good soldiers, but have been in almost constant revolt against the Mexican government. A rising in 1740–41, in which they were joined by the neighboring Mayo (q.v.), was put down by Governor Vildosola, who defeated the Indians in two great battles, and shot their chiefs. The Yaqui remained quiet until 1825, when an attempt at taxation by the newly established Mexican government led to another revolt under Juzucanca, known as Banderas, from a banner which he carried, claimed to have originally belonged to Montezuma. He proved an able general and organizer, arranging alliances with neighboring tribes, restraining his people from unnecessary cruelties, and hiring white soldiers to drill his men. After three years' fighting, said to have cost 3000 lives, the war was brought to a close on the promise of concessions by the Mexican government, with permission to the Yaqui to retain their captured arms, cattle, and supplies. Banderas was commissioned captain general of the tribe with a regular salary. In 1832 Banderas headed another rising with the purpose of organizing the tribes of Sonora into an Indian state with himself as king. With 1000 Yaqui warriors, reënforced by contingents of Pima and Opatá (qq.v.), he marched upon Ures, but was defeated by Escalante. Banderas was taken and shot. The war continued nearly a year longer, but the Indians were finally brought to submission. Another war, begun about 1884, ended in April, 1887, with the capture of the Yaqui chief Cajenie, who was publicly executed in the presence of his people. The Indians were now supposed to be completely crushed, but continued inroads of gold hunters upon the Yaqui territory, with the connivance of the Mexican government, led to serious disturbances a few years afterward and culminated in 1900 in a general rising. In one of the first engagements a small detachment of Mexican troops was surprised near Mazatlán and half their number were killed. Soon afterward General Torres with 700 troops surrounded a large force of Yaqui in a cañon near the same place and killed 124 men, women, and children, and captured 234 women and children, who were at once deported to practical slavery in Yucatan. In 1740 the Yaqui were supposed to number about 40,000, but continued wars have reduced them to about 13,000.

YAQUI. A river of northwest Mexico (Map: Mexico, D 4). It is formed by two headstreams, both bearing the name of the main stream, one rising on the plateau of Chihuahua, the other in Arizona. From the confluence the main stream flows southwestward through the mountains of Sonora, and empties into the Gulf of California after a course of 520 miles. Coursing through a rugged mountain valley, it is not navigable to any extent.

YARCHI, yär′kē. See RASUL.

YARD. See WEIGHTS AND MEASURES.

YARD, ROBERT STERLING (1861–). An American editor and publisher, born at Haverstraw, N. Y. Graduating from Princeton in 1883, he was for three years with W. R. Grace & Co., then was a reporter on the New York *Sun*, and from 1891 to 1900 was an editor of the New York *Herald*. Afterward he served as advertising manager (1901–05) of Charles Scribner's Sons, as editor in chief of a corporation in which he had an interest, Moffat, Yard and Company (1905–11), and as editor in chief of the *Century Magazine* (1913–14). From 1903 to 1905, in addition to other duties, he was editor of *The Lamp*.

YARDLEY, SIR GEORGE. See YEARDLEY.

YARIBA, yä′rē-bä. A former negro kingdom in Africa. See YORUBA.

YARITAGUA, yä′rē-tä′gwä. A town of Venezuela, situated in a beautiful mountain valley, 75 miles east of Lake Maracaibo. It is noted for the production of excellent tobacco, and is a commercial centre of some importance. Pop. (est.), 4177.

YARKAND, yär′känd′. A town of Eastern Turkestan, China, on the Yarkand Darya, a headstream of the Tarim (q.v.), about 100 miles southeast of Kashgar (Map: Asia, J 5). It lies in a fertile valley and is surrounded by a high wall and a moat. It has strategic importance. In the northwestern part of the city rises the fort of Yengisher. There are also a citadel in the new Chinese quarter, an old palace of the Emir, numerous mosques, and a fine bazar. Yarkand is the centre of an agricultural and stock raising region and manufactures felt and carpets. It also carries on a considerable trade in wool, silk, leather, dyes, sugar, opium, tea, etc. The city was taken by the Dungans in 1864, and became the second capital of Kashgar under Yakub Beg, but was recovered by the Chinese in 1877. Its population is estimated at about 70,000, composed principally of Mohammedans of Turko-Tatar descent.

YARMOUTH, yär′muth, or GREAT YARMOUTH. A seaport, fishing and sea-bathing town of England, on the east coast of Norfolk, 19 miles east of Norwich, at the mouth of the Yare, on a peninsula about 1½ miles broad, washed on the west by the Yare and Breydon water, and on the east by the North Sea (Map: England, II 4). The town communicates with the Suffolk suburbs of Southtown, of Little Yarmouth, and Gorleston, now part of the municipality, on the right bank of the Yare, by a bridge. Quays border each side of the river for nearly 2 miles, and here are the town

hall, the council chamber, and several other handsome buildings and many of the finest houses. There are a sailors' home, fishermen's hospital, and military asylum, the principal church being that of St. Nicholas, founded in the twelfth century, a handsome cruciform building, one of the largest parish churches in England, with a tower and spire 168 feet high. The town also has a monumental column, 144 feet high, to the memory of Nelson, several ornamental batteries of ancient guns, and a marine drive and promenade 2 miles long. Vessels of over 200 tons can enter the harbor, which is formed by the Yare. Yarmouth is the principal seat of the English herring fishery The fishing fleet employed numbers some 6000 vessels. The curing of fish is important, and the Yarmouth bloater is highly esteemed An extensive export trade in agricultural produce, herrings, and malt is maintained Shipbuilding is carried on, as well as the manufacture of ropes, sails, nets, and silk goods. There are also foundries, tan works, and flour mills. Yarmouth was raided by German naval and aerial forces in the great war which began in 1914. See WAR IN EUROPE. Pop., 1901, 51,250, 1910, 55,905

YARMOUTH. A port of entry and the capital of Yarmouth County, Nova Scotia, Canada, on a bay of the Atlantic. It is the terminus of the Canadian Pacific and the Halifax and South Western railroads, 205 miles southwest of Halifax (Map: Nova Scotia, D 9). It is the fourth shipbuilding place in the Dominion, has large fishery and lumber interests, thriving manufactures, and is a summer resort. Pop., 1901, 6430; 1911, 6600.

YARN (AS *gearn*, OHG *garn*, Ger. *Garn*, yarn). The name applied to the thread spun for the purpose of weaving cloths of various kinds. It differs not only in the materials of which it is made, but also in the fineness to which it is spun. The latter quality is of great importance, as upon it depends entirely the evenness and quality of the manufacture. In order that uniformity may be insured, a pound of the material is taken as the standard, and this is divided into hanks or cuts. Thus, with linen yarn, a hank or cut consists of 300 yards; and if it takes 25 of these hanks to make a pound, the yarn is called 25s; and if 40, 40s; and so on. A hank of cotton consists of 840 yards; a hank of wool is variously estimated in different countries and localities. See COTTON; SPINNING, WOOL.

YAROSLAV, yä'rō-släf' (?–1054). Grand Prince of Kiev, son of Vladimir (died 1015). Upon his father's death he inherited Novgorod. Soon afterward Svatopolk of Turov gained possession of Kiev, which in 1019 was wrested from him by Yaroslav with Scandinavian aid. After the death of his elder brother Mstislav, in 1039, Yaroslav was ruler of the greater part of what then constituted Russia. He founded, among other towns, the city of Yaroslavl. He married Indegerd, daughter of the Swedish King Olaf. His deeds were celebrated in some of the Norse sagas.

YAROSLAVL, yä'rō-slä'v'l. A government of central Russia (Map: Russia, E 3). Area about 13,723 square miles. Agriculture is the principal occupation. The household industries are developed in Yaroslavl as they are in but few parts of Russia. Linen weaving is especially important and has for its centre the industrial village of Velikoye. The production of locks, knives, nails, agricultural implements, etc., is considerable There are besides a number of cotton and flour mills, paper mills, chemical works, etc. The transit trade in grain is important. Pop., 1912, 1,239,300

YAROSLAVL. The capital of the government of the same name in central Russia, situated on the right bank of the Volga, 174 miles northeast of Moscow (Map: Russia, E 3). It is an ancient town with a number of interesting old churches. The manufacturing industries are important. The leading establishments are a cotton mill, tobacco factories, flour mills, and paint factories. Pop., 1910, 111,876. Yaroslavl was founded in 1071, and was the capital of a principality from the beginning of the thirteenth to the end of the fifteenth century, when the principality was absorbed by Moscow. See the article RUSSIA, *History*.

YAR'RELL, WILLIAM (1784–1856). An English naturalist, born in London. He was one of the founders of the Zoological Society in 1826. His chief works are *History of British Fishes*, illustrated by 400 woodcuts (2 vols, 1835–36; 3d ed, with memoir of the author, 1859); and *History of British Birds*, with 520 wood engravings (2 vols, 1839–43; 4th ed., 1881–85).

YAR'ROW. A small stream in Selkirkshire, southern Scotland, joining the Ettrick, a tributary of the Tweed, near Selkirk (Map: Scotland, E 4). On its banks are the ruins of Newark Castle, and Bowhill, the ducal seat of Buccleuch Yarrow has been celebrated by Scott, Wordsworth, and other poets.

YARROW. A genus of plants. See ACHILLEA.

YARUMAL, yä'rōō-mäl'. A town of the Department of Antioquia, Colombia, 52 miles northeast of Medellín, on the right bank of the Cauta. In the vicinity are gold mines and extensive pastures. Pop., 1912, 21,250.

YARURAU, ya'rōō-ra'ōō. An Indian linguistic stock of Venezuela. The Yaruros (Jaruris), or, as they called themselves, Japurin, dwelt on or near the Orinoco, between the rivers Meta and Capanapaco. Consult: D G. Brinton, *The American Race* (New York, 1891); Tavera-Acosta, *En el Sur* (Ciudad Bolívar, 1907); L. R. Oramas, in *Anales de la Universidad Central de Venezuela*, vol. x (Caracas, 1909)

YASNAYA POLYANA, yàs-nä'ya pōl-yä'nà. The estate of Liov Tolstoy (q.v.).

YASSY, yäs'sē. See JASSY

YATES, DAVID GILBERT (1870–). An American physician, born in New Jersey in 1870. He received his preliminary education in private schools and after a brief experience in journalism entered New York University, receiving his medical degree in 1898. Thereafter he devoted himself mainly to special practice, becoming successively senior assistant surgeon to the New York Eye and Ear Infirmary, aural surgeon to the New York City Children's Hospitals and Schools, and assistant surgeon to the Manhattan Eye, Ear, and Throat Hospital. He contributed many original papers to the literature of his specialty, and at various times was contributing editor of the *Medical Critic* and of the NEW INTERNATIONAL YEAR BOOK, and medical editor of the NEW INTERNATIONAL ENCYCLOPÆDIA.

YATES, EDMUND HODGSON (1831–94). A British journalist and novelist, born in Edinburgh. At 16 he entered the General Post Office, London, from which in 1872 he retired

on a pension of £200 to devote his time wholly to literature. In that year he came to the United States to lecture, and in 1873 and 1874 was London correspondent for the *New York Herald*. Of his numerous journalistic ventures, the most successful was *The World*, a London society paper, which he founded in 1874. For an attack on Thackeray in *Town Talk*, he was expelled from the Garrick Club (1858), and for a libel on the Earl of Lonsdale in *The World* (1880), he was imprisoned for seven weeks (1885). Yates's first novel was *Broken to Harness*, which appeared in *Temple Bar* for 1864, a magazine which he was then editing. Among his novels are *Land at Last* (1866); *The Black Sheep* (1867); *Nobody's Fortune* (1871); and *The Impending Sword* (1874). Besides magazine articles and sketches, Yates wrote several successful farces, and an autobiography entitled *Recollections and Experiences* (1884).

YATES, Richard (1818–73). An American political leader, the war Governor of Illinois. He was born in Warsaw, Ky., removed with his parents in 1831 to Springfield, Ill., graduated at Illinois College, Jacksonville, in 1838; and practised law in Springfield. He became prominent in local Whig politics, was a member of the State Legislature (1842-49), and a member of Congress (1851-55). Allying himself with the Republican party at its organization, he was its candidate for Governor in 1860, and was elected, serving until 1865. His activity and loyalty marked him as one of the greatest of the country's war Governors. His advice was sought by President Lincoln in regard to national problems, and in State affairs he overcame and controlled the strong pro-Southern movement that developed in Illinois at certain periods of the war. He was a member of the United States Senate (1865–71), and took a prominent part in reconstruction legislation.

YATES, Robert (1738–1801). An American jurist. He was born in Schenectady, N. Y., was educated in New York City, and in 1760 began the practice of the law in Albany. He sided with the Patriot party on the approach of the Revolutionary War, and wrote several anti-British essays (signed "The Rough Hewer"), which attracted widespread attention. He was a member of the Provincial Congress from 1775 to 1777, serving on the committee which drew up New York's first Constitution in 1776; was a judge of the Supreme Court of New York from 1776 to 1798; and was Chief Justice after 1790. In 1787 he was one of New York's three delegates to the United States Constitutional Convention, but being an extreme anti-Federalist, soon withdrew, after playing the part of an obstructionist, and in the following year violently opposed the ratification of the Constitution by New York. His notes of the debates in the convention of 1787 were published at Albany in 1821 as *Secret Proceedings and Debates of the Convention Assembled at Philadelphia in 1787*.

YATUNG, yä'tŏŏng' (said to mean "Hole-in-the-Valley"). A British trading post in Tibet, near the border of Sikkim, established in 1894 in accordance with the provisions of a convention negotiated in 1890, the necessary buildings being provided by the Chinese government. It really never became a trading post till after the convention of 1904 (Younghusband) between Great Britain and Tibet, in which the latter agreed to the maintenance of trading posts at Yatung, Gyangtze, and Gartok. It is 80 miles from Darjeeling (7400 feet), also in Sikkim, the terminus of the Indian railway system in that direction. Yatung is situated in the Chumbi valley at an elevation of 10,480 feet above the level of the sea, and is reached from Darjeeling over the Jelep Pass in seven days. The place is entirely shut in by lofty mountains and a battlemented "Chinese wall" built across the gorge.

YAUCO, yä'ōō-kō. A town on the south coast of Porto Rico, 68 miles west of Ponce, in the important coffee-growing section of the island (Map: Porto Rico, B 3). Pop., 1899, 6108; 1910, 6589.

YAUPON. See Yapon.

YAUTIA. yow-tē'a. See Dasheen.

YAVAPAI, ya'va-pī' (sun people). A North American Indian tribe of Yuman stock (q.v.), originally an offshoot from the Mohave (q.v.) of the Colorado River, and claiming the territory between the Bill Williams fork and the Rio Verde. From their close associations with the Apache (q.v.) they were sometimes known as Apache Mohave. They numbered 289 in 1910. In their aboriginal habits and characteristics they resembled the Mohave and the Apache, but are excellent basket makers. Consult G. A. Dorsey, *Indian Tribes of the Southwest* (Chicago, 1904).

YAVARY, yä'vä-rē'. See Javary.

YAWL. See Yacht.

YAWNING (from *yawn*, AS. *gānan*, *ginian*, OHG. *geinōn*, *ginēn*, Ger. *gähnen*, to yawn). A long, deep, involuntary inspiration accompanied by unusual expansion of the chest, wide opening of the mouth, and elevation of the shoulders. It is generally an evidence of mental weariness, though it is frequently imitative. This modified respiratory movement is caused by imperfect aëration of the blood and is essentially reflex, the stimulus determining each movement acting on the respiratory centre. It occurs during paralysis of the muscles which raise the shoulder. Yawning occurs in certain animals, as the dog, lion, and horse.

YAWS (probably from African *yaw*, raspberry, so called because of the tubercles characterizing the disease). A contagious disease characterized by an eruption of white or yellowish tubercles, granules, or papules, topped with crusts, and sometimes becoming confluent. The disease is common in Africa, Central America, Brazil, Guiana, the West Indies, Mozambique, and Madagascar, Java, Ceylon, the Fiji Islands, and Samoa, and is found in any country to which slaves have been taken from Africa, although a tropical disease. It is also called frambœsia, pian, bubas, coko, tonga, etc. An attack lasts from two to six months, or for many years. Mercury, iodide of potassium, iron, arsenic, sarsaparilla, and sulphur are used in its treatment. A spirochæta (q.v.) has been discovered which is believed to be the cause of yaws and similar to the spirochæta of syphilis. Salvarsan (q.v.) is said to have a specific effect against both organisms. See "Yaws," in *Reference Handbook of the Medical Sciences* (New York, 1916).

YAZD. See Yezd.

YAZDAGARD, yäz'dä-gärd. The name of three Persian kings of the Sassanidæ (q.v.) dynasty.

YAZOO (yăz'ōō) **CITY.** A town and the county seat of Yazoo Co., Miss., 45 miles northwest of Jackson, on the Yazoo River, and on the

Yazoo and Mississippi Valley Railroad (Map: Mississippi, E 5). The principal industrial establishments include a cotton mill, two cottonseed-oil mills, two lumber mills, and an ice factory. Noteworthy features are the Elks Home, and Ricks Memorial Library. Pop., 1900, 4944, 1910, 6796.

YAZOO FRAUD. A term applied to the transaction by which the State of Georgia, by Act of the Legislature of Jan. 7, 1795, granted a large portion of her western territory chiefly to four land companies known as the Yazoo Companies, from the region thus deeded. The consideration was $500,000, and the area conveyed was about 35,000,000 acres. The territory was described as extending from the Alabama and Coosa rivers to the Mississippi and from the thirty-fifth to the thirty-first parallel of latitude. It was believed the Legislature had acted from corrupt motives—every member of that body except one being a shareholder in the companies Many buyers were notorious speculators, and many were residents of other States. The people of the State were indignant and a party was formed to agitate for the repeal of the sale. A new Legislature was elected, and the repeal was brought about. By the statute of Feb 13, 1796, the records of the transaction were burned in the presence of the Governor and Legislature, and in 1798 a State convention made the repealing act a part of the Constitution, on the ground that the State had the right to repudiate a contract founded on improper motives. The territory in question was ceded by Georgia to the United States in 1802. In 1803 a commission was appointed by President Jefferson under an Act of Congress to investigate the Yazoo claims. Madison as chairman recommended a compromise, but Georgia refused to compensate the claimants. The bill was defeated, largely through the instrumentality of John Randolph; though taken up several times after this it failed to pass. Their claim, however, was sustained by the United States Supreme Court in the case of Fletcher *vs.* Peck, 6 Cranch 87 (1810), Chief Justice Marshall holding that the charge of bribery in 1795 could not be brought before the court as a collateral issue, that the Legislature could not in 1796 declare invalid its own Act of 1795, that the grant of 1795 was in the nature of a contract, and that the law of 1796 was unconstitutional as in effect an ex post facto law destructive of the vested estate of the grantees under the Act of 1795 Accordingly in 1814 Congress ordered the lands to be sold and appropriated $8,000,000 for extinguishing the rights of the claimants. Three years later the Treasury reported a final settlement, which involved the payment of $4,282,151. Consult Henry Adams, *History of the United States*, vols i and ii (New York, 1889–91), and C. H. Haskins, "Yazoo Land Companies," in American Historical Association, *Papers*, vol. v (ib., 1901).

YAZOO (yăz'o͞o) **RIVER.** A river in the State of Mississippi, formed by the union of the Tallahatchie and the Yalobusha rivers just above Greenwood, Miss., whence it flows southward and enters the Mississippi at Vicksburg (Map: Mississippi, D 5). The Tallahatchie and its chief tributary, the Coldwater, rise in northern Mississippi. The Yazoo receives also the Sunflower, about 20 miles above Vicksburg. It is navigable for its entire length, and most of its main affluents are navigable for small boats, and are used for logging. Its total length is about 300 miles.

YEAMANS, yē'manz, ANNIE (1835–1912). An American actress, born on the Isle of Wight. While a child she was taken by her parents to Sydney, New South Wales. In 1853 she was married to Edward Yeamans. Her first appearance in New York City was in *Cendrillon*. She entered upon a long engagement with Harrigan and Hart at the Theatre Comique, where she became noted for her impersonations of Irish characters. Subsequently Mrs Yeamans appeared under many managements and in a great variety of plays, both in England and the United States.

YEAMANS, SIR JOHN (c.1610–74). A Colonial Governor of South Carolina, born in Bristol, England. He went to Barbados in early manhood and became a planter In 1665 the proprietors of Carolina appointed him Governor of the country called Clarendon, extending from San Mateo to Cape Fear. In the same year he sailed with three ships from Barbados, and at Cape Fear established a short-lived colony. In 1669 he was reappointed Governor, but soon named William Sayle in his stead. In 1671 he was once more given that position. During the next few years many new settlers arrived and negro slaves were introduced. In 1674 the proprietors became dissatisfied with Yeamans's management of affairs and removed him. He returned to Barbados, where he died.

YEAR (AS. *gēar, gēr*, Goth. *jēr*, OHG. *jār*, Ger. *Jahr*, year). In general, a space of time equal in length to the period occupied by the earth in completing a circuit of its orbit around the sun. Astronomers distinguish several different kinds of years The tropical year is the year of chronologists and of the calendar (q.v), and is defined as the interval of time between two successive passages of the sun through the vernal equinox (q.v.). Its length is 365 days 5 hours 48 minutes and 46 seconds. The sidereal year is the actual period of the earth's orbital revolution, and differs from the tropical year on account of the precessional motion of the equinoxes themselves. (See PRECESSION.) It is 365 days 6 hours 9 minutes 9.5 seconds in length. The anomalistic year is the time elapsing between two successive returns of the earth to its perihelion (q.v.) point. It is a little longer than the sidereal year, on account of the motion of the earth's perihelion. (See PERTURBATIONS.) Its length is 365 days 6 hours 13 minutes 53 seconds. The light year is a unit of linear measure, used by astronomers in stating the distances of the fixed stars. (See STAR.) It is the linear space traversed by light in one year, and as light moves at the rate of about 186,600 miles per second, the light year furnishes a linear unit large enough to measure even the vast cosmic distances of interstellar space. Bissextile, or leap year (q.v.), is a calendar year in which the ordinary number of days has been arbitrarily increased by one, making it contain 366 days instead of 365. The commencement of the year among the Jews and Mohammedans has no fixed position in relation to the sun's course or the seasons, it being a lunar year. See ANOMALISTIC YEAR; CALENDAR.

YEAR AND A DAY. Under a peculiar rule of the common law, a fraction of a day was not recognized, and the last day of any given period of time was considered to be completed for legal

purpose as soon as it began, and therefore, in order to provide for the actual expiration of a full calendar year, it was necessary to add a day. This period was adopted as the limitation of many rights and liabilities.

YEAR BOOKS. A collection of reports of cases decided in the English courts of common law from the reign of Edward I to Henry VIII. The reports were made by the prothonotaries or chief scribes of the courts and published annually by them at the expense of the crown. They were written in Norman French and are the earliest reports having any substantial value as precedents. There are somewhat fragmentary memoranda of litigation antedating the Norman Conquest, and there are official records of litigation beginning with the reign of Richard I, but these for the most part constitute a record only of the results of the litigation as determining the rights of the parties, and are consequently of little or no value as legal precedents. The *Year Books* are not now often cited in the opinions of courts, but they are of great historical value and a thorough study of them in recent years has thrown much light on many abstruse legal problems. They were originally published in 11 parts. An edition of the *Year Book* of Edward I–II by Maynard, published in 1678, has since been edited and published in English. A translation from manuscript reports of the cases in the various years of Edward I 11–35 inclusive was published by Alfred J. Harwood (London, 1866).

YEARDLEY, yärd'li, or **YARDLEY,** Sir George (c.1577–1627). A Deputy Governor of the Colony of Virginia, born in England. He served in the Low Countries, sailed for Virginia as captain of Sir Thomas Gates's expedition, and was wrecked on the Bermudas, but reached Virginia in 1610. He was acting Deputy Governor of the Colony from the departure of Sir Thomas Dale in 1616 until the arrival of Argall in 1617. In the following year he went to England, and while there was chosen Deputy Governor of the Colony for three years and was knighted by King James I. He reached Virginia on April 19, 1619, and by proclamation modified some of the harsh laws under which the colonists had been living. Acting under instructions, he also convoked the famous House of Burgesses, the first legislative body that had ever assembled in America. His administration did not prove satisfactory to the company, so at the end of his term he was succeeded by Sir Francis Wyatt (q.v.). Yeardley remained in Virginia, however, as a member of the council, and in 1626 was again appointed Deputy Governor, this time by King Charles I. He continued in office until his death.

YEAR'S MIND. See Month's Mind.

YEAST, or Barm. The mass of plant cells produced during the alcoholic fermentation of sugars. Yeast is produced in large quantities in beer brewing, beer yeast consisting mainly of the cells of a species of fungi known as *Saccharomyces cerevisiæ*. *S. pasteurianus* and other species are also used in brewing, and *S. ellipsoideus* in wine fermentation. This plant, which multiplies exclusively by budding, is capable of existing for a time in a pure aqueous solution of sugar. An excellent medium is such a solution with some albuminous matter added to it. But the best medium for its existence and growth is constituted by some liquid like wort or grape juice. In such a liquid the formation of yeast, accompanying fermentation, may be induced by exposure to the air in a brewery or some other place where alcoholic fermentation is going on, the air of such places containing the germs that develop into the yeast plant. The temperature at which the plant thrives best is from 23° to 25° C. Even very intense cold does not kill it, although its vegetation is arrested below 5° C. Heat, in the presence of moisture, kills it at temperatures above 75° C.; if dry, the plant may be heated above 100° C. without losing its vitality.

In a fermenting mixture a frothy mass rises to the top, owing to the entrapped carbon dioxide; this is known as top yeast; while the yeast settling to the bottom is called bottom yeast. Higher temperatures favor the formation of the former, and lower temperatures favor the latter. Bakers use either compressed yeast (compressed cakes of top yeast) or dried yeast (a dried mixture of yeast cells with much starch). The former has high fermenting capacity and gives uniform results, but it will keep only a day or two; while the latter retains its capacity to produce fermentation for a long period. Brewers' yeast is not desirable for bread making, because it is likely to give a bitter flavor and its activity is slow in a dough mixture. Certain fungi (*Mucor alternans*, *Amylomyces Rouxii*, etc.) are coming to be used in practice as substitutes for yeast, for they have the ability to split starch, which is generally lacking in yeasts. See Ascomycetes; Brewing.

YEAST. A novel by Charles Kingsley, published as a serial in *Fraser's Magazine* in 1848, and in book form in 1851. It gives a vivid picture of the Chartist agitation.

YEATS, yēts, William Butler (1865). An Irish poet, son of a distinguished artist, J. B. Yeats, born June 13, 1865, in Dublin, and educated chiefly in that city. He studied art for a time, but early—in his twenty-second year—turned to literature as a profession. He was the representative man of the movement known as the Irish Literary Revival. (See Irish Literature, *Irish Literature in English*.) His inspiration he drew from the myth, legend, romance, and folklore of Ireland. First of all a lyric poet, as such he was second to none of those who wrote in English in his generation. He also became known as a dramatist, writer of fiction, and critic. Settling with his family in London in 1887, he contributed to the magazines and reviews, from time to time published a book of prose or verse, and in the meanwhile worked assiduously, in collaboration with William Ellis, on the edition (3 vols., 1893) of Blake, which is a monument to that poet's genius. In 1890 Yeats was in Paris; from 1891 to 1894 in Dublin; and in the latter year in London again. In 1895, feeling that his mystic leanings, such as later found expression in *The Tables of the Law* (privately printed, 1897) and in other prose tales, were taking him too far away from the life of Ireland, he returned to his native land, and thenceforth divided his time between England and Ireland. In 1899 began the dramatic activity of the Irish Literary Theatre which Yeats, with Lady Gregory and Edward Martyn, and assisted a little later by George Moore (qq.v.), set going, and which was subsequently to become the Irish National Theatre Society. In 1903, and again in 1914, Yeats visited the United States, and lectured widely there. The volumes of his poems published in

1895, 1899, and 1901 represent him well as a lyrist, *The Wanderings of Oisin* (1899) as a narrative poet, *The Countess Cathleen* (1892), *The Land of Heart's Desire* (1894), and *Cathleen in Houlihan* (1902) as a dramatist; and *Ideas of Good and Evil* (1903) as the subtle and finished critic. In 1916 appeared the autobiographical *Reveries over Childhood and Youth*. His *Collected Works* in 8 volumes were published in New York in 1908. Consult: H. S. Krans, *William Butler Yeats and the Irish Literary Revival* (New York, 1904), George Moore, *Hail and Farewell* (3 vols., ib., 1912–14), passim; Lady Gregory, *Our Irish Theatre* (ib., 1913); Cornelius Weygand, *Irish Plays and Playwrights* (ib., 1913); Forrest Reid, *W. B. Yeats* (ib., 1915), a critical study.

YECLA, yā'kla. A town of the Province of Murcia, Spain, 72 miles southwest of Valencia (Map: Spain, E 3). Cereals, wine, excellent oil, feather grass, and vegetables constitute the chief productions of the district, with some manufactures of spirits, soap, and leather goods. In the vicinity are many ruins. Pop., 1900, 18,117; 1910, 22,883.

YEDO, or **YEDDO**, yĕd'dō. The former name of the capital of Japan. See TOKYO.

YEGOREVSK, yĕ-gôr'yĕfsk. A district town in the Government of Ryazan, central Russia, about 60 miles southeast of Moscow (Map: Russia, E 3). It is an industrial town and has extensive cotton mills with an annual output exceeding $5,000,000 in value. Pop., 1910, 29,183.

YEISK, yā'ĭsk. A seaport in the Province of Kuban, north Caucasia, situated on the eastern coast of the Sea of Azov, 60 miles southwest of Azov (Map: Russia, E 5). It produces leather, flour, and tallow, but a large part of the population is engaged in agriculture and gardening. Pop., 1910, 48,329.

YEKATERINBURG, yĕ-kä'tyĕ-rĕn-bŭrk. A town of Russia. See EKATERINBURG.

YEKATERINODAR, yĕ-kä'tyĕ-rĕ'nō-där'. The capital of Kuban, north Caucasia. See EKATERINODAR.

YEKATERINOSLAV, yĕ-kä'tyĕ-rĕ'nō-slăf'. A town and government of Russia. See EKATERINOSLAV.

YELANSK, yĕl'ănsk. A Cossack settlement in the Province of the Don Cossacks, South Russia, on the left bank of the Don, 290 miles north-northeast of Novo-Tcherkask. It is engaged principally in fishing, farming, gardening, and sheep raising. Pop., 1910, about 13,000.

YELETS, yĕl'ĕts. A district town in the Government of Orel, Russia, on the river Sosnā, 120 miles east-southeast of the town of Orel (Map: Russia, E 4). The town contains many factories and carries on considerable trade in live stock. Lace making is a widely spread household industry. Pop., 1900, 38,239; 1910, 58,100.

YELISAVETGRAD, yĕ-lyē'zà-vĕt-grät'. A district town in the Government of Kherson, South Russia, situated on the Ingul about 740 miles south of Moscow. It consists of a town proper and four suburbs, and is well built, with straight wide streets and avenues of trees. It was founded in 1754, in the reign of Empress Elizabeth, for whom it was named. Yelisavetgrad is, after Odessa, the principal manufacturing town in the government. There are extensive flour mills, tobacco factories, etc. There is a considerable trade in grain and flour, cattle, sheep, wool, horses, crockery, timber, and leather goods. An agricultural fair is held annually. Pop., 1910, 75,800, about one-third Jewish.

YELISAVETPOL, yĕ-lyē'zà-vĕt-pōl'y', or **ELIZABETPOL**. A government of Transcaucasia, Russia, bounded by Persia on the south; area nearly 17,000 square miles (Map: Russia, G 6). It belongs partly to the region of the Little Caucasus and is partly covered with steppes. It is watered chiefly by the Kur and its tributaries. The mountain slopes are thickly wooded and some of the valleys are fertile and well cultivated. There are rich mineral deposits, especially of copper, which is mined on a considerable scale. Agriculture is the chief occupation and considerable quantities of wine are produced. The government is traversed by the Transcaucasian Railway. Pop., 1912, 1,035,800, of whom more than half were Mohammedans.

YELISAVETPOL, or **ELIZABETPOL**. A town of Russia, capital of the Government of the same name, situated on an affluent of the river Kur, about 120 miles southeast of Tiflis (Map: Russia, G 6). The older portion of the town is occupied mostly by Mohammedans and is ill built, with narrow and crooked streets and low-roofed houses. The newer portion is built on a modern scale and contains some fine buildings. Yelisavetpol has a mosque dating from the seventeenth century, an ancient mausoleum, and a fine bazar In the neighborhood of the city are found numerous ancient remains. The town became Russian by conquest in 1804, before which it was known as *Ganzha*. The fortifications constructed by the Turks are still in existence. The chief occupation of the inhabitants is agriculture. Pop., 1910, 60,447, consisting chiefly of Tatars and Armenians.

YELL. See SHETLAND ISLANDS.

YELLOW, INDIAN. See INDIAN YELLOW.

YELLOW ASH. See CLADRASTIS.

YELLOW BASS. A fresh-water bass (*Morone interrupta*) of the southern Mississippi valley, about 15 inches long, brassy yellow, with about seven distinct longitudinal black lines, the continuity of which is broken towards the tail. See BASS, and Plate of BASS.

YELLOWBELLY. A common sunfish (*Lepomis auritus*). See SUNFISH; and Plate of DARTERS AND SUNFISH.

YELLOWBILL. A sportsman's name for the American black scoter. See SCOTER.

YELLOWBIRD. Any of many distinctively yellow birds. In the United States the common, thistle, or black-winged yellowbird is the goldfinch (q.v.); the summer yellowbird, or wild canary, is a warbler (q.v.).

YELLOW FEVER, or YELLOW JACK. An acute specific disease, occurring within certain geographical limits and characterized by a fever of short duration, a yellow tint of the skin, gastro-intestinal disturbances, and hæmorrhages into the skin and mucous membranes. It is due to the action of a specific virus, the precise nature of which is unknown, transmitted by a mosquito of the genus *stegomyia*. The disease was first recognized definitely in 1647 in the West Indies. In 1691 it was very fatal in Barbados, where it was called the "new distemper." From this date the disease has been endemic in the West Indies. It is also prevalent along the west coast of Africa at Senegal and Sierra Leone. At times the disease extends southward along both shores of South America,

and northward to the South Atlantic and Gulf States. Occasionally it is brought to the large Atlantic seaports by ships sailing from countries where the fever prevails. Severe visitations occurred in the lower Mississippi valley in the autumn of 1878, the deaths in New Orleans and Memphis alone exceeding 5000. Until the American occupation of Cuba in 1898 yellow fever was practically never absent from that island. It appeared in the Panama Canal zone in 1905, but under Goreas it was controlled and is now practically exterminated. See PANAMA.

Experiments carried on in Cuba by Walter Reed (q.v.), James Carroll, Aristide Agramonte, and Jesse W. Lazear (who died from yellow fever from the effects of an accidental mosquito bite) by order of the United States army have proved that this disease, like malaria, is communicated from one individual to another only by a species of house mosquito (*Stegomyia fasciata*). See INSECTS, PROPAGATION OF DISEASE BY: MOSQUITO. After the recognition of the true etiology of yellow fever, and the institution of sanitary reforms in Cuba based on this knowledge, the disease disappeared from that island, to return when the Cubans discontinued precautions. Its occurrence in hot and moist areas and at low levels coincides with the distribution of the mosquito. It is more fatal from May to August, and is stopped by the onset of frost. Negroes are less susceptible than whites. One attack confers immunity.

While the mosquito is undoubtedly the medium of communication in yellow fever the ultimate reservoir of the disease has not been discovered. Balfour has recently advanced the hypothesis that this reservoir exists in certain tribes of monkeys, basing his belief upon the fact that in certain localities prior to an outbreak of yellow fever monkeys of the red howler tribe have been observed lying dead or dying in neighboring forests, apparently as the result of a disease similar to yellow fever. It is also noteworthy that the disease is endemic only in regions where monkeys are plentiful. It is suggested that these animals may bear a relation to yellow fever similar to that of the rat to bubonic plague.

Attempts to discover the causative germ of yellow fever (if one exists) have been unremitting. The fact that a definite time elapses between infection of the mosquito and the development of its power to communicate the disease to man points to a germ, probably an ultramicroscopic protozoön, or filterable virus, as the agent. The blood and serum of yellow-fever patients are capable, when injected into healthy persons, of communicating the disease.

The period intervening between infection and the onset of the disease is as a rule three or four days, but may be from one to seven days. The attack may come on suddenly with severe chills or rigors or may be preceded by symptoms of languor, headache, and malaise. The temperature rapidly rises and in two or three days may reach 105° F. or even higher. The fever lasts from three to five days and is attended by pains in the back, limbs, and head. The tongue is coated but bright red at the tip and sides; there is tenderness and pain over the epigastrium, with nausea and vomiting. About the second or third day jaundice begins in the conjunctivæ, and quickly spreads over the whole body. In favorable cases the fever abates at the end of the fourth or fifth day, and recovery is complete in two or three weeks. But in severe cases the symptoms continue with increased violence. The skin becomes yellower, small hæmorrhages take place into the skin, and vomiting becomes frequent. The rejected material is at first light in color (white vomit), but is soon followed by the black vomit, which is an ominous symptom, since it betokens an extensive alteration in the blood. Black vomit has somewhat the appearance of coffee grounds, and consists of blood which has been extravasated into the stomach and further altered by the action of the gastric juice. Blood may also be discharged from the bowels and hæmorrhages take place from the nose, mouth, or gums. At this stage delirium is apt to set in and the patient soon lapses into unconsciousness. In violent cases death sometimes takes place within a few hours of the onset of the first symptoms. In these cases jaundice and high temperature are absent. Death is due to hæmorrhage, cardiac failure, suppression of the urine, or to the direct effect of the poison on the vital centres. The mortality in different epidemics varies greatly and may be as low as 10 per cent or as high as 85 per cent of the individuals attacked. Among alcoholic patients and those who are weakened from hardship or other causes the death rate is exceedingly high.

The solution of the problem of preventing outbreaks of yellow fever is one of the most remarkable achievements of sanitary science. The disease is known to be favored by heat, moisture, bad drainage, house and communal uncleanness, and generally unhygienic conditions, and these must be remedied as a first step in stamping out the malady. Chief attention, however, is paid to the mosquito, and its breeding places should be destroyed. During an epidemic the greatest care is exercised to prevent yellow-fever patients from being bitten by mosquitoes; special pains are taken to disinfect houses and rooms in which a case has occurred and to kill all mosquitoes in them. People residing in infected districts should be careful to guard against being bitten by these insects, both indoors and out. It is customary to enforce a strict quarantine against vessels sailing from ports where it is known that yellow fever exists. (See QUARANTINE.) Sanitary scientists predict confidently that the world will soon be rid of this scourge. Preventive inoculations of specially prepared serums have been tried, but not found generally effective. Serums also have been used for treatment, but with indefinite results.

Yellow fever is a self-limited disease, but is likely to be attended by serious lesions of important organs. Absolute rest in bed, from the first apearance of symptoms until convalescence is well established, is imperative. In no other disease is rest so important, and disregard of this precaution fraught with such serious danger. Sudden death has occurred from too early exertion when the patient was apparently on the highroad to recovery. At the outset of the attack a mild emetic such as ipecac or warm water and mustard may be given to empty the stomach, and the bowels should be evacuated quickly by means of castor oil, or an effervescent saline cathartic, as magnesium citrate or a Seidlitz powder. During the following days one or two daily bowel movements should be obtained, preferably by enemas of magnesium sulphate in warm water. Fever is best controlled by means of cold sponging. Baths, while

effective in lowering the temperature, are dangerous on account of the movement they entail Antipyretic drugs have to be given with caution because of their tendency to depress an already weakened heart. Threatened suppression of the urine is a grave complication and is combated by wet or dry cups over the region of the kidneys, intravenous or intracellular injections of normal saline solution or high rectal injections. Free stimulation with whisky and strychnine is necessary at times to counteract the tendency to collapse and heart failure. If possible, attendants should be immune. Contrary to the practice in other fevers, no food should be allowed yellow fever patients for the first three or four days, or longer in severe cases, and then only the blandest and most easily digestible liquids may be taken. Milk and lime water, or vichy, barley water, or buttermilk, may be continued well on into convalescence. Solid food cannot be absorbed by the patient and it may work serious harm See C B Camerer, "A Résumé of Etiological Factors Concerned in Yellow Fever," in *United States Naval Medical Bulletin* (Washington, January, 1915); *Yellow Fever*, Document No. 822 of the Sixty-first Congress, 3d Session (ib., 1911), containing the collected papers of Walter Reed on the disease.

YELLOWFISH. See NIGGER FISH.

YELLOWHAMMER (from *yellow* + *hammer*, from AS *amere, amore*, OHG *amero*, Ger. *Ammer*, bunting, yellowhammer). A name popularly, but erroneously, given in some parts of the United States to the common flicker (q.v.). The name properly belongs to a fringilline bird of Europe, the yellow bunting (*Emberiza citrinella*), one of the most common of small birds in Great Britain and in most parts of Europe. It is about seven inches long, and the male is brilliant in plumage. The head and nape of the neck are lemon yellow, with a few dusky black patches; the upper part of the back and wings reddish brown, tinged with yellow; the wing and tail quills dusky black, with narrow external edges of bright yellow or bright brown; the upper tail coverts reddish chestnut, edged with yellow; the throat and whole under surface lemon yellow, clouded on the breast and flanks with reddish brown. The female is much less vivid. The yellowhammer frequents hedges and low trees, and generally nests on the ground. The song of the male is very sweet, and consists of few notes In Italy yellowhammers are caught and fattened like ortolans for the table. See Plate of BUNTINGS AND GROSBEAKS.

YELLOW-HEADED BLACKBIRD. See BLACKBIRD.

YELLOW JACK. A popular name for the yellow fever (q.v.).

YELLOWJACKET. Any of several species of the smaller yellow-marked social wasps, particularly *Vespa germanica* and *Vespa cuneata*. See WASP.

YELLOW LARKSPUR. See TROPÆOLUM.

YELLOWLEGS. The popular name of two species of American snipes inhabitating the entire hemisphere; in summer North America is their home, while in winter they reach Chile. The common or summer yellowlegs (*Totanus flavipes*) is about ten inches long from the tip of the bill to the end of the tail, with wings about six inches long. Its flesh is delicious. The greater yellowlegs (*Totanus melanoleucus*) is 14 inches long, wing eight inches, but similar in appearance, with ashy color above, under parts whitish, with transverse spots and stripes on breast and sides The two species resemble each other so closely not only in color, but in habits, call notes, nest and eggs, and haunts, that the size is almost the only constant difference; both are known as tattlers or yelpers, because on discovering a gunner they raise a hue and cry to warn other birds. See Plate of BEACH BIRDS.

YELLOW LOCUST. See CLADRASTIS.

YELLOW MURRAIN. See TEXAS FEVER.

YELLOW PARILLA. See MOONSEED.

YELLOW PERCH. See PERCH.

YELLOWPLUSH PAPERS. A series of articles by Thackeray, portraying the rise and fall of a stock-dabbling London flunky, first published in *Fraser's* in 1838. They afterward appeared among the author's *Comic Tales and Sketches*.

YELLOW PUCCOON. See HYDRASTIS.

YELLOW RIVER. A river of China. See HOANG-HO.

YELLOW ROOT. See HYDRASTIS

YELLOW-RUMPED WARBLER. See MYRTLE BIRD

YELLOWS. See PEACH, *Diseases*.

YELLOW SEA, or HWANG-HAI. A large arm of the Pacific Ocean, 600 miles long, lying between Korea and the east coast of China (Map: China, M 4). Its north shore belongs to Manchuria. It is over 300 miles wide in the south, where it opens widely into the Eastern Sea, which is separated from the Pacific Ocean by the Luchu Islands South of Korea the Korea Strait connects the Yellow Sea with the Sea of Japan. In the north the large Shan-tung peninsula cuts off Korea Bay, the Gulf of Liaotung, and Gulf of Pechili. The Yellow Sea is nearly everywhere less than 300 feet deep. The Korean shore is lined with numerous small islands, and near the Chinese shore there are large sand banks. The sea receives the Yang-tse-kiang while the Hoang-ho which discharging yellow mud gives the sea its name, flows to the Gulf of Pechili, but frequently changes its course to the Yellow Sea.

YELLOWSTONE LAKE. The principal lake in the Yellowstone National Park (q.v.).

YELLOWSTONE NATIONAL PARK. A United States government reservation set apart as a public pleasure ground and game preserve. It occupies a rectangular area in the northwestern corner of Wyoming, overlapping into Montana and Idaho on the north and west by strips about two miles wide (Map: Wyoming, A 1). The park measures 54 miles from east to west, and 62 miles from north to south; its area is about 3350 square miles. The area immediately surrounding the park, with the exception of the valley of Yellowstone River on the north, is comprised within the following national forests: the Beartooth on the northeast, the Absaroka on the north, the Gallatin on the north, northwest and west, the Madison on the west, the Targhee on the west and south, the Teton on the south and east, and the Shoshone on the east.

Yellowstone Park lies in the heart of the Rocky Mountains. It consists of an elevated plateau basin with a mean altitude of 8000 feet, surrounded by lofty and rugged mountain ranges. On the east runs the Absakora range, a northern extension of the Shoshone Mountains, whose spurs cover the Shoshone National Forest with

an almost impassable complex of peaks, ranges, and deeply eroded river valleys. Several peaks in the national forest are more than 11,000 feet high, and the Fortress and Dead Indian Peaks rise respectively to altitudes of 12,073 and 12,253 feet. The southern national forests are occupied by northern outliers of the lofty Wind River and Teton ranges, the latter running also up the west boundary. The Gallatin Range on the northwest and the Snowy Mountains on the north complete the barrier. The central basin consists of more or less level or undulating lava fields, but spurs from the surrounding mountains run into it from all directions, volcanic cones and other peaks as well as small isolated mountain groups project from the plateau floor, while most of the larger streams have cut their way through the lava in yawning cañons, so that the surface is extremely diversified, and the plateau cut into a number of separate fields, basins, or peaks. There are 30 peaks within the park whose altitude exceeds 10,000 feet. The loftiest as well as the most rugged portion lies east of Yellowstone Lake, where Mount Humphreys and Turret Mountain rise respectively to altitudes of 11,000 and 10,400 feet. Directly on the northern boundary Electric Peak towers to a height of 11,155 feet, and affords a wide view of the park and environs to the north.

The Continental Divide crosses in an irregular line from the middle of the west boundary to near the southeast corner, so that the waters of the park go to both oceans. South of the Divide the upper course of the Snake River receives some of its headstreams from Shoshone, Lewis, and Heart lakes. North of the Divide all streams are tributary to the Missouri. The most important is the Yellowstone which traverses the park from the southeastern corner to the middle of the northern boundary, and expands into Yellowstone Lake, one of the central features of the region. The Madison River, one of the headstreams of the Missouri, is formed on the central plateau by the junction of the Gibbon and Firehole rivers, while the eastern mountains give rise to the Shoshone, an affluent of the Bighorn.

The original geological structure of the park is almost completely hidden by a great Tertiary lava flow, the easternmost extension of the Snake River basalt plains, which are connected to the west with the vast Oregon lava fields. The underlying sedimentary rocks range from Cambrian to Cretaceous, but are chiefly Cretaceous. The present plateaus and mountains, with the exception of the Gallatin range, are composed of lava. See *Hot Springs and Geysers*, below.

Owing to the elevation, the climate is rigorous, but not excessively cold compared with lower surrounding regions. The summer is short and characterized by great diurnal extremes of temperature, frosts occurring occasionally at night even in midsummer. At Mammoth Hot Springs the mean temperature for July is 61°, and the mean maximum 76°, the mercury rising occasionally as high as 96°. The growing season does not begin until May, and vegetation reaches its greatest luxuriance near the end of July. In January the mean temperature is about 20°, and the mean minimum about 10°, with an occasional fall to 40° below zero. In the higher portion of the park lower temperatures prevail. The average annual rainfall is about 20 inches, sufficient to support the forests and mountain vegetation.

Nearly nine-tenths of the area is under forest. Dense forests cover the mountains up to an altitude of about 9000 feet, but on some of the basin floors there are scattered open, park-like spaces covered with grass or incrustations from the hot springs. The forests are almost wholly coniferous, although birches, willows, and poplars (*Populus tremuloides*) are not uncommon. The most common tree, and the only one monopolizing extensive forest areas, is the lodgepole pine (*Pinus contorta*), and the second in distribution is the balsam (*Abies lasiocarpa*), chiefly confined to the higher and moister regions. Engelmann spruce (*Picea engelmanni*) and the Douglas fir (*Pseudotsuga taxifolia*) are also common, but the trees do not nearly reach the size attained in western Oregon and Washington, and the forests can scarcely be called grand, though they add charm to the scenery. The herbaceous vegetation is chiefly that of a mountain flora, though sage brush occurs on some of the plateaus, and the alpine species above the timber line include nearly all common to the Rocky Mountains. The regions immediately surrounding the hot springs have a peculiar flora, partly resembling the xerophytes of the desert, partly allied to plants found on the seashore.

Owing to protection, the wild animals in the park are increasing. Elk or wapiti abound, and can be seen in large bands of hundreds or thousands. Moose, deer, antelopes, and mountain sheep are noted in winter, though in summer they generally retreat to the less frequented mountain regions. In 1902 there were about 25 head of buffalo (bison) roaming wild in the park. In that year three of these were corralled and 21 others were purchased. This herd increased until in 1916 it numbered 239 animals, 28 males and 21 females having been born during the summer of 1915. These animals are kept on the range, but forage is fed to them during the winter months. There is also a wild herd, which is seldom seen; it probably numbers over 50 head. Mountain lions (pumas) are numerous, but they are killed by the park authorities. Bears, especially the black and the brown bear, are increasing in numbers. Beavers have also increased, and their dams and houses can be seen on the streams throughout the park. Many varieties of song birds are found in the park in summer, though they can hardly be said to be numerous. Ducks, geese, and other waterfowl are numerous and tame, and many of them are seen in winter along streams that are fed by hot springs and consequently never freeze. Trout of several varieties are so plentiful in nearly all the streams that with the existing regulations and the hatching and planting of many thousand eggs annually it will be impossible for the tourists to deplete them.

There is probably no region of equal area which excels the Yellowstone Park in the variety of its scenery. For the beautiful as well as the grand and merely interesting effects of volcanic forces the region has been unapproached since the destruction by an eruption of the White Terrace in New Zealand. Besides the three chief natural features described under separate subheads below there are many minor objects of interest, such as cliffs of obsidian or volcanic glass along the shores of Beaver Lake, and the curious freaks of erosion seen in the mushroom-shaped [illegible]

Region and in the natural bridge spanning one of the creeks flowing into Yellowstone Lake.

Yellowstone Lake and Cañon. The Yellowstone River enters the park at its southeastern corner in a marshy valley, and soon flows into the southeastern arm of Yellowstone Lake The lake lies at an altitude of 7741 feet above sea level, being the largest lake at that altitude in North America, and one of the most beautiful mountain lakes in the world. It is 20 miles long and 10 miles wide, but of a shape so irregular that it has a shore line of over 100 miles, having several arms extending westward and southward. Its shores are densely forested, and on the east tower numerous lofty peaks, including the highest within the park. Ancient beaches indicate that the lake was formerly much larger and deeper than now, and that instead of discharging into the Yellowstone River, and thence to the Atlantic, it formerly sent its waters to the Pacific. After leaving the lake at the northern end the river is broad and tranquil. Then it becomes narrow, rapid, and broken by huge rocks, and, after turning to the northeast, it falls over a precipice 109 feet high, and is narrowed to a width of 100 feet. A half mile below this cataract, which is known as the Upper Falls, the river plunges again over a ledge of rhyolite, and falls 308 feet into the Grand Cañon. Here it rushes for 20 miles as a foaming stream shut in by precipitous or exceedingly steep walls of lava 1200 to 1500 feet high, which are brightly colored red, yellow, and green as a result of the decomposition of the rhyolite, and which are crowned by dark-green spruces above. Turning again to the northwest, the river passes through another cañon whose walls are lower and less definite, and then leaves the park.

Hot Springs and Geysers. Springs of all kinds abound. There are countless springs of cold pure water and some cold mineral springs, but the peculiar phenomena which have especially made the park famous are the hot springs due to heat still beneath the surface There are hot springs everywhere, in valleys and on mountain summits, on plateaus and at the bottoms and on the sides of cañons, and even at the bottoms of rivers and lakes. Most of them are highly charged with mineral matter, usually siliceous, while many emit sulphurous fumes, and some are distinctly poisonous. The ground around the principal hot springs and geysers is covered with white incrustations of silica or calcareous minerals, often streaked with bright coloring matter; the larger springs have built up small cones of these materials. Of the noneruptive springs the most famous are the Mammoth Hot Springs, situated near the northern entrance to the park. They are charged with calcareous matter derived from the Cretaceous limestone beneath the lava, and have deposited this material in a dazzling white cone several hundred feet high consisting of semicircular basins arranged in terraces on the hill slope. The basins are 1 to 8 feet in diameter and 1 to 2 feet deep, and their walls are beautifully scalloped, ornamented with natural beadwork, and streaked with bright red and yellow. The colors around the springs and geysers are due to the presence of algæ which are found in nearly all the pools and springs. The water issues at a boiling temperature in the large basin at the summit, and cools gradually while descending to successive basins below. There are several extinct basin cones in the neighborhood covered with humus and vegetation, such as Terrace Mountain, which is much larger than the present Mammoth Springs.

There are at least 70 eruptive hot springs or geysers in the park, including the largest geysers in the world. (See GEYSER.) These are grouped in five basins, the Norris Basin in the north central part of the park on the Gibbon River, the Lower and Upper Basins on the Firehole River between the Central and Madison Plateaus, and minor basins near Shoshone and Heart lakes. Among the most celebrated individual geysers is the Giant, which at somewhat uncertain intervals throws up a column of hot water over 200 feet high, and maintains it for over an hour. Old Faithful is the most regular in its intervals, spouting every 65 minutes a column 125 feet high Excelsior Geyser was the most violent, but it has not been in eruption since 1888. The bed rock was sometimes torn up for many feet around it, while the volume of water ejected was enormous. Castle Geyser is one of the most beautiful, having a symmetrical white cone composed of coral-like geyserite. Most of the geysers are irregular in their periods, Old Faithful being nearly the only one whose eruptions can be safely predicted. Some are doubly periodic, having a smaller and a larger eruption at more or less regular intervals. New geysers occasionally burst forth, while others become extinct; thus one of the large geysers in the Norris Basin was formed suddenly in 1878. See Plate with article GEYSER.

Fossil Forests. In the northeast portion of the park are some fossil forests (q.v.), which are in many respects the most remarkable ones that are known. These are found along the valley of Lamar River on the slopes of Specimen Ridge. These fossil forests are different from those in other regions in that most of the fossil trees stand erect on the hillsides in practically the same position that they occupied when they were living.

Along the slopes of Specimen Ridge there are 12 fossil forests superimposed one upon another. One forest grew to maturity and was buried by the outflows of ashes, mud, and other volcanic material. Another forest then grew on top of this deposit, and so on until 12 forests had flourished and been buried during the period in which the 2000 feet of beds were being accumulated.

Government and Artificial Improvements. The park is under the sole jurisdiction of the Federal government, and is administered by the Secretary of the Interior. It is directly in charge of a superintendent, who is an army officer, and who is aided by a detachment of Federal troops in enforcing the regulations. Hunting, trapping, or killing any animal except to prevent it from doing serious injury is prohibited, but fishing for pleasure or food is permitted. All private commercial enterprises are excluded except that small plots of land may be leased to private parties for hotel purposes, and all hotels are thus privately conducted, but under government inspection. Licenses are also issued to private parties to provide traveling facilities within the park. Good carriage roads now give access to all the principal objects of interest, and a small steamboat plies on the Yellowstone Lake. The Northern Pacific Railway reaches the park on the north at Gardiner, Montana; the Oregon

Short Line Railroad reaches it on the west at Yellowstone, Montana; and the Chicago, Burlington, and Quincy Railroad reaches Cody, Wyoming, from which the eastern entrance to the park may be reached by a drive of 63 miles.

The Yellowstone region was originally occupied by peaceful Sheepeater Indians. There are evidences that white trappers had entered the region as early as 1808, but the rumors of its wonders, which from time to time reached the civilized world, were given little credence until Henry D. Washburn, Surveyor General of Montana, published the first real account of it in 1870. In 1871 the region was explored and mapped by the United States Geological and Geographical Survey of the Territories, and in 1872 Congress made it a national park.

Consult: *Twelfth Annual Report United States Geological and Geographical Survey of the Territories* (Washington, 1883); United States Geological Survey, *Geologic Folio No. 30* (ib., 1896); Chittenden, *Yellowstone National Park*, with bibliography (Cincinnati, 1915); Hague, *Geological History of Yellowstone National Park* (Dept. of the Interior, 1912); Weed, *Geysers* (Dept. of the Interior, 1912); Knowlton, *Fossil Forests of the Yellowstone National Park* (Dept. of the Interior, 1912); and *General Information regarding Yellowstone National Park*, with bibliography (issued annually by the Dept. of the Interior).

YELLOWSTONE RIVER. A tributary of the Upper Missouri. It rises in the Shoshone Mountains, in northwestern Wyoming, near the southeast corner of the Yellowstone Park, flows northwestward for about 40 miles and enters Yellowstone Lake, which may be considered the source of the main stream (Map: Wyoming, A 1). After leaving the lake the stream flows northwestward for about 15 miles, plunges over the Great Falls and then dashes through the impassable Grand Cañon. From the Snow Mountains it runs eastward and northeastward to the Missouri at Fort Buford. The river is about 500 miles long and drains an area of about 67,500 square miles. Between the Big-horn, its chief tributary, and the Powder, the Yellowstone is from 2400 to 2700 feet wide, and becomes turbid.

YELLOWTAIL. The name of several marine fishes, specifically one of the amber fishes (q.v.). (See Plate of HORSE MACKEREL.) A related species (*Elegatis bipinnulatus*), one of the runners, is called yellowtail in the West Indies.

YELLOWTHROAT. See MARYLAND YELLOWTHROAT.

YELLOW WELD. See WELD.

YELLOW WOOD. See CLADRASTIS; OXLEYA.

YEMASSEE, yĕm'*as*-sē', THE. A Colonial romance of South Carolina by William Gilmore Simms (1835).

YEMBU. See YAMBU.

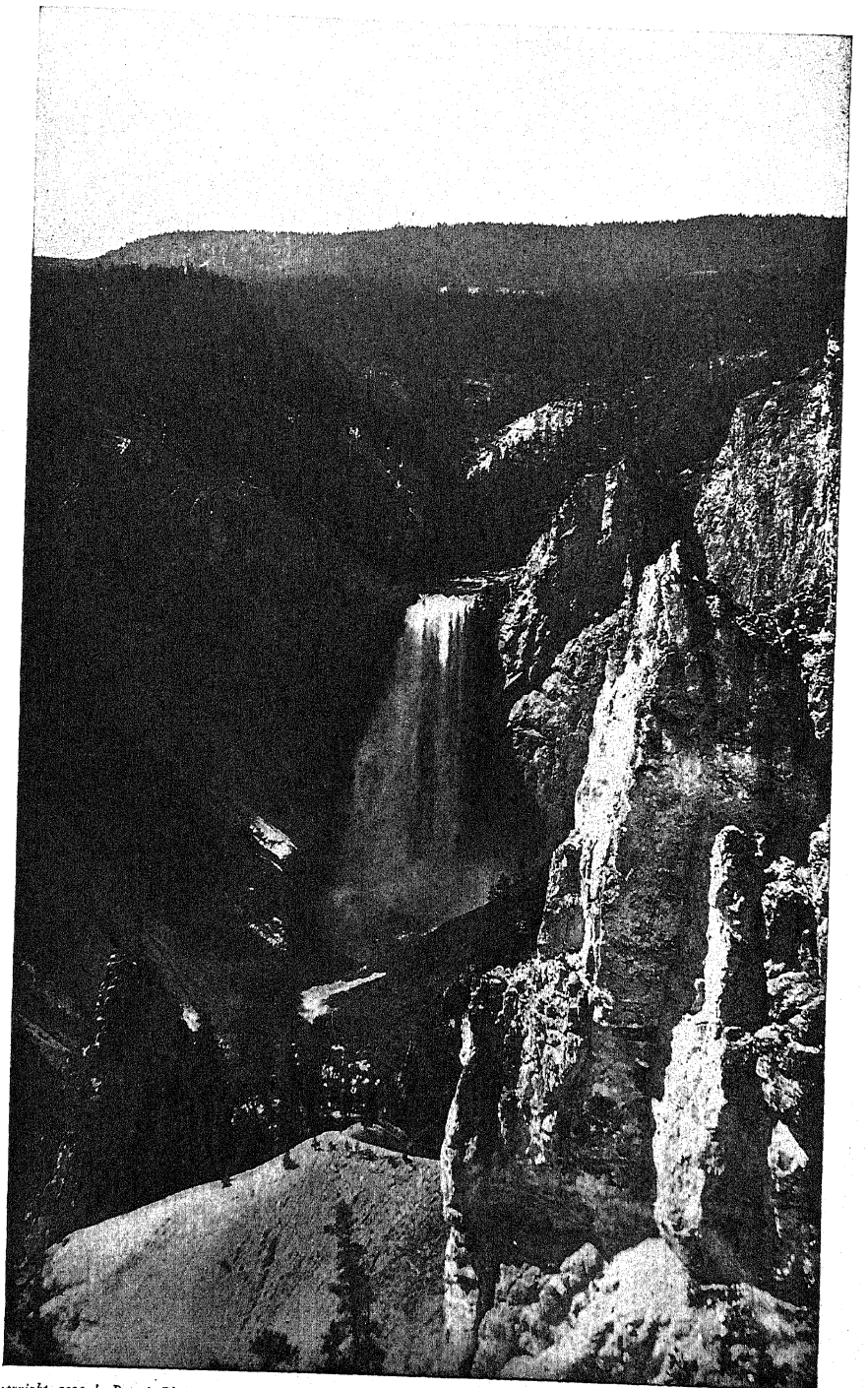
YEMEN, yĕm'ĕn. A region in the southwest corner of Arabia, extending along the coast of the Red Sea from Hedjaz to the Strait of Bab-el-Mandeb. It forms part of the Turkish Empire (Map: Turkey in Asia, E 8). Area, about 73,800 square miles. Yemen is the southern and most favored part of the ancient *Arabia Felix*, or Happy Arabia. It is a mountainous country, some of the greatest elevations in Arabia being in its southern portion. From the coast a series of arid terraces rise to the mountains from 30 to 50 miles away. The upper level is the physical anomaly of the Arabian plateau, containing treeless arable land with coffee gardens and clean, substantial towns. This area divides an uninhabited littoral save where ports must exist for commerce and the high range behind which stretch desert sands. The high plateau extending north and south along the central region is scarred by black, ugly volcanic formations.

The coast has a mean annual temperature of 85° F., little water and a sorry soil, but the inland climate is generally good, a daily mist rising there and protecting the land from the scorching, vertical rays of the sun. The rainfall here is ample except in the north. Coffee is the main crop. Hodeida and Loheia are the leading ports, while Mocha has decayed. Transportation is effected by camel caravans over the difficult mountain roads. Yemen has recently been divided into four vilayets—Azir, Hodeida, Sana, and Tais. Pop., estimated at about 750,000. In ancient times the Sabæans (q.v.) held sway in Yemen. The country passed under the dominion of the Turks in the sixteenth century. In 1630 the Arabs drove out the Turks, and later the Imam of Sana became a powerful potentate ruling over an extensive domain. In 1872 the land came under control of the Turks again, and in recent years a constant unrest among the Yemenis is apparent which arises from the falling off of their export trade in coffee and frankincense under Turkish yoke.

YEN (Jap., from Chin. *yuen*, round object). A Japanese coin minted in both gold and silver. The gold yen is worth about $0.997; the silver yen about $0.528.

YENIKALE, yĕn'ĭ-kä'lā, STRAIT OF. A narrow passage connecting the Sea of Azov with the Black Sea and separating the Crimean Peninsula from the western extremity of the Caucasus (Map: Russia, E 5). It is 25 miles long and from 2½ to 23 miles wide, an expansion in the middle forming the harbor of Kertch (q.v.). The channel, which was shallow because of a bar, has been deepened to 24 feet.

YENISEI, yĕn'ĕ-sā'ĕ. One of the three great rivers of Siberia, and one of the longest rivers in the world. It rises on the south slope of the Sayansky Mountains in northwest Mongolia, and after breaking through the range flows in a general north-northwest direction across Siberia and within the Territory of Yeniseisk until it empties into the Arctic Ocean in long. 80° E. through the Gulf of Yenisei (Map: Asia, K 2). The gulf is a large estuary 10 to 100 miles wide and about 250 miles long, a few miles east of the Gulf of Obi. The length of the Yenisei proper, excluding the estuary, is about 2500 miles, but measuring from the source of the Selenga which rises in western Mongolia and flows into Lake Baikal and thence through the Angara to the Yenisei, the length is 3250 miles. This length is about equal to that of the Obi-Irtysh and the Yang-tse-kiang; and is exceeded only by that of the Amazon, the Nile, and the Mississippi-Missouri. The passage through the Sayansky Mountains is turbulent. Navigation begins a few miles farther down at Minusinsk and after receiving the Angara, the Yenisei flows through the Siberian plains with a sluggish course, though its east bank is flanked by highlands and mountain ranges almost to its mouth. Along its middle course the banks are generally covered with forests of pine, birch, and larch, but the extreme lower portion passes through the Arctic tundras. In its lower reaches the



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THE GREAT FALLS OF THE YELLOWSTONE

river sometimes has a width of 4 miles during the floods, and near the estuary it divides into parallel branches inclosing a number of islands, while the upper part of the estuary itself is filled with a large archipelago which has given it the name of the Liman of the Seventy Islands.

The Yenisei receives three great tributaries from the east, the Angara, or Upper Tunguska, which drains Lake Baikal, the Stony Tunguska, and the Lower Tunguska. Through these and its smaller western tributaries it approaches so closely to its two great neighboring rivers, the Obi and the Lena, that with the aid of a few canals a continuous waterway is afforded throughout western Siberia. There is a canal between the Kas, a tributary of the Yenisei, and the Ket, flowing into the Obi, but, owing to the shallowness of the two connecting streams, it is passable only by small vessels. The river is free from ice for 155 days at Turukhausk and for 196 days at Krasnoyarsk. About a dozen steamers ply regularly to Minusinsk but traveling is at times rendered dangerous by severe northern gales. Nevertheless sea-going vessels can ascend the river as far as Yeniseisk, near the mouth of the Angara, and ships from Europe have for a number of years regularly carried supplies for the mines along the river, by way of the Arctic Ocean, a good harbor having been found in the estuary. The Trans-Siberian Railroad crosses the river at Krasnoyarsk. An attempt is already under way to establish regular communication between Yeniseisk and the Atlantic ports of Europe via the Yenisei and the Arctic seas.

YENISEISK, yĕn'ĕ-sā'ĭsk. A government of Siberia extending from the Arctic Ocean to Mongolia (Map: Asia, L 3). Area, estimated at over 988,000 square miles, or nearly half of European Russia (exclusive of Finland). The region has a greatly varied surface. In the south the Sayansky Mountains extend in parallel chains inclosing deep and narrow valleys and rising in their highest peaks to over 5000 feet. North of the Sayansky Mountains the surface is mostly undulating or hilly and is densely wooded. The entire portion north of the Tungus Mountains consists of tundras varied to a slight extent by hilly patches east of the Yenisei River. The region belongs largely to the basin of the Yenisei (q.v.), which receives many tributaries. In the northern part there are also a number of rivers such as the Khatanga, the Taimur, and the Pyassina flowing directly into the Arctic Ocean. The lakes are comparatively small. The climate is on the whole continental and extremely severe. In the northern part the soil remains frozen at a depth of 2 feet even in summer, and the winter temperature in that part is lower than in Nova Zembla (q.v.). The mean annual temperature ranges from 8° at Tolsty Nos (lat. 70° 5′ N.) to 31° at Minusinsk (lat. 53° 43′ N.). Yeniseisk is not rich in minerals, although gold is found in the extreme south. Flax growing has steadily increased in importance. In 1913 about 5000 puds of flax was raised. There is an abundance of agricultural land in the south, but labor is very scarce. The land belongs almost entirely to the crown. The extensive and valuable forests are utterly unprotected by the government and are suffering greatly from conflagrations. Fishing is carried on extensively in the north. The Trans-Siberian Railway runs through the southern part of the government. Pop., 1912, 970,800, of whom the non-Russians (chiefly Tunguses, Yakuts, Samoyeds, Ostyaks, and Tatars) numbered about 50,000 The Russian population includes over 57,000 exiles and a large number of dissenters. Capital, Krasnoyarsk (q.v.).

YENRI, yĕn'rē. A Japanese word meaning circle principle, and used to designate a crude kind of calculus invented possibly by Seki (q.v.), and certainly known to his pupils early in the eighteenth century. It seeks to approximate the area and circumference of the circle by the aid of infinite series. Consult Smith and Mikami, *History of Japanese Mathematics* (Chicago, 1914).

YEO, yō, Sir James Lucas (1782–1818). A British naval officer, prominent in the War of 1812. He was born at Southampton, and entered the British navy in 1793. He served at the siege of Genoa in 1800 and later in the Adriatic. In 1809 he captured Cayenne, the capital of French Guiana, securing about 1000 prisoners. On Feb. 3, 1812, in command of the frigate *Southampton,* he captured a superior piratical frigate, the *Amethyste;* and in 1813 he became commodore and commander in chief of the British naval force on the Great Lakes, where he was opposed by Commodore Chauncey, commanding the American fleet. The two fleets seem to have been about equal in fighting strength Yeo took formal command at Kingston, on Lake Ontario, in May, and on the 29th, the American fleet being at the west end of the lake, united with Sir George Prevost (q.v.) in a half-hearted and unsuccessful attack on Sackett's Harbor, where the Americans were building two vessels. On Aug. 10, 1813, in an indecisive engagement with Chauncey's fleet off Fort Niagara, Yeo captured two small American vessels, and on September 11 an unimportant engagement occurred off the mouth of the Genesee, Chauncey gaining a slight advantage. In another engagement, on September 28, in York Bay, Yeo was somewhat crippled, and for some time was blockaded by Chauncey in Kingston harbor. On May 6, 1814, Yeo, with a strengthened fleet, captured Oswego, which was immediately reoccupied by the Americans; and from May 29 to June 6 he blockaded Chauncey at Sackett's Harbor. Thereafter neither officer felt strong enough to attack, and both avoided a general engagement. In 1815 Yeo became commander in chief of the British naval forces on the west coast of Africa, and in 1818 died while returning to England.

YEOMAN, yō'man (probably from AS. *gā, gē,* Goth. *gawi,* OHG. *gowi, gouwi,* Ger. *Gau,* district, province + *man,* man). A term in early English history applied to a common menial servant, but after the fifteenth century denoting a class of small freeholders, forming the next grade below gentlemen. The term yeoman is sometimes considered identical with the freeholder, possessed of the elective franchise.

YEOMANRY. The mounted branch of the British volunteers (see Volunteer) up to the Boer War were described as Yeomanry Volunteers, owing to the fact that they were recruited from the yeomanry classes, and thus were financially able to support the necessary cavalry charger and equipment. In the Boer War these troops served with considerable success, so that (April 17, 1901) the title was changed to Imperial Yeomanry, and the strength of the force very considerably increased. The Imperial Yeomanry were designed primarily as mounted forces for home defense, while Colonial Yeo-

manry for Imperial defense were also enlisted. The yeomanry in 1907 were absorbed in the Territorial army. See UNITED KINGDOM, *Army;* MILITIA.

YEOMEN OF THE GUARD. An English company forming a part of the Royal Household and serving on state occasions as the bodyguard of the sovereign. The yeomen of the guard wear a picturesque uniform which dates back to the fifteenth century, the corps being formed by Henry VII in 1485. It consists of old soldiers and is officered by a captain, who is usually a member of the Ministry and a peer, a lieutenant, an ensign, a clerk of the cheque and adjutant, and four exons. These appointments are usually awarded to retired officers and are much valued. There are also noncommissioned officers and 100 yeomen or privates. The yeomen of the guard, though uniformed similarly to the Tower Warders, well known to visitors to London, are a distinct corps. They are armed with partizans, a form of long-handled cutting weapon. Consult Preston, *Yeomen of the Guard* (London, 1887). See BEEFEATER.

YERKES, CHARLES TYSON (1837–1905). An American capitalist, born in Philadelphia. He was educated in the Quaker School and the Central High School in Philadelphia, was a clerk for a time in a flour and grain commission house there, opened a money and stock-broker's office in 1858, and from 1861 to 1886 was in the banking business, making a specialty of dealing in bonds. In 1871 he was forced to make an assignment, and as he refused to give any preference to the city of Philadelphia, to which he was in debt for bonds sold on its account, he was tried on a charge of having misappropriated public funds, was convicted, and for a short time, until pardoned, was imprisoned. In 1873–74, at the time of the Jay Cooke failure, he reëstablished himself financially by a series of fortunate investments, and he gradually became identified largely with the development of the street railway system in Philadelphia. In 1881 he removed to Chicago, where after 1886 he secured virtual control of the city's street and elevated railway systems, which he greatly extended. In 1892–93 he was an influential member of the board of directors of the World's Fair in Chicago, and devoted his attention particularly to the fine arts department, to which he lent his own notable collection of paintings. In 1892 he endowed the famous Yerkes Observatory (q.v.), which was completed in 1896. He took an active part in the construction and extension of the new London underground railway system.

YERKES, ROBERT MEARNS (1876–). An American psychologist, born at Breadysville, Pa. He graduated from Ursinus College in 1897, and studied at Harvard (Ph.D., 1901), where he was an instructor in comparative psychology (1901–08) and thereafter assistant professor. After 1913 he was also psychologist to the Psychopathic Hospital, Boston. He became editor of the *Journal of Animal Behavior.* His writings include: *The Dancing Mouse, A Study in Animal Behavior* (1907); *Introduction to Psychology* (1911); *Methods of Studying Vision in Animals* (1911), with J. B. Watson; *Outline of a Study of the Self* (1914); *A Point Scale for Measuring Mental Ability* (1915), with Bridges and Hardwick.

YERKES OBSERVATORY. The astronomical observatory of the University of Chicago, located at Williams Bay, Wis. It is named after its founder, Charles Tyson Yerkes (q.v.), who supplied the funds for buildings and instruments. This institution contains the largest refracting telescope in existence. It is of 40 inches diameter and used principally for the observation of close or faint double stars, the planets and satellites, and spectroscopic work. See OBSERVATORY; TELESCOPE.

YERMAK TIMOFEYEV, yĕr'mäk tē'mŏ-fā'yĕf (?–1584). Conqueror of Siberia. He was chief (hetman) of the Don Cossacks, and, in consequence of his depredations, was defeated and outlawed by Ivan the Terrible, but he was subsequently pardoned. In 1579 the family of Stroganov, to whom the Czar had granted lands on both sides of the Urals, applied to Yermak for assistance against Kutchum, Khan of Sibir, who ruled the country between the Tobol and Irtysh rivers, and whose tribesmen had interfered with the operation of the great Stroganoff salt works. Yermak invaded the country, took the town of Sibir (Isker) in October, 1581, and subjugated the people as far as the Irtysh. The conquered country he gave to the Czar Ivan, who made him Prince of Siberia. Conflicts, however, were renewed with Kutchum in 1584. In September of that year Yermak was drowned in the Irtysh, and it was not until 1587 that the Khanate of Sibir was definitely conquered by the Russians. Yermak's deeds are celebrated in Russian folk songs and in Khomyakov's *Yermak,* a drama in verse (1832).

YESSENTUKI. See ESSENTUKI.

YEW (AS. *iw, ēow, ēoh,* OHG. *îwa, îha,* Ger. *Eibe,* Swiss *Iche, Ige,* yew; connected with OIr. *éo,* Welsh *yw,* Corn. *hivin,* Bret. *iven, ivinen,* yew, OPruss. *iwis,* Lith. *jëvà,* Lett. *ëva,* black alder, OChurch Slav. *iva,* willow). A name applied to species of *Taxus,* a genus of conifers



YEW (*Taxus baccata*).

which includes about seven species, distributed throughout the temperate and subtropical regions of the Northern Hemisphere, also in tropical Asia and the mountains of Mexico. The European yew is *T. baccata,* which becomes a large forest tree, while the American yew or ground hemlock is *T. canadensis,* a low straggling shrub. The most distinguishing feature of the genus is the fruit, which is a red, fleshy cup, nearly inclosing the bony seed.

YEZD, yĕzd, or **YAZD,** yäzd. The capital of the Province of Yezd, Persia, 165 miles east by

south of Ispahan, on the route between that city and Kirman (Map: Persia, F 7). The chief features are the ruins of the old walls, numerous mosques, and a large bazar. The manufactures of silk and felt goods are important, and there is a considerable trade in opium and sugar. In the neighborhood are deposits of cobalt, antimony, and nickel. Pop., estimated at 45,000. Yezd is the leading centre of Zoroastrianism in Persia.

YEZIDIS, yĕz'ē-dēz (etymology uncertain). The name given to a sect known as Devil Worshipers found in Kurdistan, Armenia, and the Caucasus. They call themselves Dasni, after the name of certain tribes in the vicinity of Mosul. The Mohammedans associate the term with Yezid, the second Ommiad Caliph (720–724 A.D.), but the religion is undoubtedly older. Some have sought to connect it with the city of Yezd in Persia or with the Kurdish and Persian *Yazdān*, God. The symbol of their faith is a peacock, which they call Malik Taus, the term by which they designate the devil. Otherwise they shrink from mentioning him The devil is a creative agent of the supreme god and is the author of evil. He was a fallen angel, but God reinstated him to heavenly rank and forbade the angels to scorn him. Hence mankind should not venture to treat the power of evil with contempt. It is largely this that gives the idea that they are devil worshipers, although it is possible, owing to their geographical position, that the Yezidis may actually show some surviving traces of the old devil worship in Mazanderan (q.v.) anathematized by Zoroaster (q.v.). In numbers the Yezidis are not large, although there are said to be some 12,000 in the Caucasus region alone. Throughout history they have suffered much from persecution The religion shows traces of old Iranian and Assyrian beliefs, such as dualistic traits and regard for the fire, the sun, and the elements, combined with some Mohammedan traits and influenced likewise by Manichæism (q.v.) and Nestorian Christianity. (See NESTORIANS.) They recognize Mohammed as a prophet beside Abraham and the Patriarchs; and they consider that Christ was an angel in human form. The belief in a future life forms part of their faith. The rites of baptism and generally of circumcision are practiced among them, and there are special offices connected with marriage and death. Polygamy is not common among them. Their chief book of divine revelation is entitled *Al-Yalvah*, and its great interpreter was Shaikh Adi, who lived about 1200 A.D. Consult: Sir A. H. Layard, *Nineveh and its Remains* (London, 1850); Joachim Menant, *Les Yézidis* (Paris, 1892); Chabot, *Notice sur les Yézidis* (ib., 1896); Henri Lammens, *Le Massif du Gabal Siman et les Yézidis de Syrie* (Beirut, 1906); R. Frank, *Scheich 'Adî, der grosse Heilige der Jezîdis* (Kirchheim, 1911).

YEZO, yĕz'ō. The most northerly of the large islands of Japan, forming with its 12 adjacent islands and the Kurile Islands (q.v.) a division of the Japanese Empire known as the Hokkaido, or North Sea Circuit (Map: Japan, G 1). It is separated from the main island of Japan on the south by the deep strait of Tsugaru, 10 miles wide, and is included within the meridians of 139° 11′ and 146° 7′ E., and the parallels of 41° 21′ and 45° 30′ N. Area (including the Kurile Islands), 30,143 square miles; pop., 1903, 843,615; 1908, 1,459,424.

The surface is much broken by two great intersecting mountain systems, one volcanic, from the Kurile Islands, and the other of granite and old schists, from Sakhalin, culminating in Tokachi-dake (8200 feet). The volcanic peaks are numerous, the best known being Komagatake (4000 feet), still active. The chief rivers are the Ishikari, 407 miles long, the seat of a great salmon-fishing and canning industry, and the Tokachi. There is comparatively little level land that is suitable for cultivation. The principal industries, besides farming, are hunting, fishing, and mining—chiefly gold and coal. Mineral oil is found near Hakodate (the principal seaport) and elsewhere, and is being developed by foreign companies. Brewing is carried on at Sapporo, the capital of Ishikari province, and glass works for bottle making and several paper mills are in operation. The chief exportable commodities are canned salmon, fish manure, fish oil, dried fish roe, seaweed, salt, and sulphur. In 1913, 829.9 miles of railway were in operation. The forests are dense, and many wild animals, including deer and bears, abound. The climate is severe, and for nearly six months the country is covered with a deep mantle of snow and ice. Besides Sapporo and Hakodate, already mentioned, the chief towns are Okkashi, Nemuro, Muroran, a naval station on Volcano Bay, and Fukuyama or Matsumai. From 1600 to 1868 the southwestern portion of the island was the possession of a daimyo named Matsumai, and Hakodate belonged to the Shogun. In 1871, fearing Russian aggression, active colonization was begun, a new department—the *Kaitakushi*, or Colonization Department—was established, and much development work was done under foreign superintendence. This was abolished in 1881, and the country was divided into prefectures as in Japan proper. It is still regarded as a colony, however, and electoral privileges have not as yet been extended to its inhabitants.

YGGDRASILL, ĭg'drà-sĭl (ONorse *yggdrasill*, the bearer of Yggr, a name of Odin). The name given in Scandinavian mythology to a tree which was conceived as binding together heaven, earth, and hell. It is an ash, whose branches spread over all the world, and reach above the heavens. It sends out three roots in three different directions: one to the Æsir in heaven, another to the frost giants, the third to the underworld, or, according to other accounts, to the world of mankind. Under each root springs a wonderful fountain, endowed with marvelous virtues; under the root extending to the Æsir in heaven, the Urdar fountain; under the root to the giants, Mimer's fountain, in which wisdom and wit lie hidden; under the root to the underworld, the fountain Hvergelmir. From the tree itself drops honey. In it dwell an eagle, between whose eyes the hawk Vedhrfölmir or Vedhrlanfnir sits, and a squirrel, named Ratatoskr, while at its roots gnaws the serpent Nidhhöggr. Between the eagle and the serpent the squirrel continually tries to breed dissension. The mythological basis of the tree Yggdrasill is uncertain, but from certain features it seems probable that Christian ideas have been blended with the original Scandinavian concepts.

YGNERNE. See IGERNA.

YID'DISH (Judæo-Ger., Jewish, from Ger. *jüdisch*, Jewish). The language spoken by the Jews in eastern Europe, the most widely spread dialect of the Jews. Those Jews who, towards

the end of the Middle Ages, left Germany for the Slavic lands (Bohemia, Poland, Galicia, and Lithuania), spoke the Middle High German of their places of origin and up to the sixteenth century wrote it quite correctly, although they employed the Hebrew alphabet. The absence of active intercourse with Germany, however, led in time to a process of simplification of morphology and syntax. Thus the genitive in -s, the imperfect, subjunctive, and to a large extent the neuter gender were lost, all the prepositions came to be constructed with the dative, etc. At the same time the German sounds underwent certain changes, and a large number of Hebrew, Aramaic, and Slavic words were incorporated in the language. The resultant idiom, the Yiddish, supplanted the Slavic spoken by the primitive Jewish settlers in the east of Europe and has been carried to all parts of the world, including Germany, admitting words and idioms from all the languages with which it has come into contact. See JEWS; LADINO (3).

Literature. Hebrew throughout the Middle Ages was the literary language of the Jews, and was employed not only in religious services, but also in business correspondence, and in the preparation of legal documents. As early as the sixteenth century translations of the Bible into Yiddish began to make their appearance to supply the wants of women, who did not receive a Hebrew education, and of the ignorant. The most popular Yiddish edition of the Pentateuch and of the Five Scrolls is the one known as *Zenah Urenah*. This is a paraphrase of the biblical text, embellished with the homiletic interpretations of the Talmud and Midrash. The compiler of the book was Jacob ben Isaac, of Janowo, Poland, who lived at the end of the sixteenth century. Besides translations of the Bible there appeared books of a purely religious or moral character.

It was not, however, until the beginning of the nineteenth century that Yiddish began to be used as a literary language. The movement for reform and for modern culture (*Haskalah*), aroused by the Mendelssohnian translation of the Bible, soon gained a firm foothold in Russia and in Galicia. The neo-Hebraic writers of the Haskalah despised Yiddish which they regarded as a corrupt jargon. Nevertheless the desire to instruct the great mass of the Jewish people led some of them, like the talented Dr. Ettinger, to write in Yiddish, and their example was followed by a number of popular poets like Michel Gordon and Goldfaden (1840–1908). The *pogrom* of 1881 and the persecutions which followed it helped invest Yiddish literature with a thoroughly national character. This literature is cultivated almost exclusively in Russia and the United States.

Solomon Abramowitsch (Abramowitz), better known by his pseudonym "Mendele Mocher Seforim," ranks among the best Yiddish authors of modern times. Best known of his works are: *Die Kliatsche* (The Mare), a beautiful allegory of the history of Jewish persecution and its effects on the national character (Vilna, 1873); *Das kleine Menschel* (The Mannikin), a satire of a self-made man (ib., 1865); *Fischke der Krumer* (Fischke the Lame), a study of beggar life (Zhitomir, 1888); and *Die Takse* (The Tax), a criticism of the Jewish communal system (1869). His masterly arraignment of sham and wrong and his quaint humor won for him the sobriquet of "The Jewish Cervantes." I. I. Linetzki's *Das Polishe Jungel* (The Polish Boy) is valuable for the picture it gives of the Chassidic life among the Jews. I. M. Dick (1808–93) was a prolific writer of the Romantic school. Jacob Dinesohn produced a number of popular sentimental novels. N. M. Shaikewitsch, otherwise known as "Shomer," wrote more than 100 lengthy books marked by a talent for narration and little else. Mordecai Spector, Shalom Rabinowitsch, better known as "Shalom Aleichem" (1859–1916), and I. L. Perez (q.v.) are, after Abramowitsch, the most prominent of modern prose writers in Yiddish. They resemble Abramowitsch in the general undercurrent of sadness which runs through all their work, but like him, too, they display prominently a taste for humor, which in Rabinowitsch is often mingled with acute satire and in Perez with pathos and mysticism.

The influence most conducive to the rise of the Yiddish literature was the introduction of the Yiddish newspaper. The first successful newspaper in the language was established in 1863, when A. Zederbaum began to publish the *Kol Mewasser*, as a supplement to his Hebrew weekly *Hameliz*. Since then many Yiddish periodicals have appeared in various lands. The *Judisches Tageblatt*, the first Yiddish daily, appeared in New York in 1885, under the management of the editor of the weekly *Judische Gazetten*. The first Yiddish daily in Russia, *Der Freind*, made its appearance in January, 1903, at St. Petersburg. In January, 1904, another daily, *Der Tag*, began publication at the office of the Hebrew daily *Hameliz*, St. Petersburg. The national awakening among the Jews following the Kishineff massacre of 1903 and intensified by the revolutionary movement which began in 1905 has resulted in the greatly extended use of Yiddish as a literary medium. It is almost exclusively in connection with the newspaper that Yiddish literature has developed in the United States. The Socialist press has counted among its contributors many men of high gifts and wide attainments who have enlarged the intellectual horizon of the Jewish public. Prominent in the ranks of Yiddish journalism was Abraham Cahan (q.v.), who has also written successfully in English. J. Rombro, better known by his nom de plume of Philip Krantz, gained reputation as an editor and writer on topics of general history. S. Libin (q.v.) has shown in his sketches of Ghetto life a finished art approaching that of the French masters. Morris Wintchevsky (q.v.) is in style probably the most original and effective of the group of Yiddish journalists. J. Goido, Leon Kobrin, and B. Feigenbaum may also be mentioned. Of writers not identified particularly with the liberal movement, the best known are Alexander Harkavy, Abraham Tannenbaum, Selikowitsch, Seiffert, and A. M. Sharkansky. Eliokim Zunser, originally one of the class of badchens, or professional jesters, has gained wide note as the writer of songs whose fervent national spirit and sympathy for the workingman are made to atone for their lack of poetic art. Indisputably first, however, among writers of verse is Morris Rosenfeld, who has become known to the non-Yiddish public through translations of his poems into English (*Songs from the Ghetto*, Boston, 1898), and into German (*Lieder aus dem Ghetto*, Berlin, 1899). From the sweatshop and the tenement he has drawn most of his themes, and the pervading tone in

his verse is one of deep melancholy. Yet at times he has shown himself capable of turning his fine lyric powers to the singing of the joys of life—nature, love, children. One of the most appreciated writers of lyrics is S Blumgarten Jehoash (q.v.). (See REISEN, A.) The Yiddish drama also received its fullest development in America. In the beginning of the eighteenth century two Yiddish plays, *The Sale of Joseph* and the *Ahasuerus Play*, had appeared in print. These were performed in private Jewish homes, especially on the festival of Purim. In 1878 the poet Goldfaden who had first performed in Rumania with an itinerant company of actors, established the first Jewish theatre in Odessa. This soon found imitators in other large towns of Russia. But the government closed these theatres in 1883 and the actors had to seek their audiences in New York, where about the same time Tomaschewski and Golubok started a Jewish theatre followed by several others. The Yiddish drama, however, up to 1890 was of a very low order from the artistic point of view. A great advance began with the work of Jacob Gordin (q.v.), who dealt skillfully with numerous phases of Jewish life in Russia and America. Creditable work has also been done by Wintchevsky, "Shalom Aleichem," D Pinski, P. Hirschbein, Shalom Asch, and Libin.

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YING-TSE. yĭng'tsĕ. A treaty port of Manchuria. See NEWCHWANG.

YIN-YANG, yēn'yäng' (Chin. *yin*, shade, darkness + *yang*, light). The two primordial forces, essences, or principles developed from the self-existing *T'ai-yi* or Great Monad, by the action and interaction of which, according to Chinese cosmogonic theories, the universe has been produced and cosmic harmony is maintained. The terms *yang* and *yin* primarily mean light and darkness, but they are also taken to represent heaven and earth, male and female, positive and negative, odd and even, etc., and the whole conception bears a striking resemblance to the Pythagorean theory of number as the principle of order, and of the 10 fundamental opposites of that system. (See PYTHAGOREANISM.) In Japanese these two principles are known as *In-yō*.

YLANG-YLANG, ē'läng-ē'läng. *Cananga odorata*, a large rapidly growing tree, 60 to 80 feet high, belonging to the family Anonaceæ. The tree is native in the Philippines, Java, and elsewhere, and it has been successfully introduced into many tropical countries. Its large, greenish-yellow flowers are strongly scented, and by distillation they yield the popular perfume ylang-ylang, the production of which is quite an industry in the Philippines. About 150 to 200 pounds of flowers yield a pound of the volatile oil. The best oil comes from Manila and is valued at about $3.00 an ounce.

YOAKUM, yō'kŭm. A town in De Witt and Lavaca counties, Tex., 118 miles east of San Antonio, on the San Antonio and Aransas Pass Railroad (Map: Texas, D 5). It has railroad shops, a canning factory, creamery, turkey abatoir, kiln-drying plant, ice factory, flour and corn mill, cistern factory, and bottling works. Yoakum adopted the commission form of government in 1914. Pop., 1900, 3499; 1910, 4657.

YODEL. See JODELN.

YOGA, yō'ga (Skt., *yōga*, union, concentration). The name of one of the orthodox systems of philosophy of the Hindus. While the basis of this system, the Sankhya (q.v.), is chiefly concerned in teaching the *tattvas*, or principles of creation, and the successive development of the latter, the main object of the Yoga is to establish the doctrine of a Supreme Being, and to teach the means by which the human soul may become permanently united with it. This Lord, or Supreme Being, is defined by Patanjali (q.v.), the reputed founder of the system, as "a particular *Purusa*, or spirit, who is untouched by affections, works, the result of works, or deserts; who is the preceptor of even the first, because he is not limited by time; and whose appellation is Om, the term of glory." See OM.

To attain the concentration which leads to union of the soul with the Supreme Lord, eight stages are necessary. These are self-control (*yama*), religious observance (*niyama*), postures (*āsana*), regulation of the breath (*prānāyāma*), restraint of the senses (*pratyāhāra*), steadying of the mind (*dhāraṇā*), meditation (*dhyāna*), and profound contemplation (*samādhi*). The first stage, self-control, consists in not doing injury to living beings, veracity, avoidance of theft, chastity, and nonacceptance of gifts. The second stage, religious observance, comprises external as well as internal purity, contentment, austerity, muttering of the Vedic hymns, and devoted reliance on the Lord. The third stage, of Yoga postures of various sorts, is regarded as essential to those following. The fourth stage, regulation of the breath, is threefold, according as it concerns exhalation or inhalation, or becomes tantamount to suspension of the breath. The fifth stage, the restraint of the senses, means the diversion or withdrawal of the senses from their respective objects, and their entire accommodation to the nature of the mind. This stage is preparatory to the

Dhāraṇā, or the steadying of the mind, which means the freeing of the mind from any sensual distraction by fixing the thoughts on some part of the body, on the navel or the tip of the nose. Meditation, the seventh stage, is the fixing of the mind on the one object of knowledge, the Supreme Spirit, so as to exclude all other thoughts. The eighth and last stage, profound contemplation, is the perfect absorption of thought into the one object of contemplation, the Supreme Spirit; it is devoid of all thought, even of meditation. In such a state a Yogin is insensible to heat and cold, to pleasure and pain; he is the same in prosperity and adversity, he enjoys an ecstatic condition. The last three stages are also comprised under the distinctive name *samyama*, or restraint, because it is chiefly on the perfection attained in these three collectively that depend the wonderful results which are promised to a Yogin when he applies them to the contemplation of special objects. Such results are, i.e., a knowledge of the past and future, a knowledge of the sounds of all animals, of all that happened in one's former births, of the thoughts of others, of the time of one's own death, a knowledge of all that exists in the different worlds, of stars and planets, of the structure of one's own body, etc. There are especially, however, eight great powers which a Yogin will acquire when properly regulating and applying the *samyama*—the power of shrinking into the form of the minutest atom, of becoming extremely light, of becoming extremely heavy, of unlimited reach of the organs, of irresistible will, of obtaining perfect dominion over everything, of changing the course of nature, and, lastly, of going anywhere at will. If the Yogin applies *samyama* to the contemplation of the smallest divisions of time, and the successive order in which such divisions occur, he obtains a discrimination which enables him to understand the subtle elements, and to see all objects at once. When his intellect has become free from all considerations of self, and his spirit is no longer subject to the result of acts performed, and when both have thus obtained the same degree of purity, the Yogin obtains eternal liberation.

This is seldom obtained in one birth, for usually only a succession of births brings to maturity the result obtained in a prior birth. (See KARMA; METEMPSYCHOSIS.) When, however, final liberation is attained, first, all ideas of self cease. In consequence, thought is turned inward, and this is the commencement of liberation. But as recollections, derived from former existences, sometimes prevail in his mind, they must be abandoned. When the Yogin has succeeded in this, his knowledge will have become so infinite that but little will remain for him to know. Then the cosmical *gunas*, or qualities (see SANKHYA), having accomplished the main object of spirit, gradually arrive at the end of their functions, and, as a consequence, matter becomes separated from spirit. This is *Kāivalya*, or true liberation. The practical part of the Yoga was admitted into the later Vedanta (q.v.).

The great power which this system of philosophy has at all periods exercised on the Hindu mind is less derived from its philosophical speculations or its moral injunctions, than from the wonderful effects which the Yoga practices are supposed to produce, and from the countenance they give to the favorite tendency of orthodox Hinduism, the performance of austerities. But to acquire such powers for show is expressly condemned by Patanjali and he recommends them merely as a means of practicing the Yoga dispositions, so as to fit one's self for the knowledge which can come only to those who have overcome all resistance. The perfect Yoga thus attained is called *Rāja-Yōga* or *Kāivalya*, in distinction from the practical Yoga called *Hatha-Yōga*, which latter is but a means to the supreme end of liberation. The textbook of this form of Yoga is Jogindra's *Hathapradīpika* (edited and translated by Tatya and Iyangar, Bombay, 1893).

Originally, Yoga was not theistic; the Purusha was not God, but the perfected (liberated) spirit. But this individual spirit gradually, in the course of centuries, being influenced by the Vedanta, assumed the place of a personal supreme spirit or God, and *yōga* was interpreted as "union with God," whereas at first every spirit was individually eternal and *yōga* was the attempt to isolate spirit from matter. The system of Patanjali was taught by him in a work called *Yōga-sūtra* (edited and translated by Mitra, Calcutta, 1883; translated by Dvivedi, Bombay, 1890), which consists of four padas, or chapters, each comprising a number of sutras (q.v.).

The oldest commentary on it is ascribed to one Vyasa (q.v.), and this was commented on by Vachaspati Miśra. Of other commentaries, those by Vijnanabhikshu (edited by Sastri, Benares, 1884) and Bhojadeva (edited by Mitra, Calcutta, 1883) are the best.

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YOKKAICHI, yōk'kī'chĕ. A town in the Prefecture of Miye, Japan, situated on the Owari Bay, in the southern part of the island of Hondo, 23 miles southwest of Nagoya (Map: Japan, E 6). It is an industrial town with many factories built in European style. The manufactures include silk, paper, and porcelain ware known as Banko faience. Pop., 1908, 30,704.

YOKOHAMA, yō-kō-hä'mä (Cross Strand). The principal treaty port of Japan, situated on the south coast of the main island, 18 miles south of Tokyo, the capital (Map: Japan, F 6). It stands on a little indentation on the west shore of Tokyo Bay opposite the small prefectural city of Kanagawa, 2 miles north, originally designated in the treaty of 1858 as the port to be opened to foreign trade in the following year. Its position on the Tokaido, however, exposed the foreign residents to frequent attacks by the military retainers of the territorial barons as they journeyed to and from

Yedo (Tokyo), and the native authorities favored the removal of the settlement to its present site on the opposite strand, where stood at that time only a few fishermen's huts. The settlement then established, and the large native town which has grown up alongside of it on the north, occupy the original sea beach and a large stretch of filled-in swamp land at the back, bounded on the south and southwest by a tidal creek stretching west and southwest to Mississippi Bay At a later date a well-wooded hill on the south of this creek, now known as the Bluff, was thrown open to foreigners for residential purposes, and it is now thickly dotted with handsome villas and bungalows. In 1901 the villages of Honmoku, Negishi, and Nakamura, lying along the foot of the bluff as far as Mississippi Bay, were annexed to the municipality, which in 1908 contained a population of 394,303. The town is well laid out and contains many fine buildings of stone, including the prefectural buildings, the Saibansho or courthouse, post office, customhouse, railway station, a public hall, an Anglican, a French-Catholic, and a Protestant Union church in the settlement, and several native churches There are also hospitals, a fine cricket and recreation ground, a race course, a public garden on the Bluff, hotels, club houses, banks, and several weekly and daily newspapers, in English, French, and Japanese. A fine water supply was introduced in 1887, brought about 30 miles, from the Sagamigawa. Ships load and unload at a great pier 2000 feet long, and the anchorage is rendered safe by two great breakwaters 12,000 feet in length. Two large graving docks were completed in 1896–97. Imports and exports of merchandise were valued at 235 102,000 and 316,821,000 yen respectively in 1913 (this figure is slightly over half the total Japanese export). At Kobe, which is the other great Japanese port, imports in 1913 were valued at 346,609,000 yen and exports at 170,470,000 yen. Yokohama is the great silk emporium of the country, as Kobe is the great emporium for tea. The railway between Yokohama and Tokyo, built in 1872, was the first in Japan

YOKOHAMA. See FOWL.

YOKOSŬKA, yō'kō-sō̆'kȧ. A coast town of Japan, and the greatest of the six Imperial naval stations (Map: Japan, A 2). It is situated on a landlocked inlet of the Bay of Yedo, 12 miles south of Yokohama, with which it is in hourly communication by steamer. It is also connected by rail with Yokohama and Tokyo, via Kamakura. Here are the Imperial dockyards and arsenals, with great graving docks and every appliance for turning out large armored vessels; begun during the Shogunate in 1866; opened under the Empire in 1871; initial cost $1,470,431. Pop., 1908, 70,364. At Hemmi-mura, a mile distant, is the grave of Will Adams (q.v.), the English pilot who arrived in 1600, and after whom *Anjin-chō* or Pilot Street in Tokyo is named. His memory is still honored in Japan.

YO'KUTS. A group of California Indian tribes constituting the Mariposan (q.v.) stock, living in the southern San Joaquin valley, among which are the Tachi, Wechikht, Wikchamni, and Yowdanchi. In 1910 they numbered 533. Consult A. L. Kroeber, "The Yokuts Languages of South Central California," *University of California Publication in American Archaeology and Ethnology*, vol. ii, part 5.

YOLK. See EGG.

YOLOF, yō'lŏf, **JOLOF,** yō'lŏf, or **WOLOF,** wō'lŏf (Speakers). Negroes of the western Sudan between the lower Senegal and the Gambia and stretching inland. They are said to be a handsome race, tall in stature (68–70 inches), dolichocephalic (index 75 2), and intensely black in color, but having regular features due without doubt to mixture with the Hamitic peoples north of them. The Yolof language is the medium of communication throughout Senegambia. In religion the Yolof are Mohammedans, but they still wear fetishes on their foreheads, breasts, and abdomens, mixed with bits of the Koran wrapped in parchment. They pay great attention to dress and personal adornment. Consult: De Roger, *Recherches philosophiques sur la langue oulofe* (Paris, 1829); Bérenger Féraud, "Etude sur les Ouolofs," in *Revue d'Anthropologie, IV* (ib., 1875); Delafosse, *Haut-Sénégal-Niger* (ib., 1912).

YOM KIPPUR, yŏm kĭp'ur. A late rabbinical term now in use as a designation of the *yom ha-kippurim*, or day of atonement. The laws relating to it are found in Lev. xvi.; xxiii. 26–32; xxv. 9; Num. xxix. 7–11. Concerning the ceremonies of the day see ATONEMENT, DAY OF. Modern Jewish and Christian scholars have maintained that this institution is of comparatively late origin. Since it is not mentioned in Deuteronomy or by Ezekiel, J. F. L. George regarded it as having been instituted during the Babylonian exile, and called attention to the fact that Ezekiel ordained an analogous rite of purification of the temple for the first and the seventh days of the seventh month. B. Wechsler pointed to the significant silence in Nehemiah viii concerning this day, and suggested that Lev. xvi. 1–28 describes an earlier festival characterized by the purification of the altar, while verses 29 ff. refer to a later annual ceremony. This view was somewhat further developed by S. Adler and I. Benzinger. The former emphasized the difference between the old ritual affecting only the altar, and the fully developed institution which secured to the people as a whole pardon for sins unwittingly and unintentionally committed; the latter brought these observations into connection with the current system of Pentateuchal criticism. Consult: J. F. L. George, *Die alteren jüdischen Feste* (Berlin, 1835); B. Wechsler, "Zur Geschichte der Versöhnungsfeier," in Geiger, *Jüdische Zeitschrift für Wissenschaft und Leben*, vol. ii (Breslau, 1863); S. Adler, "Der Versöhnungstag in der Bibel" in Stade, *Zeitschrift für die alttestamentliche Wissenschaft*, vol. iii (Giessen, 1883); I. Benzinger, *Hebraische Archäologie* (2d ed., Tübingen, 1907).

YONEZAWA, yō'nĕ-zä'wȧ. An important town in the Province of Uzen, Japan, 125 miles north of Tokyo, on the island of Hondo (Map: Japan, F 5). It is in the southeast of a fertile plain which is surrounded by lofty mountains, 30 miles distant. It is connected with Fukushima by railway. Pop., 1908, 35,380.

YONGE, yŭng, CHARLOTTE MARY (1823–1901). An English novelist, born at Otterbourne, in Hampshire. She was educated at home; resided in her native place throughout her life; and may be regarded, in many respects, as the mid-Victorian ideal of all a lady of her position should be. In religion she was an adherent of the High Church, whose doctrines she quietly took for granted in her novels, or sought to commend to the good graces of her

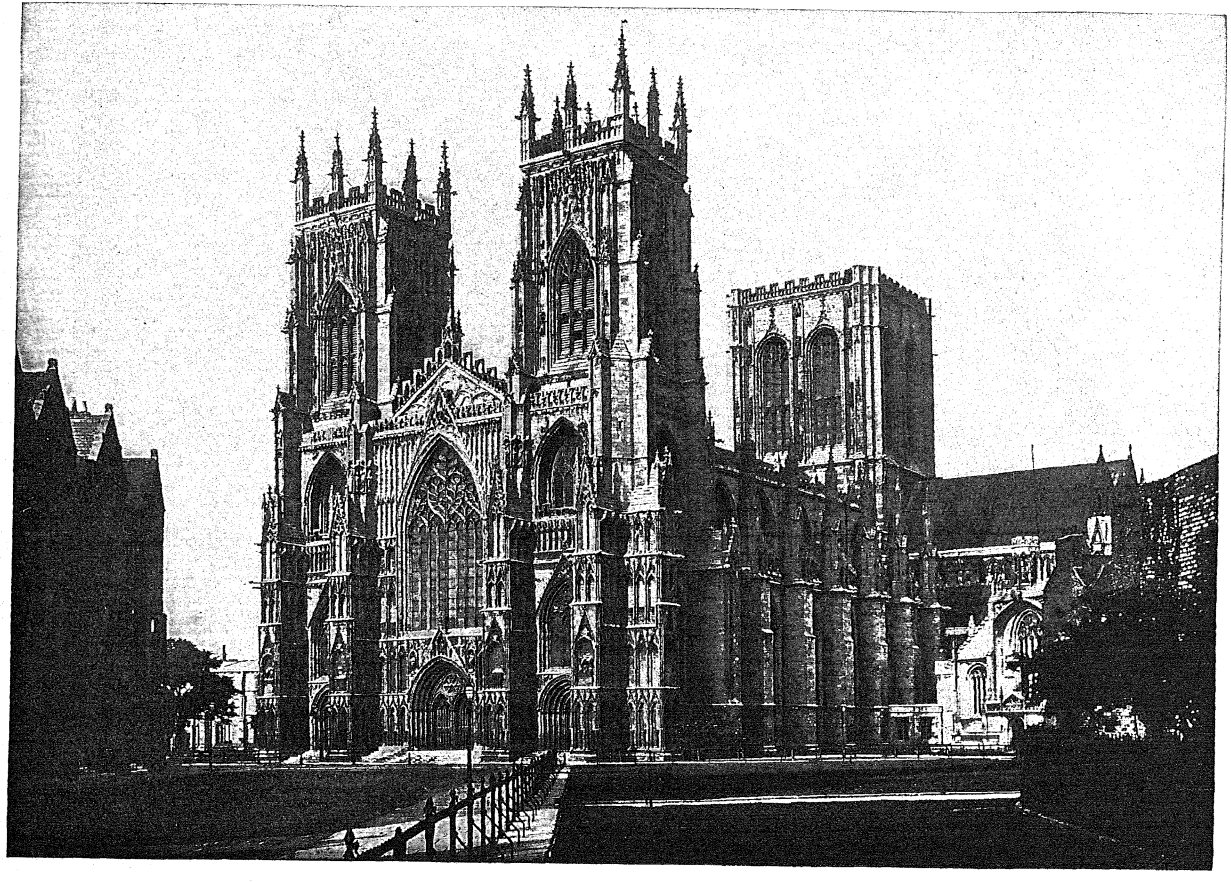
readers. Her orthodoxy led her to disapprove of workmen's institutes, lest the geological instruction there offered should imperil the foundations of the faith of those who attended them. For more than 30 years she edited the *Monthly Packet*, in which many of her novels made their first appearance. Miss Yonge published 160 separate books, comprising historical and educational works and novels, most of them bearing a strong religious or moral stamp, and some historical, some stories of contemporary domestic life. Her first great success as novelist was with *The Heir of Redclyffe* (1853), which was very widely read. Its spiritual romanticism was not only popular with the lay public, but it was received with enthusiasm by Morris and Rossetti. When Miss Yonge began authorship, a family council decided that it would be wrong or indelicate for one of her sex and station to become an author, unless the earnings of her pen were devoted to some good purpose, in which decision she dutifully acquiesced. The profits of *Redclyffe* bought a schooner for the use of a Melanesian missionary, while royalties from *The Daisy Chain* (1856) went to a New Zealand mission. Miss Yonge's books for girls are perhaps best represented by *The Daisy Chain*, and her essays in the field of historical romance by *The Dove in the Eagle's Nest* (1866). Village life was admirably depicted in a series of tales closing with *Forget-Me-Not* (1900). *Modern Broods*, written the year before her death, is a picture of the younger generation with which she was out of touch, and is perhaps her poorest book. Among miscellaneous publications may be cited *Catherine of Aragon and the Sources of the English Reformation* (1881), *Life of Hannah More* (1888); and *Life of the Prince Consort* (1889). Miss Yonge still remains a school classic. Consult Christabel Coleridge, *Life of Charlotte M. Yonge* (New York, 1903), and Ethel Romanes, *Charlotte Mary Yonge, An Appreciation* (London, 1908).

YONGE, Sir William (c.1695–1755). An English politician and wit, fourth baronet, son of Sir Walter Yonge. He was born at Colyton, Devonshire, and in 1722 entered Parliament. He became an office-hunting Whig, disliked and distrusted, but so useful to Sir Robert Walpole and the King that he held important positions, such as Secretary for War and joint vice treasurer of Ireland. Yonge's career was successful, in spite of the universal contempt he aroused. This was perhaps due to his skill as a parliamentary debater and the fact that he was an unswerving and useful supporter of the Whig party. He had no qualities of statesmanship, and perhaps prided himself as much on his reputation as a wit as on his successes in politics. His satirical verses led to the dislike of Pope, who mentions him in the *Essay on Man* as Sir Billy and refers to him elsewhere with great contempt. That his opinion carried some weight is evidenced by the fact that Dr. Johnson once appealed to him in a question of pronunciation.

YONKERS, yŏn'kĕrz. A city in Westchester Co., N. Y., adjoining New York City on the north; on the east bank of the Hudson River, with a water front of 4½ miles, and on the New York Central and Hudson River Railroad, from whose terminal in New York it is 15 miles distant (Map: New York, B 2). It is situated on ground rising gradually from the river. The more elevated section affords a magnificent view of the Hudson and of the Palisades (q.v.) on the opposite bank, and has handsome residences. There are more than 107 miles of streets, most of which distance is paved, the greater part with macadam. The most interesting structure of the city is the Philipse Manor House (now a museum) dating from 1682, which served as the city hall until 1909, when a handsome new city hall was built in Washington Park. Other noteworthy features include the Hebrew Home for the Aged and Infirm, the Leake and Watts Orphan House, St. John's Riverside Hospital, St. Joseph's Hospital, the Homœopathic Hospital, the Elks Building, new Y. M. C. A. and Y. W. C. A. buildings, "Greystone," formerly the residence of Samuel J. Tilden, seven parks, and a Carnegie library in Washington Park. There are also St. Joseph's Catholic Seminary, with a large library, Saunders Trade School, the Hollywood Inn for Workingmen, and the free circulating library of the Woman's Institute. Not only is Yonkers an attractive residential city, but it has important industrial interests. According to the 1914 census of manufactures the 186 manufacturing establishments had an invested capital of $59,409,000, and an output valued at $67,223,000. Hats, carpets, and rugs are among the principal products. There are large grain elevators, sugar refineries, foundries and machine shops, wire works, patent medicine and chemical factories, and the extensive works of the Otis Elevator Company. The government is vested in a mayor, chosen biennially, and a common council. The water works, which represent a total expenditure of $3,000,000 are the property of the municipality. The city maintains a steel recreation pavilion on the water front and three public bathhouses. For maintenance and operation it spends annually over $3,500,000, the chief items of expenditure being: principal and interest on debt, $992,000; public works, $555,000; public safety (police and fire), $555,000; education, $669,000; water bureau, $380,000; other appropriations, $349,000. Pop., 1890, 32,033; 1900, 47,931; 1910, 79,803; 1915, 90,948; 1920, 100,226.

Yonkers was first settled about 1650, and derives its name from Adrian Van der Donck, called De Jonkheer, or young nobleman, by the Dutch, who owned the surrounding territory from 1645 to 1672. From 1672 to 1779 it was included in the Philipse Manor, the part now constituting the city being called Philipsburg. During the Revolution it was in the midst of the Neutral Ground. In 1788 the township of Yonkers was organized, and in 1855 the village of Yonkers was incorporated. In 1872 the town was divided, the north portion being chartered as a city, and the south portion becoming Kingsbridge, which two years later was annexed to New York City. Consult Allison, *The History of Yonkers* (New York, 1896); Scharf, *History of Westchester County* (ib., 1886).

YONNE, yŏn. A department of north central France, formed of portions of Burgundy and Champagne (Map: France, N., J 5). Area, 2892 square miles. The department is traversed by the Yonne, a tributary of the Seine, and its surface is undulating or hilly, with many beautiful valleys. A considerable portion is covered with forest, but more than half of the area is under cultivation, producing large crops of wheat, oats, beets, and potatoes. Vineyards cover about 84,000 acres and its wines, especially Chablis, are famous. The chief mineral product is building stone, and the most impor-



YORK MINSTER

tant industries are sugar refining, lumbering, and glass manufacture. Pop., 1901, 321,062; 1911, 303,889. Capital, Auxerre.

YONNE. A tributary of the Seine, having its source in the mountains of Morvan, in the Department of Nièvre, France (Map: France, N., J 4). It empties into the Seine from the south, near Montereau. It becomes navigable at Auxerre. Length, about 150 miles.

YORCK (or YORK) **VON WARTENBURG,** yôrk fôn vär'ten-bụrk, HANS DAVID LUDWIG, COUNT (1759–1830). A Prussian field marshal. He was born at Potsdam, entered the army in 1772, and was cashiered for insubordination and imprisoned (1779–81). He was in the Dutch East Indian service in 1783–84 and was reinstated in the Prussian army in 1787. He served in the Polish campaign of 1794 and distinguished himself in the struggle against France in 1806. In 1807 he attained the rank of major general and in 1811 was made Governor-General of East and West Prussia. In the Russian campaign of 1812 he commanded the Prussian contingent in Napoleon's army, but he had no heart in this service, and during the retreat from Russia entered into a convention with the Russians, Dec. 30, 1812, by which the Prussian troops were neutralized. Yorck distinguished himself in the campaign of 1813–14, defeated Eugène Beauharnais at Möckern, took part in the battle of Bautzen and that on the Katzbach, and fought at Leipzig. He shared also in the fighting which preceded the capture of Paris by the Allies. He was made a count in 1814 and a field marshal in 1821. For his life consult Droysen (10th ed., Leipzig, 1890).

YORICK. 1. The former jester of the King of Denmark in Shakespeare's *Hamlet.* 2. The pseudonym assumed by Laurence Sterne in most of his works after the publication of *Tristram Shandy.*

YORITOMO MINAMOTO. See MINAMOTO YORITOMO.

YORK. A county borough and city, the county town of Yorkshire, England, situated at the junction of the Ouse and Foss, 188 miles by rail N. by W. from London (Map: England, E 3). The city preserves its mediæval aspect with its narrow streets, quaint houses, ancient gateways, and double walls. The walls, with a circuit of a little over 2½ miles, date mainly from the fourteenth century and are well preserved; their top has long formed an interesting promenade. There are remains or memorials of Roman towers and temples, and of the earliest British churches. One of the most magnificent of the Anglo-Saxon churches was erected at York in the eighth century, and, destroyed by fire, rebuilt, enlarged, and changed from time to time, is now the cathedral known as York Minster. A portion of the original church was disinterred during excavations in 1829. The present structure ranks with the finest specimens of Gothic architecture in the world. It was built mainly in the thirteenth and fourteenth centuries. Its length is 525 feet, 6 inches, and its extreme breadth 250 feet. The height of the central tower is 213 feet, that of the western towers 202 feet. Besides the cathedral, York has numerous churches of great architectural interest. Among the modern churches is the Roman Catholic pro-cathedral. The educational institutions include St. Peter's School, founded in 1557, Archbishop Holgate's free school, dating from Henry VIII, and the Yorkshire School for the Blind, conducted in a palace originally built for the Lord President of the Council of the North.

The building erected for a fine-art exhibition held in 1879 contains a concert hall and picture galleries. The Yorkshire Philosophical Society possesses a handsome building and gardens, with a museum, rich in antiquarian relics and specimens illustrative of natural history. In the gardens are the interesting ruins of St. Mary's Abbey. There are also the county hospital, the first established in England north of the Trent, the lunatic asylum, and the Friends' retreat. The ancient castle, with the exception of its imposing Clifford's tower, is superseded by the modern and commodious assize courts. The Guildhall, a fine Gothic building, was erected in 1446. The government is vested in 12 aldermen and 36 councilors, of whom one is Lord Mayor. The city has returned two members to Parliament since 1295. The municipality owns the Foss Canal, provides tugs for towing vessels between Hull and York, and constitutes the Ouse navigation authority. It has built promenades and baths along the river. The city's industries include the making of leather gloves, combs, glass, etc., iron founding, flax spinning, the manufacture of linen, and the construction of railway cars.

Before the Roman invasion York was one of the chief towns of the Brigantes, the most numerous and powerful of the British tribes. It was constituted a Roman station, under the name of Eboracum, by Agricola about 79 A.D., and became the principal seat of Roman power in the north, perhaps in all Britain. Here Hadrian lived and Severus and Constantius Chlorus died. When the emperors visited the province, York was their chosen residence. It suffered during the long conflict between the Britons and the Picts, against whose incursions York was a material defense. It afterward became the capital of Northumbria. The first metropolitan church in England was built here by Edwin, the Northumbrian King, whom Paulinus baptized in 627 shortly before he became the first archbishop of York. William the Conqueror was long unable to overcome this stronghold of the north.

York has an interesting record, reaching from early Norman times down to the Civil War, of royal visits and conferences. In 1536, during the insurrections consequent upon the dissolution of the monasteries by Henry VIII, the city was seized by the insurgents of the "pilgrimage of grace." In its immediate neighborhood, Fairfax, in 1644, conquered Prince Rupert on Marston Moor. The city and castle surrendered to the Parliamentarians a few weeks after. Pop., 1891, 67,749; 1901, 77,914; 1911, 82,282. The area is 3730 acres. Consult: A. W. Twyford, *York and York Castle* (London, 1883); A. P. Purey-Cust, *Heraldry of York Minster* (2 vols., Leeds, 1890–96); James Raine, *York,* in "Historic Towns Series" (London, 1893).

YORK. A town in York Co., Me., 40 miles southwest of Portland, on the York Harbor and Beach Railroad (Map: Maine, B 5). It is situated on the coast, and, aside from its historic interest, has considerable reputation as a summer resort. Pop., 1900, 2668; 1910, 2802. York was settled as Agamenticus in 1624, and was chartered by Sir Ferdinando Gorges as a borough in 1641, and in 1642 as the city of Georgeana—the first English municipal corpora-

in North America. Consult Emery, *Ancient Records, Genealogy and Modern Town of York* (Boston, 1874).

YORK. A city and the county seat of York Co., Neb., 52 miles west of Lincoln, on the Chicago, Burlington, and Quincy, and the Chicago and Northwestern railroads (Map: Nebraska, C 4). It is the seat of York College (United Brethren), opened in 1890, and has the School of the Holy Family, the State Odd Fellows Home, the Mothers Jewels Home (M. E.), and a public library. There are also a fine county courthouse and two parks. York has large alfalfa mills and nurseries, and a music-publishing house, and manufactures flour, blank books, and foundry products. Pop., 1900, 5132; 1910, 6235.

YORK. A city and the county seat of York Co., Pa., 96 miles west of Philadelphia, on the Pennsylvania, the Western Maryland, and the Maryland and Pennsylvania railroads (Map: Pennsylvania, H 8). Among the prominent institutions are the York Collegiate Institute, the York County Academy, Children's Home, Christian Home, Tuberculosis Dispensary, hospital, almshouse, and the public, St. John's Episcopal, and York County Law libraries. There are seven parks—Penn and Farquhar being the largest. York derives considerable commercial importance from its situation in a productive farming region, and is also a prominent industrial centre. In the census year 1914 the various manufacturing establishments had $29,328,000 invested capital and an output valued at $21,969,000. The city is especially interested in the manufacture of foundry and machine-shop products, tobacco and cigars. There are also silk mills, farm-implement works, piano and organ factories, planing mills, breweries, brickyards, and manufactories of carriages and wagons, automobiles, wall paper, nails and spikes, paper and wood pulp, furniture, shirts, safes, ice machines, turbines, hosiery, flour, chains, wire cloth, cigar boxes, leather, artificial stone, etc. An extensive wholesale trade is carried on. The commission form of government, providing for a mayor, elected quadriennially, and four commissioners, elected biennially, has been adopted. Pop., 1900, 33,708; 1910, 44,750; 1915, 50,543; 1920, 47,512.

Several Germans settled here in 1729, but a town was not laid out until 1741. From Sept. 30, 1777, until June 27, 1778, the Continental Congress, driven from Philadelphia by the approach of Howe's army, was in session here. Consult Gibson, *History of York County* (Chicago, 1886).

YORK. A city and the county seat of York Co., S. C., 41 miles southwest of Charlotte, N. C., on the Southern and the Carolina and Northwestern railroads (Map: South Carolina, C 1). The leading manufactures are cotton, cotton-seed oil, buggies, lumber, and monuments. The place was settled in 1774. Until 1915 the city was known as Yorkville. Pop., 1900, 2012; 1910, 2326.

YORK, HOUSE OF. A royal house of England which contended with the House of Lancaster for the possession of the throne in the fifteenth century. The Lancastrian line had obtained the crown in 1399 in the person of Henry IV (q.v.) and remained in possession until the incapacity of Henry VI (q.v.) afforded an opportunity for the assertion of the Yorkist claims by Richard, Duke of York (1411–60), who united in his person the claims of Lionel, Duke of Clarence, third son of Edward III, and Edmund Langley, Duke of York, fifth son of that monarch. He thus could show a stronger title than Henry VI, who traced from John of Gaunt, fourth son of Edward III. Richard's aspirations for the crown and his rivalry with the ambitious Duke of Somerset led to the outbreak of the Wars of the Roses. (See ROSES, WARS OF THE.) Richard perished at Wakefield in 1460, but the struggle was continued by his son, Edward, who ascended the throne in the following year as Edward IV (q.v.). Edward died in 1483, and the throne was usurped by his brother, Richard, Duke of Gloucester, but the popular belief that he was responsible for the murder of the sons of Edward and that he intended to marry Edward's daughter, Elizabeth, cost him his throne and his life. He fell at Bosworth in 1485. (See RICHARD III.) Henry, Earl of Richmond, the victor of Bosworth, by his marriage with Elizabeth, eldest child of Edward IV, united in himself the claims of the houses of Lancaster and York and reigned as Henry VII (q.v.). George, Duke of Clarence, younger brother of Edward IV, who was executed in 1478, left a son, Edward, Earl of Warwick, and a daughter, Margaret. Edward was kept a prisoner in the Tower by Henry VII until 1499. Margaret married Sir Richard Pole and her fourth son was the celebrated Cardinal Reginald Pole (q.v.). See PLANTAGENET; TUDOR.

YORK, RICHARD, DUKE OF (1411–60). An English statesman, only son of Richard, Earl of Cambridge (died 1415), by Anne Mortimer, sister of Edmund, Earl of March. Before his majority he was appointed constable of England, and in 1436, under Henry VI, Regent of France. He resigned in 1437, was reappointed in 1440, and recalled in 1445. In 1447 he was made the King's lieutenant in Ireland, returned to England in 1450, and, gaining in influence, in 1454 he was chosen protector of the kingdom during the illness of Henry VI. About the beginning of 1455 the King recovered, and various charges of treasonable intentions, arising from York's claim to the heirship to the throne, culminated in a short engagement in May (regarded as the first battle of the Wars of the Roses), but reconciliation between the King and the Duke followed. York was relieved of the protectorship in 1456. In 1460 his title to the heirship was admitted, but, as the Lords were unwilling to dethrone the King, a compromise was reached in October whereby it was agreed that York should succeed to the throne upon the death of Henry, and the Duke was proclaimed heir apparent and protector. Queen Margaret's objection to this arrangement led to hostilities, and York fell in the battle of Wakefield on the 30th of December. Two of his sons became kings of England, Edward IV and Richard III.

YORK COLLEGE. An institution for higher education founded in 1890 at York, Nebraska, under the control of the United Brethren. The departments include the college, academy, college and normal departments, music department, department of expression, and department of art. The total enrollment in 1916 was 375, and the instructors numbered 19. The value of grounds and buildings was $105,000, and the annual income about $20,000. There is an endowment of about $75,000. The library contains about 3500 volumes. The president in 1916 was M. O. McLaughlin.

YORK DEVIL. See MOLOCH.

YORKE, PHILIP See HARDWICKE, EARL OF.

YORKER BRETHREN, OLD ORDER OF. See RIVER BRETHREN.

YORK HOUSE. For a short time the London residence of the archbishops of York, after their old residence, York Place, now Whitehall, had passed from the hands of the Church to those of the crown, upon the downfall of Cardinal Wolsey It stood on the Strand, west of Salisbury House. It was subsequently the official mansion of the chancellors, and was the birthplace of Francis Bacon. York House came into the possession of the Duke of Buckingham, who began extensions, never completed, from designs by Inigo Jones.

YORK RIVER. The common estuary of the Pamunkey and Mattapony rivers in Virginia, which unite at West Point, 32 miles east of Richmond It extends 40 miles southeastward, and opens into Chesapeake Bay north of the mouth of the James (Map: Virginia, H 4). It is about 2 miles wide, and navigable to its head

YORKSHIRE, yôrk'shēr. A maritime county of northeast England (Map: England, E 2). It is the largest county in the Kingdom, with an area of 6067 square miles, but is divided into three sections known as East, West, and North Riding, which for most administrative purposes form separate counties. The surface is very diversified, the Pennine Chain occupying the western part, with lower groups of hills in the east, while the central portion forms the valley of the Ouse, which enters the Humber estuary on the southern boundary. East Riding is chiefly an agricultural region, producing oats, barley, wheat, turnips, and potatoes. West Riding is one of the greatest manufacturing districts in the Kingdom. The textile industry is the most largely represented, but smelting, founding, and other metal industries, such as the manufacture of machinery, are very important, their chief centres being Leeds and Sheffield. Mining is also extensively carried on, the chief products being coal in West Riding and iron in North Riding, the production of pig iron amounting to over 2,500,000 tons annually. Pop, 1901, 1,819,960; 1911, 2,054,729. The county town is York, and the chief cities are Leeds, Sheffield, Bradford, Halifax, Middlesbrough, and Hull. Yorkshire formed part of the Anglo-Saxon Kingdom of Northumbria. It was largely settled by Danish invaders, who from the eighth to the eleventh century were the ruling class. It is exceedingly rich in the remains of castles and monastic houses.

YORKSHIRE DON. A long, slim variety of canary bird bred in Yorkshire, England. See CANARY and the accompanying Plate.

YORKSHIRE TRAGEDY, A. A play by an unknown author, printed in 1608 under Shakespeare's name. It was founded on a story in Stow's *Chronicle.*

YORK'TON. A town and the capital of Mackenzie District, Saskatchewan, Canada, on the Canadian Pacific, Canadian Northern, and Grand Trunk Pacific railways, 130 miles northeast of Regina (Map: Saskatchewan, H 6). It contains Dominion Land and Lands Titles offices, and a hospital, and has a variety of manufactures. Pop., 1901, 700; 1911, 2309.

YORK'TOWN. A town and the county seat of York Co., Va., 70 miles southeast of Richmond; on the York River, and on the Baltimore, Chesapeake, and Richmond and the Old Dominion Steamship lines (Map: Virginia, H 4). Pop., 1910, 136 It contains the oldest customhouse in the United States and a monument commemorating the surrender of Lord Cornwallis. The town has considerable historic interest, having undergone two notable sieges (1781 and 1862). Cornwallis, after establishing himself here early in August, 1781, fortified the town with seven redoubts and six batteries on the land side, and a line of batteries along the river. Gloucester Point, on the opposite side of the river, was also strongly fortified. He had an army of about 8000 men supported by several vessels anchored in York River. Washington, with the combined American and French forces, left his headquarters near West Point, N. Y, on August 19, proceeded by land, by way of Philadelphia, to Elkton, at the head of Chesapeake Bay, then down Chesapeake Bay, reached Williamsburg on September 14, and on September 28 marched to the investment of Yorktown with a force of about 16,000, of whom two-thirds were Frenchmen, under the command of Rochambeau. A French fleet under Count de Grasse had immediately before entered the Chesapeake, and, by blocking the James and York rivers, cut off communication between the British at Yorktown and New York. On October 6 the first parallel was opened and on the 9th the batteries opened, dismounting many of the guns and destroying several vessels. On the 11th the second parallel was opened only 300 yards from the fort. On the 14th the two advanced redoubts were carried by assault, one by American, the other by French troops. On the 16th the walls and fortifications of the British works were broken down and almost every gun dismounted. The British general attempted now to escape by night by way of Gloucester Point, but the attempt was frustrated by a furious storm, which scattered his boats. On the 19th he surrendered to the allies, the land army with its munitions being surrendered to the Americans, the marines to the French. The prisoners, exclusive of seamen, numbered more than 7000, of whom 2000 were sick or wounded. Among the spoils the Americans obtained 235 pieces of cannon, 8000 stand of small arms, 28 regimental colors; the French 2 frigates and 20 transports. The total loss of the British was about 550, and of the allies 300. This victory virtually ended the Revolutionary struggle.

The second siege was begun by McClellan with about 53,000 Union troops on April 5, 1862. The Confederate general, Magruder, with 15,000 men, had taken possession early in the spring and had erected formidable works around the town and on Gloucester Point. He was soon reënforced by General Johnston, who took command, the total Confederate force now numbering about 55,000, while the Federal army, also reenforced, now numbered about 95,000. During the night of May 3–4 Johnston secretly evacuated Yorktown and retreated towards Richmond, but was pursued by a part of the Union army, and on the 5th was forced with a part of his troops under Longstreet to fight the battle of Williamsburg (q.v.).

In 1881 the centennial of the surrender of Cornwallis was celebrated with elaborate ceremonies, and a monument commemorative of the event was dedicated in the presence of many distinguished Americans and foreigners. Consult: Johnston, *The Yorktown Campaign and the Surrender of Cornwallis, 1781* (New York, 1881);

Report of the Commission Created in Accordance with a Joint Resolution of Congress Providing for the Erection of a Monument at Yorktown, Va. (Washington, 1883); Johnson and Buel (eds.), *Battles and Leaders of the Civil War* (New York, 1887); Balch, *The French in America During the War of Independence* (2 vols, Philadelphia, 1891–95); M. L. D. Foster, *Colonial Capitals of the Dominion of Virginia* (Lynchburg, 1906).

YORK VON WARTENBURG, Hans David Ludwig, Count. See Yorck von Wartenburg.

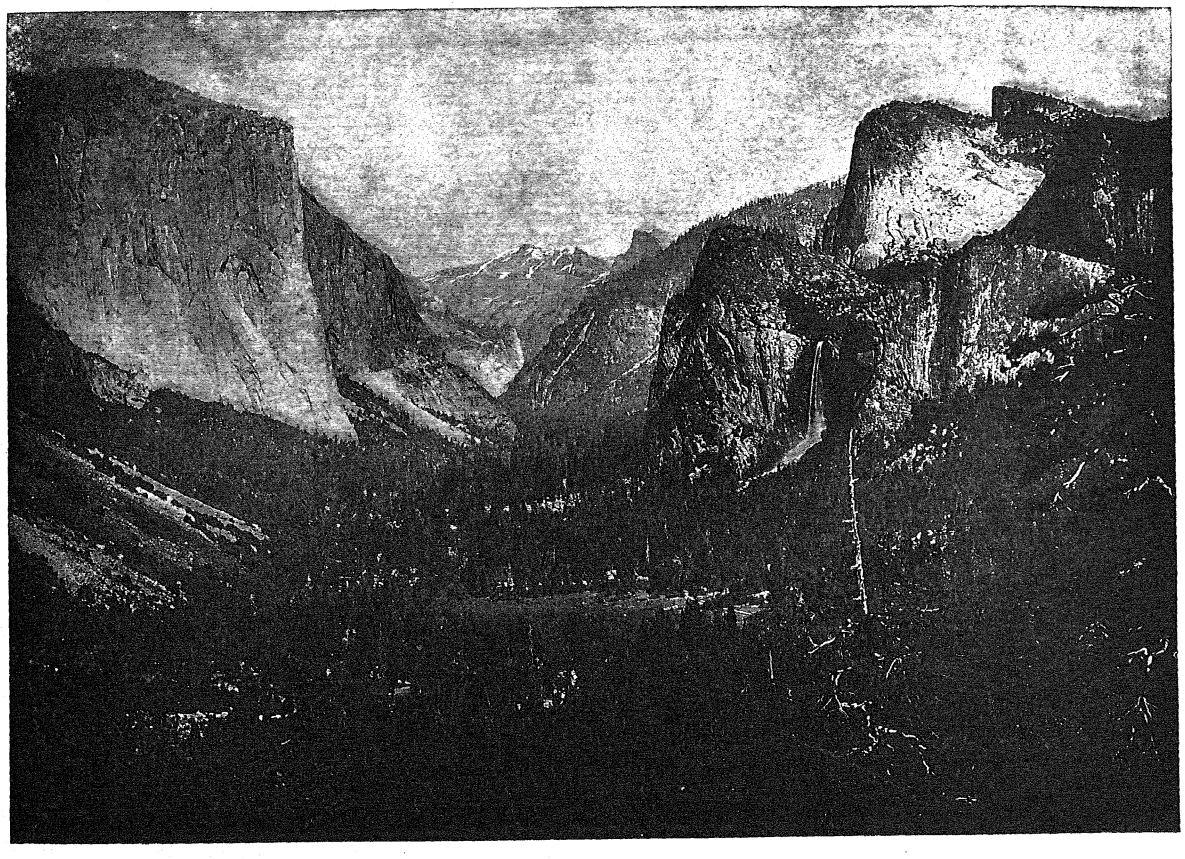
YORUBA, yō'rōō-bà, or **YARIBA.** Formerly a powerful state in Africa, comprising the territory lying southwest of the Nupe country and east of Dahomey and extending from Borgu south almost to the Bight of Benin. The invasion of the Fulbe in the first half of the nineteenth century led to the partition of the Yoruba empire into small states constantly warring with each other. Hence the existence of the large walled cities in that region, such as Oyo, the Yoruba capital, Ibadan, the chief commercial city, Abeokuta, Ilorin, and a few others, some of which are supposed once to have had as many as 200,000 inhabitants. At present Yoruba is practically embraced in southern Nigeria. The population is estimated at from 1,000,000 to 2,000,000 and is of negro origin. They are chiefly agriculturists. Palm oil is the main export article. The Yorubas are shorter than negroes in general (1.64 m. to 1.65 m.). These characters, joined with their fair color, are regarded as evidence of dwarf elements. They have large towns of rectangular houses with heavy, palm-thatched roofs, wide plazas, and merchants' booths. Professedly Mohammedan, they practice their ancient cult, which is chiefly conciliation of evil spirits and fetishism, but they punish sorcery with death. Consult: Crowther, *Grammar and Vocabulary of the Yoruba Language* (London, 1852); A. B. Ellis, *The Yoruba-Speaking Peoples* (ib., 1894); C. F. Harford-Battersby, *Niger and Yoruba Routes* (ib., 1896); Gouzien, *Manuel franco-yoruba de conversation* (Paris, 1899).

YOSEMITE (yō-sĕm'ĭ-tē) **VALLEY.** A celebrated valley on the western slope of the Sierra Nevada Mountains in the county of Mariposa, Cal. (Map: California, F 5). It is about 7 miles long and from ½ mile to 1 mile wide. The Merced River traverses the valley in a general direction from east to west. The scenery is famous for the numberless masses of picturesque rock formations and gigantic waterfalls, for striking heights and deep creek valleys. On both sides of the Merced rise perpendicular heights of granite, represented among others by El Capitan (3600 feet high), Cathedral Rocks (2500 feet), Three Brothers (3830 feet), and Half Dome (4900 feet). The most celebrated of the waterfalls are the Yosemite Falls (1430 feet), the Ribbon Falls (1612 feet), Bridal Veil Falls (620 feet); Nevada Falls (600 feet), Illilouette Falls (360 feet), Lower Yosemite and Vernal Falls (320 feet), etc. In the eastern part of the valley is Mirror Lake, a beautiful sheet of water. The valley was discovered in 1851. In 1864 it passed to California by Act of Congress, under the condition that it be kept open as a public park. In 1890 the Yosemite National Park, including the Valley, was established by Act of Congress, and in 1905 the original reservation was ceded back to the Federal government by the State. The celebrated big trees of California are in this immediate region. Consult the *Guide to the Yosemite*, by the California Geological Survey, and Bunnell, *Discovery of the Yosemite* (New York, 1893). See Park, National.

YOSHIHITO, yōsh'ĭ-hē'tō (1879–1926). Emperor of Japan. This name is little used by the Japanese, the common people calling him *Tenshi Sama*, "August Son of Heaven," and the educated *Shu-jo*, "Supreme Master." He was born Aug. 31, 1879, the third son of Emperor Meiji Tenno (q.v.). His elder brothers having died, he became Crown Prince Nov. 3, 1890. For eight years he attended the Gakushu-in or Peers' School and continued his study at his palace in Aoyama, Tokyo. In July, 1897, when he became of age, he took his seat in the House of Peers, and three years later, May 10, 1900, married Princess Sada-ko, the fourth daughter of the late Prince Kujo. To them were born three children, Prince Hirohito, the Crown Prince (born 1901), Prince Yasuhito (born 1902), and Prince Nobuhito (born 1905). Soon after his marriage he spent nearly three years in travels of observation that covered the whole realm. Every opportunity was given him to see for himself the real life of the people. On Aug. 30, 1912, upon the death of his father, he ascended the throne. Beloved by his people, he came to be known as the most democratic emperor who ever sat on the throne of Japan. Consult J. H. Longford, *The Evolution of New Japan* (New York, 1913).

YOUATT, yōō'ăt, William (1776–1847). A noted British veterinarian and author, born at Exeter. Having been educated for the ministry, he officiated in London from 1810 to 1812 or 1813, when he established, with D. P. Blaine, a veterinary infirmary which came under his sole management about 12 years later. From 1828 to 1835 he delivered lectures and conducted practicums on veterinary practice. At the same time he established the *Veterinarian*, a monthly magazine, still published. Besides important work in conjunction with the Royal Veterinary College and the Royal Agricultural Society, to whose *Journal* he was a frequent contributor, he exercised a profound influence upon his profession. His voluminous writings, both in the *Veterinarian* and in his books upon the domestic animals are widely consulted and quoted. Among his books are: *The Horse* (1831; 2d ed., 1843); *Cattle, their Breeds, Management, and Diseases* (1824); *Sheep, their Breeds, Management, and Diseases, and the Mountain Shepherd's Manual* (1837); *The Dog* (1845); *The Pig: A Treatise on Breeds, Management, Feeding, and Medical Treatment of Swine; with Directions for Salting Pork and Curing Ham* (1847).

YOUMANS, yōō'mănz, Edward Livingston (1821–87). An American scientist, born at Coeymans, N. Y. Despite an incurable malady of the eyes, he managed to acquire a good education. In 1845 his sister, Eliza Ann Youmans, became his reader and amanuensis. In 1851 he prepared a *Chemical Chart* which won such favor that the next year he published a *Class-Book of Chemistry*. From that time on he devoted himself with remarkable success to popularizing science. He became a lecturer, founded (1872) and until his death edited the *Popular Science Monthly* magazine, planned the publication of the "International Scientific Series," by means of which works by the greatest scientists



YOSEMITE VALLEY

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of all nations were published simultaneously in the principal modern languages, and introduced the works of Herbert Spencer and of other British scientists to American readers Among his own publications are: *Alcohol and the Constitution of Man* (1853), *Handbook of Household Science* (1857); *The Correlation and Conservation of Forces* (1864); and *Culture Demanded by Modern Life* (1867). Consult John Fiske, *A Century of Science, and Other Essays* (Boston, 1899).

YOUMANS, William Jay (1838–1901). An American scientist, born at Milton, N. Y., brother of Edward Livingston Youmans (q.v.). He studied chemistry under his brother and at Columbia and Yale, then took a course in medicine at New York University, and in 1865 studied natural history under Huxley in London. On his return to the United States he settled at Winona, Minn., and practiced medicine for about three years. In 1872 he assisted his brother in establishing and subsequently was associated in editing the *Popular Science Monthly*. After his brother's death in 1887 he became its editor in chief. He edited Huxley's *Lessons in Elementary Physiology*, and wrote *Pioneers of Science in America* (1895).

YOUNG, Sir Allen (1827–1915). An English mariner, born at Twickenham. Entering the merchant marine at 15 he soon rose to be captain After twice circumnavigating the world, he participated with distinction in the transport service of the Crimean War. Sailing without pay as master of the *Fox*, in the Franklin search under McClintock (q.v.), Young distinguished himself by extended sledge journeys and original discoveries (1857–59). He commanded the *Fox* in the North Atlantic Telegraph surveying expedition (1862) via the Faroe Islands, Iceland, and Greenland. For a brief period he commanded a gunboat in the European-Chinese navy. In 1871 he was commissioner to the Naples maritime congress, and in 1875 commissioner in the Suakim War to the National Aid Society. He made two Arctic voyages in the *Pandora*, one in 1875 in an unsuccessful attempt to pass through the Northwest Passage, and another in 1876 to communicate with the Nares polar expedition (see Nares, Sir George). In 1882 as commander of the *Hope* he rescued Leigh Smith's expedition wrecked on Franz Josef land. Besides receiving other honors, Young was knighted for his Arctic services. He wrote *The Two Voyages of the Pandora* (London, 1879).

YOUNG, Arthur (1741–1820). A noted British agriculturist and author, born in London. Prior to 1759 he had written four novels and several political pamphlets which seem to have had no permanent value. In 1763 he took up farming, which, combined with rural investigations at home and abroad, became his life work. The value and amount of his agricultural writings, based upon personal experience, place him in advance of British agricultural authors. His *Travels in France* pictures not only French agriculture, but conditions in France prior to the French Revolution; it is a source of information upon both these subjects. Young was secretary of the British Board of Agriculture (1793), and honorary member of the leading scientific societies of the world. Some of his best-known works are: *A Six Weeks' Tour through the Southern Counties of England and Wales* (1768); *Annals of Agriculture* (1784–1809, 1812–15); *Travels in France during the Years 1787, 1788, and 1789* (1794).

YOUNG, Brigham (1801–77). The successor of Joseph Smith, Jr., as president of the church of Jesus Christ of Latter-Day Saints. He was born in Whitingham, Windham Co., Vt, June 1, 1801. He removed to Mendon, Monroe Co., N. Y., and was baptized into the Mormon church April 14, 1832. He was at once appointed an elder, and first met Joseph Smith at Kirtland, Ohio. After a successful mission to Canada he went to Missouri in the "Army of Zion." Elected as one of the original Quorum of Twelve in 1835, he was called to preach to the Indians and presently went on a mission to the eastern States. In 1838 he directed the exodus of the saints from Missouri into Illinois. In 1840 he was sent to Liverpool to assist Apostles John Taylor and Wilford Woodruff (qq.v.) in the English mission. In 1844 he became president of the Twelve, and he held this position until elected president of the church in 1847. After the murder of Smith in 1844, Young assumed the leadership of the main body of saints, and organized their emigration to the West. In February, 1845, he led the first party from Nauvoo, and spent the following winter in a camp on the Missouri. There he promulgated his first and only "revelation," which can be found in the *Book of Doctrines and Covenants*, describing in detail the extraordinary manner of organizing the "Camps of Israel" and conducting the journey. Reaching the Salt Lake valley in 1847, he selected the site of the new temple, and carefully planned a city (see Salt Lake City). A legislature was elected and the "State of Deseret" organized. Brigham Young was chosen Governor in 1849 and applied to Congress for admission into the Union. The Territory of Utah was organized instead and Young was appointed Governor by President Fillmore and served until 1858, when there occurred the so-called Mormon War. Concerning this incident Prof. Theodore Smith in his book, *Parties and Slavery* (New York, 1906), says: "An attempt in 1857 to displace Young as Governor of Utah brought on, therefore, something very like an insurrection, for the Territory supported Young in refusing to submit. Federal judges and land officers were promptly expelled from the region, and bands of Danites committed outrages upon non-Mormon residents. . . . In the spring of 1858 he [Buchanan] issued a proclamation calling upon the Mormons to submit, sent a new governor, Cumming, over the mountains with a considerable military force, and was able to report to Congress that Young and the Mormons had ceased to resist." Prof. Levi Young of the University of Utah in giving the Mormon version of the war says: "In 1858 a United States army was sent to Utah to put down a supposed rebellion, but there were no hostilities and the soldiers were well received and made favorable reports concerning the people." In 1868 Brigham Young established a system of coöperative stores, which still controls a large part of the business of the State. In 1851 he organized a public-school system. In 1852 he declared polygamy to be a tenet of the Mormon church He died Aug. 29, 1877, and was reputed to have left $1,000,000 and 19 wives. He was the father of 57 children. See Mormons.

YOUNG, Charles Augustus (1834–1908). An American astronomer, born at Hanover,

N H He graduated at Dartmouth (1853), and till 1855 taught at Phillips Academy, Andover From 1857 to 1866 he was professor of natural philosophy and mathematics in the Western Reserve College, Ohio. In 1866 he was made professor of astronomy and natural philosophy in Dartmouth, and from 1877 to 1905 held a similar position at Princeton. In 1883 he held the presidency of the American Association for the Advancement of Science In observing the total eclipse of August, 1869, he made the first observation of the spectrum of the solar corona. He was also the discoverer of the 'reversing layer' in the solar atmosphere." (See SUN.) He also studied the prominences and chromosphere, the spectroscopic measurement of the sun's rotation, solar cyclones, and explosions. He was a member of Winlock's party of 1870, and observed the total eclipse at Jerez, Spain. He published *The Sun* (1881; rev. ed, 1895); *Textbook of General Astronomy* (1888; rev. ed., 1898); *Manual of Astronomy* (1902).

YOUNG, EDWARD (1683–1765). An English poet, born at Upham, in Hampshire, where his father was rector. He was educated at Winchester and at Oxford. He first came before the world as a poet with an *Epistle* to George Granville on Granville's being created a peer (1713). The next year this piece of fulsome flattery was followed by *The Last Day*, dedicated to the Queen; *Force of Religion*, with a dedication to the Countess of Salisbury; and an epistle on *The Late Queen's Death*. In 1719 Young tried his hand at a tragedy entitled *Busiris*, which was succeeded by *Revenge* (1721), long popular on the stage, and *The Brothers* (first produced in 1753). Perhaps it was for writing *The Instalment* (1726), on the occasion of Walpole's being invested with the Order of the Garter, that Young was granted a government pension of £200 a year. Between 1725 and 1728 appeared in succession a series of satires entitled *The Love of Fame, the Universal Passion*. Taking orders, Young became chaplain to the King (1728), and rector of Welwyn, in Hertfordshire (1730). In 1731 he married Lady Elizabeth Lee, who was a daughter of the second Earl of Lichfield, and died in 1741. Then followed the famous *Night Thoughts on Life, Death, and Immortality* (1742–45). Young passed his last years mostly in retirement, and died at the rectory of Welwyn.

Young's reputation rests almost wholly upon *Night Thoughts*. This series of poems contains passages of fine imagination in the midst of much religious gloom and religious sentimentality, and it coins many proverbial sayings, such as "Procrastination is the thief of time," that have passed into popular speech. The *Night Thoughts*, read by everybody, gave rise to a school of graveyard poets. Translated into French and German, the series was received with equal enthusiasm abroad. Besides his verse, Young wrote a remarkable essay entitled *Conjectures on Original Composition* (1759). Like the *Night Thoughts*, its influence on the Continent was notable, and especially in Germany. Young collected his works (4 vols., 1757). The poems, with a memoir by Herbert Croft, were included in Johnson's *Lives of the British Poets*, vol. iii, edited by J. B. Hill (Oxford, 1905). A folio edition of *Night Thoughts* (1797) was illustrated with designs by William Blake (q.v.). Consult: Young's *Poetical Works*, in Aldine edition, with a *Life* by J. Mitford (London, 1844; reprinted, 1864); and by G Gilfillan (Edinburgh, 1853); also the Riverside edition (Boston, 1906); the exhaustive study of his life and works by W. Thomas, under the title *Le poète Edward Young* (Paris, 1901); and H C Shelley, *Life and Letters of Edward Young* (New York, 1914). For his influence in France, consult Joseph Texte, *Cosmopolitisme littéraire* (Paris, 1895, Eng. trans. by J W Matthews, London, 1899). George Eliot wrote a famous essay on Young, entitled "Worldliness and Other Worldliness," in *Westminster Review* (London, 1857).

YOUNG, EDWARD (1831–96) An English explorer, born at Hastings. In 1862–64 he commanded the ship *Pioneer* to the Zambezi and the Shire rivers under Livingstone. In 1867 he commanded the Livingstone search expedition. He was commissioned by the Free Church of Scotland to conduct a mission to Lake Nyassa in 1875, and at this time discovered the Livingstone Mountains and established the Livingstonia settlement He wrote: *The Search After Livingstone*, a journal revised by Rev. Horace Waller (1868), and *Nyassa, a Journal of Adventures while Exploring Lake Nyassa, Central Africa, and Establishing the Settlement of Livingstonia* (1878).

YOUNG, ELLA FLAGG (1845–). An American educator, born at Buffalo, and educated at the Chicago Normal School and at the University of Chicago (Ph.D., 1900) She was married to William Young in 1868. Beginning her teaching career in 1862, she became district superintendent of schools in Chicago in 1887; professor of education in the University of Chicago 1899, where she took the degree of Ph.D. the next year; principal of the Chicago Normal School in 1905; and was superintendent of schools of Chicago from 1909 until her resignation in 1915. She took an active part in the work of educational associations, and in 1910–11 was the first woman president of the National Education Association. Mrs. Young also identified herself prominently with the woman's suffrage movement The University of Illinois conferred on her the degree of LL D. She published many educational works, including: *Isolation in the School* (1901); *Ethics in the School* (1902); *Some Types of Modern Educational Theory* (1902); and from 1906 to 1909 she was editor of the *Educational Bi-Monthly*. See biography by John T. McManis (Chicago, 1916)

YOUNG, SIR GEORGE (1837–). An English publicist and author, born at Cookham, and educated at Eton and at Trinity College, Cambridge. As third Baronet, he succeeded his father in 1848. He served on the royal commission on the coolie immigration in British Guiana in 1870, was secretary of the Factory and Workshops Acts Commission in 1875, and of the Irish Land Acts Commission in 1881, and Chief Charity Commissioner in 1903–06. His publications include: *Essay on Greek Literature in England* (1862), for which he received the Le Bas prize; *Dramas of Sophocles Rendered in English Verse, Dramatic and Lyric* (1888; 2d ed., 1906); *Cookham Church: A Village Lecture* (1901); *Poems from Victor Hugo* (1902).

YOUNG, GEORGE PAXTON (1818–89). A Canadian educator. He was born at Berwick-upon-Tweed, Scotland, and was educated at the University of Edinburgh He became a minister of the Free Church of Scotland, came to

Canada in 1847, and in 1850–53 was pastor of Knox Church, Hamilton. In 1853 he was appointed professor at Knox College In 1864 he was appointed inspector of grammar schools for Ontario, and during his term of office reorganized the grammar schools of that province He was professor of metaphysics and ethics in University College, Toronto, in 1871–89, and was considered one of the ablest teachers and professors that Canada ever had. His earlier works include: *Miscellaneous Discourses and Expositions of Scripture* (1854), and *The Philosophical Principles of Natural Religion* (1862). He also contributed to mathematical and philosophical periodicals. Consult J. C. Dent, *Canadian Portrait Gallery* (Toronto, 1880).

YOUNG, JAMES (1811–83). A Scottish chemist, born at Glasgow. He was for several years assistant to Thomas Graham About 1847 he began a series of analyses of petroleum, and succeeded in producing a lubricating oil for machinery and a lighter oil for lamps. He afterward took out a patent for a process of slow destructive distillation of coal, paraffin being among the useful products obtained, and thus founded a new and important industry. (See PARAFFIN.) His discoveries showed the value of coal oil and petroleum, and have contributed greatly to the development of the American petroleum industry. In 1872 he fitted out an expedition in search of Dr. Livingstone.

YOUNG, JAMES (1835–1913). A Canadian author and legislator, born at Galt, Ontario. In 1853–63 he was editor of the Dumfries *Reformer*, and later was an editorial contributor to the Montreal *Trade Review*, the *Monetary Times* (Toronto), and the *Globe*. While Liberal member for South Waterloo in the Dominion House of Commons in 1867–78, he procured the enactment of much useful legislation. He was a Liberal member of the Ontario Legislature in 1879–86, and in 1883 was provincial treasurer in the administration of Sir Oliver Mowat (q.v.). Young, with Joseph Howe and Isaac Buchanan (qq.v.), was a delegate to the Detroit Trade Convention in 1866, and later wrote able pamphlets on financial and political questions, emphasizing Canadian nationality. His publications include: *Reminiscences of the Early History of Galt* (1880); *Our National Future* (1887); and *Public Men and Public Life in Canada* (2 vols, 1902), chiefly a history of the Canadian Confederation.

YOUNG, JESSE BOWMAN (1844–1914). An American Methodist Episcopal clergyman and editor, born at Berwick, Pa. He graduated at Dickinson College in 1868. During the Civil War he served for three years as captain of the Eighty-fourth Pennsylvania Volunteers. He entered the ministry in 1868, joining the Central Pennsylvania Conference of his church. From 1892 to 1900 he was the editor of the *Central Christian Advocate* of St. Louis, and he published: *What a Boy Saw in the Army* (1894); *Helps for the Quiet Hour* (1900); *The Hungry Christ, and Other Sermons* (1904); *Wellsprings in the Desert* (1905); *To-Day: An Age of Opportunity* (1909); *Charms of the Bible* (1910); *The Battle of Gettysburg* (1913).

YOUNG, SIR JOHN (1807–76). A British administrator, born at Bombay, India. He was educated at Eton and at Corpus Christi College, Oxford, where he graduated in 1829. From 1831 to 1855 he was a moderate Tory member of Parliament. He became a Lord of the Treasury in 1841, was Chief Secretary for Ireland from 1852 to 1855, and was Lord High Commissioner of the Ionian Islands from 1855 to 1859, when he was recalled. From 1861 to 1867 he was Governor-General of New South Wales. In 1869 he was appointed Governor-General of Canada and Governor of Prince Edward Island which province had not then entered the Canadian Confederation. When he arrived in Canada the first rebellion headed by Louis Riel (q.v.) was in progress, and after its suppression in 1870, Young was created Baron Lisgar. He returned to Europe in 1872 and spent the rest of his life in retirement.

YOUNG, JOHN RUSSELL (1841–99). An American journalist and diplomat, born in Downington, Pa. He was educated in the public schools of Philadelphia and New Orleans. He became news editor of the Philadelphia *Press* in 1861, when as private secretary he went to Washington with Forney, the owner of the paper, who had been elected secretary of the Senate Subsequently until after the battle of Williamsburg he was with the Army of the Potomac as a war correspondent. In 1864 he accompanied General Banks on his Red River expedition. After the war he was managing editor of the New York *Tribune* (1866–69); in 1870 founded the New York *Standard*, to which he contributed letters from Paris during the Franco-German War; and in 1872 became special foreign correspondent for the New York *Herald*. In 1877 he accompanied ex-President Grant on his trip around the world, an account of which he published under the title *Around the World with General Grant* (1879). He was then a member of the *Herald* editorial staff until 1882 and was United States Minister to China from 1882 to 1885. He continued in literary and journalistic work until 1897, when he was appointed by President McKinley librarian of the new Congressional Library at Washington. He edited a *Memorial History of Philadelphia* (1895), and was a frequent contributor to magazines and reviews.

YOUNG, LUCIEN (1852–1912). An American naval officer, born at Lexington, Ky. He graduated from the United States Naval Academy in 1873. On various occasions he distinguished himself by the rescue of persons from drowning and in saving part of the crew of the wrecked *Huron*. For a time he taught in the Naval War College, and later was in the Bureau of Equipment, was commander of the port of Havana (1899–1900) and then commandant of the United States naval station at Havana. Young had command of the *Bennington* when its boilers exploded off San Diego, Cal., in 1905, and for this accident was court-martialed, but was vindicated. He was also in command of the Mare Island Navy Yard at the time of the San Francisco earthquake and fire, and did much relief work. Later he was transferred to Key West, and in 1910 was promoted to rear admiral. Young published: *Simple Elements of Navigation* (1898; 2d ed., 1898); *The Real Hawaii* (1899).

YOUNG, ROBERT (1822–88). A Scottish biblical scholar, born in Edinburgh. He was superintendent of the Mission Press at Surat from 1856 to 1861, and in 1864–74 was in charge of the Missionary Institute at Edinburgh. His works include: *The Book of the Precepts by Rabbi Moses*, translated with a *Life* of the author (1852); *Bible Commentary* (1870)

Analytical Concordance to the Bible (1879); *Two-Fold Concordance to the Greek New Testament* (1881), and *Grammatical Analysis of the Hebrew, Chaldee, and Greek Scriptures* (1885).

YOUNG, SAMUEL BALDWIN MARKS (1840–1924). An American soldier, born in Pittsburgh, Pa. He served throughout the Civil War, rising from private to brevet brigadier general of volunteers, which rank he received for services in the last campaign against General Lee. In 1866, he entered the regular army. He attained the rank of colonel in 1897, and in 1898 that of brigadier general of volunteers. Later in 1898, after serving with marked ability under General Shafter in the early part of the Santiago campaign, he was promoted major general of volunteers and for a time commanded the Second Army Corps. From July, 1899, to March, 1901, he served with distinction in the Philippines, where for a short time he was military governor of northwestern Luzon and commander of the first district of the Department of northern Luzon. He became brigadier general in the regular army in 1900 and major general in 1901. After his return from the Philippines he commanded the Department of California and helped to organize the new War College, and in 1903, on the retirement of General Miles, he was promoted lieutenant general. From August, 1903, till his retirement the next year, General Young was first chief of staff of the army. In 1909–10 he served as governor of the United States Soldiers' Home at Washington.

YOUNG, THOMAS (1773–1829). A British scientist and archæologist. He was born June 13, 1773, at Milverton, Somersetshire, of Quaker parents. He studied in London, Edinburgh, Gottingen (M.D., 1796), and Cambridge, and in 1799 began to practice medicine in London.

In 1801–03 he was professor of natural philosophy in the Royal Institution, then newly established. Elected a fellow of the Royal Society in 1794, he was its foreign secretary from 1802 till his death. Young was elected one of the physicians of St. George's Hospital in 1811. He published several medical works, of which the most important were *Medical Literature* (1813; 2d ed., 1823) and *Practical and Historical Essay on Consumptive Diseases* (1815). He retired from practice in 1814 on his appointment as inspector of calculations in the Palladium Insurance Company. He served in 1814 also on a commission appointed to investigate the dangers involved in the introduction of illuminating gas in London, and in 1816 he was appointed a member of a commission which was to determine the length of the seconds pendulum, and which also determined the Imperial gallon of 10 pounds of water. In 1818 Young became secretary of the Board of Longitude and superintendent of the *Nautical Almanac*, in which capacity he served until the dissolution of the board in 1828, when he became the sole conductor of the *Nautical Almanac*. During the last years of his life he was a member of a council appointed to advise the Admiralty in scientific matters. Young was the first to describe and measure astigmatism, as well as to study the optical constants of the eye, and explained color sensation by the theory that the eye contained three sets of nerves or receptive systems located at the retina and corresponding to red, green, and violet, and that color blindness was the result of a deficiency of one or the other of these systems. ("On the Mechanism of the Eye," in the *Philosophical Transactions*, 1801.) Young is often called the founder of physiological optics, and his theory was adopted and amplified by Helmholtz with the result that at present it is generally accepted. His most famous work in optics was his demonstration of the wave theory, which since the time of Huygens (1690) had made but slight progress. This was accomplished by his discovery of the interference of light (see INTERFERENCE, LIGHT, *Interference and Diffraction*), which served to explain the color of thin and thick plates and various other phenomena. (See his paper "On the Theory of Light and Colors," *Philosophical Transactions*, 1801.) Many of the phenomena of polarized light were also discussed by Young, and to him are to be credited many discoveries later developed by other physicists. Young first used the terms "energy" and "labor expended" (equals "work done"), as they are now understood in physics. The expression known as Young's modulus represents the use of absolute measurements in elasticity and denotes the weight which would stretch a rod or wire of unit cross section to double its length. His explanation of capillary phenomena was the first correct one ("Essay on Cohesion of Fluids," *Philosophical Transactions*, 1804.) His lectures before the Royal Institution were published in 1807 (2 vols.).

Young also conducted researches in Egyptology (q.v.), assisted greatly in the translation of the demotic text of the Rosetta stone (q.v.), and published an *Account of Some Recent Discoveries in Hieroglyphical Literature and Egyptian Antiquities* (1823). He was at work on an Egyptian dictionary when he died, May 10, 1829. Consult: George Peacock, *A Life of Young* (London, 1855); *Miscellaneous Works of Young*, edited by Peacock and Leitch (ib., 1857); Henry Crew, *The Wave Theory of Light* (New York, 1900).

YOUNG, SIR WILLIAM (1799–1887). A Canadian jurist and administrator. He was born in Falkirk, Scotland, and was educated at Glasgow University. In early life he removed to Nova Scotia, where he was called to the bar in 1826, and in 1832 was elected to the Legislative Assembly. In 1838 he went to Quebec as a delegate to inform Lord Durham (q.v.) as to the political condition of Nova Scotia, and shortly afterward was sent to England to urge the British government to grant responsible government to the province, a course later followed. In 1842 he was a member of the Executive Council, Speaker of the Assembly in 1843–54, Premier in 1854–57 and again in 1860, and Chief Justice of Nova Scotia in 1860–81. He was knighted in 1868.

YOUNG, WILLIAM HENRY (1863–). An English mathematician. Born in London, he was educated at Peterhouse, Cambridge, where he was a fellow in 1886–92. After 1887 he lectured at Girton College, was chief examiner to the Central Welsh Board in 1902–05, and in 1913 became professor of the philosophy and history of mathematics at Liverpool University. He was elected a fellow of the Royal Society. Besides more than 120 mathematical papers, he published *The Fundamental Theorems of the Differential Calculus* (1910).

His wife, GRACE CHISHOLM YOUNG, a sister of Hugh Chisholm (q.v.), studied at Girton College, Cambridge, and at Göttingen (1893–95), where she took the degree of Ph.D., *magna cum laude*,

being the first woman allowed a degree in Prussia. With her husband she was joint author of *The First Book of Geometry* (1905; Ger trans., 1908; Ital trans., 1910), and *The Theory of Sets of Points* (1906).

YOUNG CHEVALIER, THE. A title given to Charles Edward Stuart, son of the Old Pretender.

YOUNG ENGLAND. A faction of the Conservative party which had its rise about the year 1843 under the leadership of Disraeli and Lord John Manners. It sought to combat the rise of militant democracy by bringing about a closer connection between the upper classes and the people in the spirit largely of the mediæval feudalism, adapting itself to modern industrial conditions The party disappeared in 1845. Disraeli has delineated the character of the movement in his novels *Sybil* and *Coningsby*.

YOUNG EUROPE. An international association formed in 1834 on the model of Mazzini's Young Italy (q.v.). It was composed of the national societies of Young Italy, Young Poland, and Young Germany, which, independent in their own sphere, acted in common, through a central committee, for the furthering of the principles of liberty, equality, and humanity in Europe. The headquarters of the society were in Switzerland, where, in 1835–36, was brought about the organization of a French society, Young France. The activity of the society speedily aroused the opposition of the Swiss authorities, who expelled many of its members from the country. Its influence quickly disappeared.

YOUNG GERMANY. The name given to a group of German writers, of whom Heine (q.v.) was the most famous, which in the third decade of the nineteenth century initiated a revolt against the prevailing spirit of romanticism in the national literature, which had resulted in a total separation of literature from the actualities of life. Against the dominant spirit of absolutism in politics and obscurantism in religion the writers of this school maintained the principles of democracy, socialism, and rationalism. Among many things they advocated the separation of church and state, the emancipation of the Jews, and the raising of the political and social position of women. In 1835 the Federal Diet issued a decree forbidding the publication of the works of Heine, Gutzkow, Laube, Mundt, and Wienbarg (qq.v.).

YOUNG IRELAND. A party which had its rise during the agitation for the repeal of the Act of Union carried on by O'Connell (q.v.) after 1841, and differing from that great leader in their advocacy of forcible means for the attainment of their demands. The break between the Young Ireland party and the conservative section became definite about the year 1844. Those who took a prominent part in the movement were Thomas Osborne Davis (q.v.), Gavan Duffy (q.v.), John Mitchel, Thomas Francis Meagher (q.v.), John Blake Dillon, and William Smith O'Brien (q.v.). In the *Nation*, the organ of the party, the people of Ireland were repeatedly called upon to revolt, and in the stormy year 1848 the British government grew alarmed. Mitchel was arrested and deported to Tasmania, whereupon the other leaders of the Young Irelanders set to work with renewed activity to bring about an uprising. The attempted insurrection, however, failed miserably, and the leaders were all speedily arrested. Meagher and O'Brien were sentenced to death, but the sentence was commuted to transportation The movement therewith quickly collapsed See IRELAND

YOUNG ITALY. A society organized by Mazzini (q v.) in 1831 for the purpose of effecting the liberation of the Italian peninsula from Austrian domination and its union under a republican form of government As distinguished from the Carbonari (q.v.), the new society sought to attain its aims by a campaign of agitation and open insurrection rather than by conspiracy It first became openly active in the beginning of 1834, when occurred the abortive invasion of Savoy by Mazzini. Before this, however, the Sardinian government had obtained full cognizance of the movement through its spies and had entered upon a course of severe repression, a number of the leaders being put to death and others being subjected to imprisonment and exile. The impracticable character of Mazzini made it evident that a successful revolution was impossible, and the society rapidly declined in influence, its place being taken by the more conservative national movement of which the Sardinian monarch was coming to assume the leadership. The society, nevertheless, did great good in quickening the spirit of Italian patriotism, and to a very large extent made the work of Victor Emmanuel and Cavour possible. It was the model for a number of revolutionary societies throughout Europe in the stormy period preceding the upheaval of 1848. See ITALY: YOUNG EUROPE.

YOUNG MEN'S CHRISTIAN ASSOCIATIONS. Societies of young men composed of an active controlling membership identified with evangelical churches and of a more numerous associate membership not yet connected with the churches. They seek to promote the physical, social, mental, and spiritual welfare of their members and of other young men.

North America. The associations in the United States and Canada have been always affiliated, and in 1902 a promising organization was added in Mexico.

The first associations on the continent were organized in December, 1851, at Montreal and Boston, both as a result of information received regarding the society organized seven years earlier in London, England. Forty more were formed within three years. Their first international convention was held at Buffalo, N. Y., June 7, 1854. A confederation was formed, with a central committee and an annual convention, which lasted until the Civil War. The war greatly diminished the membership, and the organizations that survived worked chiefly among soldiers in the field. At a special convention of the northern associations, held in New York, November, 1861, the United States Christian Commission was formed. It received the practical sympathy of the Christian public, sent 5000 helpers to camps and hospitals, and distributed over $5,000,000 in money and stores. The associations in the South did similar army work, but not in a general organized capacity.

After the war the association entered upon a period of growth. Leading business men consented to serve in official positions. Employed officers increased in number and much more in experience and efficiency. Carefully planned buildings were erected, the indebtedness on earlier buildings was canceled, and great improvement in equipment was realized. But the chief gain came in the steady advance, through accumulated experience, of all standards of work.

In addition to the data in the following table showing the growth of the work, there were in 1915 associations for colored men in 45 cities and in 102 educational institutions; there were 78 organized counties employing over 100 secretaries, there were 84 Indian associations with 2745 members, the army and navy department reported 30 branches

NORTH AMERICA	1866	1886	1915
Total number of associations	90	1,176	2,583
Total membership	15,518	154,921	620,799
Number of railroad associations	None	70	250
Membership	.	10,900	76,700
Number of student associations	1	258	770
Membership	117	12,760	75,091
Employed officers	12	664	4,416
Buildings	None	116	759
Value of buildings		$4,822,980	$77,483,000
Current expenses of associations	$50,000	$957,023	$12,924,700
Associations reporting gymnasia	None	168	707
Associations reporting educational classes	4	282	480
Number of students	60	6,000	83,771
Associations reporting Bible classes	13	430	1,551
Associations reporting boys' work	2	158	822
International secretaries employed	None	14	94
Current expenses, international work	$522	$37,848	$787,141
Members State and provincial committees	None	540	910
State and provincial secretaries employed	None	35	152
Current expenses, State and provincial work		$38,959	$437,018

Work of Each Association. The local association has absolute autonomy, except that to affiliate with the international convention there must be constitutional provision restricting active (voting and office-bearing) membership to men in communion with some evangelical church. A typical association may be thus described: (1) Membership—(*a*) active, who carry most of the responsibility; (*b*) associate, young men of good moral character. (2) An incorporated board of directors, the usual officers, and numerous committees Real estate is generally held by a board of trustees. (3) As executive officer a salaried secretary, whose chief responsibility is to supervise, organize, and administer. (4) A specially constructed building with reception room, offices, reading room, library, meeting and recreation rooms, educational classrooms, and quarters for boys' department. Modern buildings usually contain dormitories and gymnasia for young men, which produce revenue and contribute towards the social life, especially when a restaurant is added (5) Organized departments (*a*) business—general supervision, membership; (*b*) religious—Bible and workers' training classes, evangelistic and devotional meetings, work in behalf of personal purity, and a specially emphasized personal work; (*c*) educational—evening classes, literary societies, and lectures; (*d*) physical—gymnasium and athletic field, with instructors qualified to make physical examinations and prescribe and direct safe and beneficial use of these facilities; (*e*) social—a pleasant resort with companionable supervision, music, recreative games, social gatherings, and entertainments; (*f*) information and relief—employment bureau, boarding-house register, savings fund, medical club, visitation of the sick, (*g*) a work along all these lines for boys During recent years the associations have undertaken more and more effort outside their buildings and among nonmembers Leaders, imbued with clean-sport principles, have been furnished for physical work in factories, settlements, missions, boys' clubs, and public schools and playgrounds, as well as for Sunday-school athletic leagues and civic athletic contests. Religious meetings and Bible classes have multiplied in shops, cabooses, street-car barns, and homes These various endeavors have been so conducted as to promote healthy social intercourse and good citizenship. Its work is carried on under two main divisions: home and foreign. Through an important change in 1915 Mr. John R. Mott was made general secretary of both divisions. The home work division employed 77 secretaries in 1915 in the following departments district executive, army and navy, *Association Men* (the official organ published monthly), boys' work, building bureau, Canal Zone, colored men's, county work, educational, industrial, physical, publication, railroad, religious work, secretarial bureau and fellowship, and student. A new department for city associations was formed in 1916.

General Work. The North American conventions are triennial. Each convention elects one-third of the 75 members of its Executive or International Committee, who reside in different parts of the continent. It is incorporated, and its headquarters and working quorum have been located in New York since 1866. The fund needed having been pledged, the committee erected (1907) a building as its permanent home at 124 East Twenty-eighth Street, New York Its permanent funds are held by a board of 14 trustees; the endowment in 1915 was $1,384,000. State and provincial organizations, 41 secretaries and 103 assistant secretaries in 1915, exercise a closer and more immediate supervision, each over its own field. Forty-one State and provincial conventions are held either annually or biennially.

Physical Work. The first well-equipped gymnasium was opened in New York in 1869, and the first physical director was employed in it. There are now 654 physical directors and several hundred thousand men and boys using the various means of physical training. The aid of 10,400 trained volunteer leaders makes possible the handling of this multitude. Some associations have well-equipped athletic grounds and many more have summer camps for both boys and young men.

The Athletic League of the Young Men's Christian Associations of North America and a similar league in Canada are the media for coöperation between associations that desire it in the holding of games, the establishment of athletic records, and in lines of scientific work. Associations in all the larger cities and more than 100 in smaller cities are members of these leagues.

Educational Work. This department includes the work of the reading room, library, educational lectures and practical talks, educational clubs, and classes in commercial, political, industrial, scientific, and linguistic subjects. Courses in these subjects, on which annual examinations are held and certificates granted, are suggested by the International Committee. In 1915 there were employed 2500 paid teachers

and $1,034,000 were spent in educational work. *Educational Notes* is published monthly.

Religious Work. Frequent references show the dominating religious purpose of all the work. The committee has promoted this through the influence and efforts of all its agents; through printed suggestions, especially of Bible study courses; and, since 1899, through the employment of several secretaries for special religious work.

Securing and Training Employed Officers. In 1871 was held the first of a series of annual secretarial conferences. This has been followed by the association training schools, which were organized as independent institutions at Springfield, Mass., in 1885, and at Chicago in 1890. Their courses of study include the history, organization, and methods of the entire work, Christian history, physiology, athletics, psychology, sociology, the study and teaching of the English Bible, and opportunity for participation in practical association work. The corporation controlling the Chicago school also conducts an extensive summer training conference on its grounds at Lake Geneva, Wis. School and conference training were begun at Silver Bay, N. Y., in 1901; at Lake Conchiching, Ontario, in 1906; at Estes Park, Colo., in 1910, at Blue Ridge, N. C., in 1912; at Arundel, Md., in 1912 (but transferred to Harper's Ferry in 1915); at Hollister, Mo., for railroad secretaries in 1906, and at Asilomar, Cal., in 1913.

Boys' Work. The first separate boys' department was organized at Salem, Mass., in 1869. The New York State committee employed the first boys' work supervisory secretary in 1897, and the International Committee secured a similar officer in 1900, it had five such in 1915. Commonly each class of boys—school boys, working boys, and street boys—can receive the most benefit by itself, and the largest possibilities are in the order just given. Accommodation is provided by some associations for a membership of more than 1000 boys. Community boys' work consisting of physical, educational, social, and religious centres was organized in 1915 in 22 places in Canada and the United States.

Work Among Railroad Men. The first association organization for definite work of this kind originated at Cleveland, Ohio, in 1872, although the International Committee had made evangelistic efforts among the men engaged in building the Union Pacific Railroad, beginning in 1868. Delegations from Cleveland started 18 other associations during the next five years. In 1877 the International Committee secured its first railroad secretary, there were eight in 1915. In 1915 there were 234 secretaries and 272 assistant secretaries besides 51 membership, religious work, social, and boys' secretaries and physical directors of railroad associations. In 1915 the 250 organizations expended $1,602,470. Of this amount the employees and others paid more than half, chiefly in membership fees. The remainder, together with large sums for buildings and equipment, was contributed voluntarily by the railroad corporations. The early railroad branches opened reading rooms and held religious meetings. Now every form of work done by city associations is carried on, while dormitories and restaurants, first made prominent in the railroad work, have spread from it to the city work. Emergency hospitals are sometimes maintained and many visits made to the sick and injured. Membership tickets are reciprocal. Several organizations have been formed recently among street-railway employees. Several European governments have investigated this work, with a view to starting it in their own countries.

Work Among Industrial Men. The methods and spirit of the railroad associations are also being extended to other large bodies of employed men and their employers. Numerous manufacturing, mining, and lumbering corporations have aided in establishing similar work among their men, sometimes in expensive buildings erected for the purpose. Eight international secretaries are engaged in this field of effort. Moreover, city and railroad associations hold midday meetings in shops and factories. In 1915 over 300 associations reported religious meetings in 768 different shops with total attendance of 1,772,000.

Work Among Students. The first student associations were organized in the University of Michigan and the University of Virginia in 1858. In 1877 the 30 scattered societies became united in an Intercollegiate Movement, for which a secretary was secured by the International Committee. There are now 16 international student secretaries and a total of 770 student associations with a total membership of over 75,000. A body of literature has been created, and *The Intercollegian* is published monthly. In large cities the students of various institutions are affiliated through an intercollegiate organization, which is a department of the city association, and through this much important work is carried on. As a result of this work over 38,000 students in 1915 were enlisted in private and voluntary Bible study, and a strong impetus has been given to the study of the Bible in the curriculum. With the aid of the Student Volunteer Movement for Foreign Missions, which is an outgrowth of the student associations, mission study classes have been formed with an enrollment in 1915 of 8500. Moreover nearly 9000 students were directed in community service. Summer conferences for the study of the Bible, and for the promotion of the religious life of students, commencing in 1886, have spread from Northfield to all sections of the United States, and to so many other lands that in 1895 these societies were federated by organization under American leadership into the World's Student Christian Federation.

Work in the Army and Navy. About 1880 some State and provincial committees established association tents in summer militia encampments. This effort is still growing in extent and usefulness. Three days after the first call for volunteers for the Spanish-American War, the International Committee decided to undertake a similar work in the regular army and navy. Under government authorization facilities for the comfort and welfare of the soldiers were maintained by international, State, and local committees in the United States, Cuba, Porto Rico and the Philippines. In charge of the work 223 trained secretaries were employed. Similar work was carried on from Key West for sailors. At the close of the war, the President and other officials requesting the continuance of this work, the International Committee began to form associations wherever the number of soldiers or sailors warranted. The first army association building, dedicated in 1900, was the gift of Mr William E. Dodge to the New York City association for the work on Governor's

Island. Several other buildings have since been erected. Army work is now carried on at 20 points in the United States and its dependencies, together with much visitation of outlying camps. This work has had the cordial support of the government.

In the navy (1) associations in coast cities have extended their privileges to sailors. (2) Branches of the naval associations have been formed on warships. A Naval Temperance League has been organized. (3) A house fitted up in 1899 near the New York Navy Yard as a resort for enlisted men was superseded in 1902 by a seven-story building, 75 by 100 feet in size, and costing $415,000. It was the gift of Miss Helen Miller Gould through the Woman's Auxiliary of the International Committee. (4) Similar work, both for sailors and soldiers, is done in the Philippines and at Shanghai, China.

Work Among Negro and Indian Young Men. A few scattered associations of colored young men were formed prior to 1875, but systematic effort among them began at the international convention of that year, and a visiting secretary was put in this field soon after. Six competent colored men are now fully engaged in this work. Unlike the other departments, it has had the great advantage of a beginning among the student class. Student associations are now organized in 102 educational institutions, including nearly every important school for colored young men in the South. The first fully organized city association, with a general secretary, was started in Norfolk, Va., in 1888. There were 45 in 1915.

Christian young men of the Sioux tribe spontaneously formed what were practically Young Men's Christian Associations as early as 1881. Since 1894 the International Committee has employed one of their own number, specially trained for the service, to develop this work among the Indians. Under this guidance there were, in 1915, 84 associations with 2745 members.

Work in the Panama Canal Zone. One international secretary and nine local secretaries are in charge of association activities at six centres in the Canal Zone. The government has furnished several buildings and the Canal Commission appoints an advisory committee.

Publications. Reports of all international conventions and of most of the State conventions have been printed, and constitute the detailed history of the movement, in connection with the Year Books issued by the International Committee. Hundreds of books and pamphlets have been issued.

County Work. This department employed 5 international, 14 State, and 94 county secretaries in 1915. Work was organized in 563 communities, and departments for training county secretaries had been opened at Springfield and Chicago.

Foreign Work. The International Committee sent its first foreign secretary to Japan in 1889. For several years previously urgent united appeals had come from many foreign missionaries for this aid, and in no case has a step been taken without such requests. The committee in 1915 had 175 secretaries in foreign lands; of these 73 were in China, 44 in India, and the remainder in Argentina, Brazil, Ceylon, Chile, Egypt, Japan, Mexico, Philippine Islands, Turkey, Uruguay, and West Indies. Their function is to train and develop native workers as rapidly as possible. Apart from the salaries of these secretaries, which involved an expenditure in 1914 of $433,000, the work in each locality is self-supporting. During the war with

COUNTRY	Number of associations	Number of members	Number of paid officers	Buildings owned and occupied	Values of buildings and grounds
Argentina	3	900	6	1	$101,000
Bermuda	1	66	..	1	3,000
Brazil	4	2,091	15	1	60,000
Chile	1	90	1	..	.....
Guiana	3	100	..	..	.....
Mexico	3	1,371	10	1	212,000
United States and Canada	2,357	625,598	4,103	788	74,370,533
Uruguay	1	270	2	..	.....
West Indies	5	1,000	13	5	225,000
Austria	120	3,000	3	1	84,000
Belgium	34	1,198	1	2	.....
Bulgaria	13	371	1	..	.....
Denmark	330	20,281	24	24	500,000
England, Ireland, and Wales	801	110,927	146	166	5,727,565
Finland	134	5,123	8	12	300,000
France	160	6,351	22	91	301,800
Germany	2,510	147,372	248	178	2,460,000
Holland	500	12,000	6	47	.....
Hungary	32	1,000	2	..	.....
Iceland	3	800	1	1	8,000
Italy	20	600	2	4	50,000
Norway	565	18,401	20	113	500,790
Portugal	19	765	2	1	40,000
Rumania	1	42	..	..	.....
Russia	10	1,543	2	1	62,200
Servia	1	25	..	..	.....
Scotland	193	23,265	8	52	828,000
Spain	7	150	..	..	.....
Sweden	122	11,289	21	15	743,740
Switzerland	467	14,010	14	17	922,000
Turkey in Europe and in Asia	45	2,684	8	1	7,000
China	134	15,176	170	13	547,000
India, Ceylon, Burma	161	11,930	61	23	580,000
Japan and Korea	90	10,581	34	31	385,000
North, West, and Central Africa	25	500	2	1	.....
South Africa	8	3,780	12	4	473,500
Australia and New Zealand	22	11,422	40	13	824,000
Totals	8,906	1,066,765	5,008	1,608	$90,385,728

Russia association work was done successfully in the Japanese army, Japanese and American secretaries and many missionaries participating Expensive buildings have been erected in many foreign centres, notably Tientsin, Shanghai, Manila, Kyoto, Seoul, Constantinople, Hongkong, Canton, Tokyo, and Calcutta.

The London association was formed June 6, 1844, as the result of religious effort among dry-goods clerks, by George Williams, then one of their number. From London as a centre associations were propagated throughout the United Kingdom and many other countries The first of a series of annual British conferences was held in 1858, and the first association building was erected in 1866. A National Union for England and Wales was formed in 1882, and for Ireland in 1884 The Scottish general organization was formed in 1884

The leading facts regarding the associations of the world in 1914 are given in the table on page 895.

Between 1806 and 1841 a number of Christliche Junglingsvereine came into existence in Germany. They were small bands of young men for mutual encouragement in the Christian life, and were usually connected with an individual church. Many others have since been formed, and all have come in affiliation with the more recently organized World's Committee. In 1883 a new and broader form of organization, Christliche Vereine Junger Männer, resembling the American associations, was started in Berlin. This has since spread to other cities, and its methods have been adopted by many of the older societies. Associations were organized in France about 1850. The first world's conference, meeting in Paris in 1855, and notable for formulating a basis since universally adopted, gave impetus to the French societies. The present national alliance was formed in 1867. In 1893 the Paris Association entered its new building, adapted to the advanced methods of work, and in 1902 held an enthusiastic celebration of the jubilee of its organization. The Swiss associations form two independent unions, the German and the French. The existing movement in Sweden began with the organization of the Stockholm Association in 1884, after the model of those at Paris and Berlin. Various European associations do special work for soldiers and many have boys' branches.

World's Conference and Committee. Eighteen world's conferences have met in leading European cities. At the eighth conference (Geneva, Switzerland, 1878), a Central International Committee was established, composed of representatives from the affiliating national organizations, and with a quorum resident in Geneva. This World's Committee includes an executive committee of 18 members, 31 advisory members representing and resident in 24 different countries, and corresponding members for Bohemia, Moravia, Ceylon, Iceland, and Turkey. The thirteenth conference was held in London in June, 1894, coincidently with the fiftieth anniversary of the London association. Twenty-six nationalities were represented by 2000 delegates. The sixteenth conference, which met at Paris in 1905, commemorating the fiftieth anniversary of the first conference also held there, was one of the most notable Protestant gatherings ever held in that city. The basis of 1855 was reaffirmed. A conference met in Edinburgh in 1913; there were 556 delegates.

Bibliography. *Handbook of the History, Organization, and Methods of Work of the Young Men's Christian Associations* (New York, 1892); Shipton, *Fifty Years' Work Amongst Young Men in All Lands* (London, 1895), *Report of the 13th Triennial International Conference and Jubilee Celebration* (ib, 1895); Doggett, *History of the Young Men's Christian Association*, vol. i (New York, 1896); *Jubilee of Work for Young Men in North America* (ib, 1901), Morse, *Fifty Years of Federation* (ib., 1905); Hodge, *Association Educational Work* (ib., 1912); *Year Book of the Young Men's Christian Associations of North America* (ib); *Annual Survey* prepared by The Religious Work Department (ib.); *British Young Men's Christian Association Year Book* (London).

YOUNG'S THEORY AND EXPERIMENTS. See LIGHT.

YOUNGSTOWN. A city and the county seat of Mahoning Co, Ohio, 67 miles east by south of Cleveland, and about the same distance from Pittsburgh, Pa, on the New York Central, the Erie, the Baltimore and Ohio, the Pennsylvania, the Lake Erie and Eastern, and the Pittsburgh and Lake Erie railroads (Map: Ohio, J 3). It has excellent interurban trolley connection with surrounding cities, and is situated attractively on both banks of the Mahoning River. Among the most prominent institutions are the Children's Home, the Old Ladies' Home, the Y. M. C. A. and Y. W. C. A., and city and St. Elizabeth's hospitals The park system comprises 656 acres, the most important of the seven reserves being Mill Creek, a park of great natural beauty. Noteworthy structures include the Reuben McMillan Free Library, the handsome county court house, the Federal building, Market Street viaduct, and the Wick, Mahoning, Stambaugh, and Dollar bank buildings Youngstown has considerable importance as an industrial city, being noted chiefly as the centre of a vast iron and steel producing district. According to the census of 1914, the city's 201 manufacturing establishments represented a capital of $129,819,000, gave employment to 18,220 persons, and showed a production value of $92,111,000 Chief among the establishments are enormous iron and steel works, and large sheet and tube works. Others include lumber and planing mills, carriage and wagon works, and manufactories of roofing material, iron and steel pipe, oil cloth, bridges, etc. A rolling mill was erected here in 1845, and a furnace in 1846. The government is vested in a mayor, chosen biennially, and a council. For maintenance and operation the city spent in 1913, $1,166,000, the principal items of expenditure being: education, $407,000; interest on the debt, $133,000; police department, $118,000; fire department, $98,000; water works, $96,500; sanitation, $76,000; and highways, $75,000. In 1797 John Young made the first settlement here, and in the following year obtained a title to the land from the Connecticut Land Company. Pop., 1900, 44,885; 1910, 79,066; 1915 (U. S. est.), 104,489; 1920, 132,358.

YOUNG TURK MOVEMENT. See TURKEY, *History*.

YOUNG WOMEN'S CHRISTIAN ASSOCIATION. An international organization for the improvement of the religious, intellectual, social, and physical life of young women. The movement dates from 1855, when Miss Emma Robarts formed the English Prayer Union, and when Mrs. Arthur Kinnaird opened at London

the General Female Home and Training Institute with library, Bible and mission classes, and employment bureau. The World's Young Women's Christian Association was formed in 1894. Its purpose was: to bring national associations into closer contact; to form new national committees; and to establish association work in nonchristian countries. The first world conference was held in London in 1898 with 396 delegates present from seven countries; the one held in Stockholm in 1914 had about 800 delegates present from 18 countries. The aggregate membership was nearly 800,000. The World's Committee, with headquarters in London, issues an official organ, *The Woman's International Quarterly*. This committee in 1915 maintained 72 workers in foreign fields.

The following were the 18 National Associations in 1916: Canada, 30 city and 48 college associations, 17,983 members, five national secretaries; South Africa, seven associations, 1600 European and 2000 native members, two national secretaries, United States (see below); China, 33 associations, 1300 members, four national secretaries, India, Burma, and Ceylon, 60 student, 67 city, and 30 vernacular associations, 10,000 members, four national secretaries; Japan, 24 associations, 2673 members, three national secretaries; Australasia, 21 associations, 8350 members, two national secretaries; Austria, one national secretary; Denmark, 510 associations, 19,000 members, 1 national secretary; Finland, 64 associations, 5000 members, one national secretary; France, 314 associations, 11,500 members, two national secretaries, Germany, 6000 associations, 250,000 members, one national secretary; Great Britain and Ireland, 1437 associations, 96,676 members, two national secretaries, Holland, 35 associations, 1550 members, one national secretary; Hungary, 13 associations, 1900 members, one national secretary; Italy, 44 associations, 1300 members, one national secretary; Portugal, nine associations, 365 members, one national secretary, Sweden, 44 associations, 4600 members, one national secretary. Belgium with 35 associations was not affiliated with the World's Association. Other countries in which work was carried on were: North, Portuguese East, and West Africa, West Indies, British Guiana, Argentina, Brazil, Chile, Greece, Norway, Russia, Switzerland, Turkey in Asia, Bulgaria, Malta, and Gibraltar. The following were official publications of national associations: *The Australian Quarterly; The Young Women of Canada; Le Journal de la Jeune Fille; Fursorge fur die weibliche Jugend* (Germany), *Our Outlook* (Great Britain); *The Young Women of India; L'Alba* (Italy); *The Young Women of Japan;* and similar papers in Finland and Sweden.

United States. The first organization in the United States was the Ladies' Christian Association of New York City formed in 1858 "to labor for the temporal, moral, and religious welfare of self-supporting young women." In 1866 the Young Women's Christian Association of Boston was established with employment and boarding directories, religious, educational, and social features. It opened a boarding house in 1868. In 1871 an International Conference of Women's Christian Associations met at Hartford, Conn. The first student group was the Young Ladies' Christian Association formed at Normal University, Normal, Ill., in 1873. By 1886 local groups were sufficiently numerous to permit the formation of the National Association of Young Women's Christian Associations which later became the American Committee In 1891–93 the International Conference reorganized as the International Board of Women's and Young Women's Christian Associations. The National Young Women's Christian Association was organized in December, 1906, by union of local associations formerly affiliated with the International Board of Women's and Young Women's Christian Associations and the American Committee which latter organization was affiliated with the World's Association after 1894 Its constitution was adopted in 1909. Headquarters are in New York City. In 1916 the national work was supervised by a National Board of 56 members, including one from each of the 11 field committees, and 15 auxiliary members. Its work was conducted through eight departments: secretarial, finance, conventions and conferences, publication, office, foreign, field work, and method. The secretarial department recommended secretaries to positions and maintained an extensive system of training for workers in various branches, including the National Training School at New York. The National Board adopted for 1916 a budget of $490,000 for headquarters, field, and foreign work. The third department mentioned conducted 15 national conferences in 1915 at widely scattered points, such as Silver Bay, N Y., Lake Geneva, Wis., Estes Park, Colo., Blue Ridge, N. C, Seaside, Oreg, and Asilomar, Cal. General conventions were held at New York, 1906, St. Paul, 1909, Indianapolis, 1911, Richmond, 1913, and Los Angeles, 1915. The publication department supervised the issue of the official organ, *The Association Monthly*, and many textbooks for Bible study, besides numerous leaflets and pamphlets. There were maintained in the foreign field 38 secretaries at the following places: Bombay, Calcutta, Lahore, Madras, Singapore, Shanghai, Canton, Foochow, Peking, Tientsin, Tokyo, Yokohama, Buenos Aires, and Constantinople. The first American secretaries were sent to India in 1894, to China and Japan in 1903, to South America in 1906, and to Turkey in 1913. The field work department divided the United States into 11 sections each with its own committee and offices serving as substations. The headquarters of these fields were at Chicago, Philadelphia, Minneapolis, New York, Seattle, Cincinnati, Richmond, Va., St. Louis, Dallas, San Francisco, and Denver. By 1915 every State was included in one of these fields. By 1915, moreover, 10 of the 11 field committees had established secretarial training centres. In 1916 the department of method included 22 secretaries devising plans for conducting all branches of local activities including student, immigration, physical education, missionary, religious, Indian, colored, girls', economic, industrial, and educational. In 1910 the board opened its first International Institute for immigrant girls at New York City. In 1915 it erected headquarters at the San Francisco exposition. Three members of the National Board sat on the Council of North American Student Movements. Affiliations were formed also with the World's Student Christian Federation, and the Student Volunteer Movement for Foreign Missions. The jubilee of the organization was celebrated in 1916.

There were in the United States in 1915 a total of 988 local associations; of these 254 were

town and city, 17 county, and 717 student. There were 289,777 city members, 6372 county, and 61,310 student. There were 1881 employed officers, and the annual current expenses aggregated $5,667,717, nearly all for city associations. The total value of real property owned by 144 associations was $12,444,879 The enrollment in various classes was as follows: Bible study, 73,345, mission study, 21,007; physical education, in over 200 associations, 66,473; general education, 57,438. Work among adolescent girls was conducted by 214 associations, 28,940 girls being enrolled. Lunch rooms were managed by 157 associations; 162 provided lodgings for 160,773 transients, 60 found employment for 21,004 women; 90 granted travelers' aid to 310,807 women The student associations employed 67 general secretaries, and the county associations 26. Bible study, mission classes, and social activities were the principal lines of work of the student associations, while the country associations devoted themselves to the organization of clubs and camps as well as to religious, missionary, educational, and social work. Consult: *Handbook* (New York, annually); *Year Book* (ib, annually), both published by the National Board, also Elizabeth Wilson, *Fifty Years of Association Work Among Young Women* (ib., 1916).

YOUTH. See ADOLESCENCE.

YOUTH, FOUNTAIN OF. See FOUNTAIN OF YOUTH.

YOWDANCHI. See YOKUTS.

YOZGAD. See YUZGAT.

YPRES, ē'pr', or **YPEREN,** ē'pe-rĕn. A town in the Province of West Flanders, Belgium, 35 miles south of Ostend, on the Yperlee River (Map: Belgium, A 4). In the two battles in November, 1914, and April, 1915, when the Germans unsuccessfully attempted its capture, the town suffered severely from shell fire and was reduced to a mere heap of ruins. (See WAR IN EUROPE.) Prior to the war an object of interest was the Cloth Hall, begun in 1201 and completed in 1342. Conspicuous also were the Gothic cathedral of St. Martin, dating from the thirteenth century, with rich carvings; the town hall, with frescoes and paintings; and the eleventh-century church of St. Peter. Ypres was formerly a prominent industrial centre, especially known for its extensive production of woolen goods. Linen and lace were also important manufactures. Pop., 1900, 17,371. Ypres was at the zenith of its prosperity in the thirteenth century.

In the great conflict of 1914, it was occupied by the Germans (Oct. 3, 1914). Later in the month, they evacuated it as the lines approached the sea, and it thenceforth became a position of the British lines, and as such resisted all subsequent German efforts to capture it in their desperate attempts to reach the Channel ports. See WAR IN EUROPE.

YPSILANTI, ip'sē-lăn'tē, or **HYPSILANTIS,** ĕp'sē-lăn'dēs. The name of a Fanariot family (see FANARIOTS) claiming descent from a branch of the Imperial stock of the Comneni. The claim of its members to distinction is derived from their leadership of the Greeks in the struggle for independence of Turkish rule. —ALEXANDER YPSILANTI (c.1725–1807) was Hospodar of Wallachia (1774–77, 1796–98) and of Moldavia (1787), and was executed at Constantinople for alleged complicity in Greek conspiracies. His son, CONSTANTINE YPSILANTI (1760–1816), was appointed Hospodar of Moldavia in 1799 and of Wallachia in 1802. His sympathy with Russia led (1806) to his dismissal and flight to Transylvania Reestablished in the government of Wallachia by the Russians, he showed his hatred for the Porte by encouraging (1807) the Serbians in their insurrection, but soon retired to Kiev, in Russia, where he died in 1816. Of his sons, the eldest, ALEXANDER (1792–1828), served for some time in the Russian army, fought with distinction against Napoleon in 1812–13, and by 1817 attained the rank of major general He was chosen by the Hetærists as their chief in 1820. (See HETÆRIA PHILIKE.) In promotion of the cause of Greek independence, he collected large sums in Russia, and at Jassy in March, 1821, proclaimed the independence of Greece. Little suited by nature to guide the movement he had originated, he was defeated by the Turks near Dragasani (June 19), and forced to take refuge in Austria. He was arrested and kept a prisoner for six years at Munkács and Theresienstadt. Released in 1827, broken in spirit and body by chagrin and privations, he retired to Vienna, where he died. His younger brother, DEMETRIUS (1793–1832), also began his career in the Russian army. Sent to Greece by his brother to assume the leadership of the revolt there, he took part in the capture of Tripolitza (October, 1821), but was less successful in the following year in his attack on Eubœa. His gallant defense of Argos against the Turks stopped their victorious advance (1823). His stubborn resistance (1825) to the victorious Ibrahim Pasha at Napoli was another valuable service to Greece. In 1828 he was made commander in chief; but differences arising between him and the President, Capo d'Istrias, he resigned his post in January, 1830.

YPSILANTI, ip'sĭ-lăn'tĭ. A city in Washtenaw Co., Mich., 29 miles west by south of Detroit, on the Huron River, and on the Michigan Central and the Lake Shore and Michigan Southern railroads (Map: Michigan, F 6). Ypsilanti is the seat of the Michigan State Normal College. The industrial establishments include foundries and machine shops, a creamery, a flouring mill, a paper mill, agricultural implement works, and planing mills. The river has a descent of 32 feet in the city limits and affords abundant power. Pop., 1900, 7378; 1910, 6230.

YPURINAN, ē-pōō'rē-năn *or* ē'pōō-rē'nan. An Indian language of Brazil. The Ypurinas, Hypurinas, or Jupurinas dwell on the river Purus. The Hypurinas on the river Acre or Aquiri belong to the same tribe. They are without civilization. The women go naked, but the men wear long robes, and both sexes pierce the lips and nose. Consult: D. G. Brinton, *The American Race* (New York, 1891), Ehrenreich, in *Zeitschrift für Ethnologie*, vol. xxix (Berlin, 1897); A. F. Chamberlain in *Journal de la Société des Américanistes de Paris*, new series, vol. vii (Paris, 1910).

YRIARTE, ē'rē-ärt'tā, CHARLES EMILE (1832–98). A French author, born in Paris and trained as an architect. In 1859 he followed the Spanish campaign in Morocco as correspondent and illustrator, and in 1860 that of Garibaldi in Sicily. In 1881 he became inspector of fine arts and continued to be in government offices until his death in Paris. His publications include: *Portraits parisiens* (1865); *Goya, sa vie et son œuvre* (1867); *Le puritain* (1875); *Venise*

(1877; Eng. trans., 1880; *Florence* (1880; Eng. trans., 1882), *Francoise de Rimini* (1882); *La vie d'un patricien de Venise* (1885); and *Le secret des Borgia* (1890).

YRIARTE Y OROPESA, TOMÁS DE. See IRIARTE.

YSAYE, ē'zā'yē, EUGÈNE (1858–). A Belgian violinist, born in Liége. His father, a successful conductor and violinist, who had acted as his teacher, sent him early to the Liége Conservatory. He next studied under Wieniawski and Vieuxtemps at Brussels, the latter of whom was so impressed with the boy's talent that he obtained for him state aid by which he was enabled to complete his studies in Paris. His first important engagement was as leader of Bilse's orchestra, Berlin, which appointment he held until 1881, after which he toured Europe and America. In 1886–98 he was professor and director of the violin department at the Brussels Conservatory, where he organized the celebrated Ysaye quartet. After his retirement from the conservatory he devoted all his time to extensive tours. He gained fame for a tone unusually large and capable of infinite variety of coloring, for a stupendous technic, and above all as an interpretative artist of compelling power and extraordinary personal magnetism. His compositions include six violin concertos, variations on a theme by Paganini, three mazurkas for violin, and *Poème élégiaque* for violin with orchestra.

YSLETA, ēs-lā'ta. See ISLETA.

YSOLDE, ē-sōld'. See ISEULT.

YSOPET, ē'zō'pēt'. A diminutive of Æsop; a general name in mediæval French literature applied to any collection of fables, more especially the title of a volume of this nature written by Marie de France. A modernized version is to be found in Roquefort's edition of the author's works (1820). Consult J. Bédier, *Les Lais de Marie de France*, in "Revue des Deux-Mondes" (Paris, 1891); Karl Warnke, "Die Quellen des Esope der Marie de France," in *Forschungen zur romanischen Philologie* (Halle, 1900).

YSSEL, ī'sĕl, or **IJSSEL.** A river of the Netherlands, connecting the Rhine with the Zuyder Zee (Map: Belgium, E 3). At Doesburg it is joined by the Oude. Yssel and the connection between this and the Rhine may have been made by Drusus (q.v.). Thence it flows north and northwest past Zutphen and Deventer, forming part of the boundary between Gelderland and Overyssel, and, passing Kampen, falls into the Zuyder Zee, forming at its mouth a delta of several arms. The Yssel is navigable for steamers throughout its length of 60 miles, the mouth being kept open by jetties. There is another river of the same name, a branch of the Lek, in the Province of Utrecht.

YSTAD, ē'stād. A town of the Province of Malmöhus, Sweden, on the Baltic, 40 miles east-southeast of Malmö (Map: Sweden, E 9). It is an ancient town. Sugar, tobacco, ironwork, and leather are manufactured. The new port is exceptionally free from ice. Pop., 1910, 11,285.

YTTERBIUM, ĭ-tĕr'bĭ-ŭm. A metal obtained in 1878 by Marignac and considered as an element until 1907, when Urbain showed it to be composed of two distinct elements, which he named, respectively, neo-ytterbium and lutecium. As an element, it had the symbol Yb and its atomic weight was assumed to be 172.0. It occurs in monazite and gadolinite in the form of the oxide, to which was assigned the formula Yb_2O_3 (ytterbia).

YTTRIUM, ĭt'rĭ-ŭm (Neo-Lat., from *Ytterby*, in Sweden). A metallic element contained in the mineral gadolinite and first pronounced to be a new substance by Mosander in 1843. It is found with other cerium metals, as a silicate, in gadolinite and allanite, and as a fluoride in yttocerite. The metal was obtained by Berzelius as an impure powder by reducing the chloride with potassium. Yttrium (symbol, Y, atomic weight, 89.0) is a dark-gray powder that assumes the lustre and color of metallic iron when burnished. It combines with oxygen to form a sesquioxide, which is a yellowish-white powder.

YÜ, or **TA YÜ,** tä yōō (died 2197 B.C.). The third of the ancient kings so much lauded by Confucius for their virtue and their benign rule —the others being Yao (q.v.) and Shun. He was a native of Sze-chuen, a reputed descendant of Hwang-ti, and son of that Kun, Minister of Public Works under Yao, who had struggled unsuccessfully for nine years with the great inundation of that reign. Commissioned by Shun, Yao's successor, to take up his father's unfinished work, Yu set out four days after marriage, and for 13 years never rested in his task, traversing nine provinces, opening up waterways, noting soil and productions, and fixing the form of tax contributions. In 2278 B.C. he announced the completion of his labors, and received the Principality of Hia (or Hsia) as his reward. In 2224 B.C. he became the colleague and successor of Shun, and in 2205, after three years' mourning for his colleague, he founded the Hia (or Hsia), the first of the 25 dynasties of China. The greatest of the engineering feats attributed to Yü is the opening of the great gorge or defile on the Yang-tse through the Wu Mountains above I-Chang (q.v.). Consult the "Tribute of Yü," in Legge, *Chinese Classics*, vol. iii. (London, 1865); Friedrich Hirth, *Ancient History of China* (New York, 1911).

YUAN. See YUEN.

YUAN SHIH-KAI, yōō-än' shē-kī' (1859–1916). President of the Republic of China. He was born in Honan Province, the son of a district governor. He early aspired to an official position but was unable to pass the exhaustive examination in the Chinese classics which at that time was the only avenue of entrance into the government service. Therefore he turned his attention to the army as offering the best means for political advancement. He went to Korea, then under the suzerainty of China, and through his military and diplomatic talents rose rapidly in the service. His abilities were so marked that he became the protégé of Li Hung Chang (q.v.), through whose influence he was appointed Director General of Trade and International Relations in Korea in 1883. As commander of the Chinese troops in the peninsula he played a bold game, which resulted in the Palace Revolution of 1884, the burning of the Japanese Legation at Seoul, and the complete domination of the Emperor of Korea and Korean affairs by the Chinese government.

As Chinese Resident at Seoul, Yuan Shih-kai revealed himself as a master of diplomacy, and successfully checked all Japanese plans to secure control of Korea. Unfortunately for him, all of his work was undone by the disastrous Chino-Japanese War of 1894–95, in which China was overwhelmingly defeated and the Chinese driven out of the peninsula. The Japanese made a strong effort to capture Yuan, whom they recognized as their ablest enemy next to Li

Hung Chang, but Yuan escaped from Seoul in time and was escorted to the coast by a guard of British sailors

In spite of the unfortunate termination of the war, Yuan Shih-kai was one of the few who remained in the good graces of the Empress Dowager Tze Hsi (q.v.). Through his powerful friendship with Li Hung Chang, he was appointed Judicial Commissioner of Pechihli Province Here he was able to build up, through his own initiative and energy, the only body of modern Chinese soldiers at that time, some 7000 in all, drilled by the German von Hanneken. In 1897 Yuan was rewarded with the command of an army corps.

In the following year the Emperor Kwang-su (q.v.) and his adviser Kang Yu-wei (q.v.) inaugurated the reform movement designed to bring China abreast with Europe and America. For success they deemed it necessary to get rid of the Empress Dowager Tze Hsi, whom they regarded as the chief obstacle to reform, and also of her nephew Jung Lu, commander of the northern military and naval forces and stationed at Tientsin. It was planned to execute Jung Lu and then place the Empress Dowager in strict confinement. This task was intrusted by the Emperor to Yuan Shih-kai. But Yuan, although of modern tendencies, did not regard the reform movement of 1898 as capable of succeeding. He thought it premature and unwise, and that it would end in further disaster to China, which was then being despoiled right and left by the European Powers. Instead of making away with Jung Lu (his blood brother, by the way), Yuan informed him of the plot and also warned the Empress Dowager. The result was the coup d'état of 1898, by which the Emperor was practically deposed and imprisoned, the leading reformers beheaded or banished, and Tze Hsi returned to supreme power. To the end of his days, the Emperor Kwang-sü blamed Yuan Shih-kai for having ruined the reform cause. It is extremely doubtful, however, whether the movement would have succeeded, even without the alleged defection of Yuan. China was not yet ready for the change, the great mass of the people were unimpressed, and widespread dissatisfaction was caused by the reform edicts. Above all it was necessary to have a strong personality at the head of the government at that critical period, and such Tze Hsi assuredly was.

With the outbreak of the Boxer troubles in 1899, Yuan Shih-kai was made Governor of Shantung Province, where the movement had originated, succeeding the infamous Yu Hsien, who was transferred to Shansi. Yuan's appointment gave great satisfaction to the Diplomatic Corps at Peking. He succeeded in pacifying the province and keeping it in a fair state of order during 1899 and 1900. He was the most popular Chinese official with foreigners at this time, and it was through his instrumentality that the outside world was informed of events in Peking during the siege. His able administration of affairs did much towards preventing the spread of the rebellion. The Empress Dowager further showed her confidence in him by appointing him Acting Viceroy of Pechihli Province in 1901. Yuan was now her most trusted adviser, for Li Hung Chang had died in November of that year. In 1903 the task of reorganizing the entire army was given to him. In 1907 he became a Grand Councilor and President of the Wai Wu Pu, the Chinese foreign office, formerly known as the Tsung-li Yamen and later as the Waichiaopu.

In 1908 the Emperor and Empress Dowager died within one day of each other, and the infant Hsuan-tung (q.v.) succeeded, with his father, Prince Chun, as Regent Prince Chun, who had never forgiven Yuan Shih-kai for the part he played in 1898 against his brother the Emperor, seized his opportunity and ordered Yuan into retirement by an edict of January, 1909, on the fiction that he was to "nurse his sore foot." He could not proceed further against him for Yuan was too powerfully intrenched in the good graces of the foreigners, the diplomats, and foreign governments Yuan retired to his estates in Honan and calmly awaited events The power of the Regent soon became unstable through palace intrigues, trouble in the provinces, and loss of prestige abroad With affairs going badly for the Manchu monarchy, repeated invitations were sent to Yuan to return. But he pleaded inability because of the (imaginary) infirmity for which he had been dismissed He remained in seclusion until 1911, and then, with the fall of the Manchus in sight, he realized his opportunity and returned to Peking. He was appointed commander in chief and later Premier, and was made a Marquis.

The Revolution had suddenly broken out at Wuchang in October, 1911, and was almost uniformly successful. It rapidly spread over all of south China On Dec. 29, 1911, Dr. Sun Yat-sen (q.v.), the genius of the whole movement, was elected Provisional President by the Nanking Assembly. By this time Yuan Shih-kai was in full control in the north, and it looked as if China would be split up into two parts, divided by the Yang-tse Kiang, a republic in the south and a limited monarchy, with Yuan as the real power, in the north. But sentiment throughout the country was in favor of the Revolution, and on Feb. 12, 1912, the little Emperor Hsuan-tung abdicated. The next day Yuan Shih-kai was proclaimed the "Fully Empowered Organizer of the Republic of China." To preserve the fruits of victory and to unite the country, Dr. Sun nobly resigned as Provisional President, and Yuan, after a show of reluctance, and despite an outbreak among his troops, who looted a large part of Peking, was elected President and inaugurated Oct. 6, 1913, for a term of five years.

As soon as he received his high office Yuan Shih-kai began to consolidate his power. China was more or less in chaos and the future seemed doubtful and uncertain. In support of his policies Yuan had a trained army, the foreigners favored him, the people at large knew little or nothing of republican institutions, and as for money Yuan had secured a loan of $125,000,000 from the largest banking houses of Europe. He soon got into difficulties with the Kuomintang or Southern party in the Parliament. Failing to come to an agreement with them he summarily expelled these members, 132 Senators and 370 Deputies, from Parliament. Spasmodic attempts to overthrow him failed, and Sun Yat-sen retired to Tokyo and Huang-hsing (q.v.) to the United States. On Jan. 10, 1914, on the advice of the Vice President and others, Yuan dismissed the Parliament, and by a mandate of May 24, 1914, created an Advisory Council, to sit as a Provisional Congress or Council of State (*Tsan Chieng Yuan*). The members of this council varied from 50 to 75, appointed solely by President Yuan, and supposed to act

as an advisory, administrative, and legislative body, until the election of the National Parliament (*Li Fa Yuan*). Throughout the year 1914 Yuan strengthened his position by successful expeditions against the bandits, White Wolf and the Red Beard. *Hunghutzes*, in Mongolia and elsewhere, and against rioters in Sze-chuen and on the Tibetan border. He ruled with dictatorial power abolishing the Provincial Assemblies and Municipal Councils. Early in the year he electrified the world by restoring the old worship of Heaven and Confucius in China, and personally went through the ceremony on behalf of the state. His purpose in this was to keep the people true to their ancient traditions.

These acts of Yuan Shih-kai seemed to presage a return to monarchical government in China, with himself as Emperor. The idea received a strong impetus through the 21 Japanese demands on China in 1915. These extraordinary demands, by which Japan took advantage of the complications in Europe to further her designs in the Far East, forced the Chinese government to concede, among other stipulations, extraterritorial and commercial privileges in Manchuria and Inner Mongolia, railway concessions, the lease of Port Arthur and Dalny until 1997 and the lease of the South Manchurian Railway until the year 2002. China protested bitterly and made a show of resistance, but was forced by an ultimatum from Japan to submit. The six demands in Article 5, seriously impairing the independence and integrity of China, the Foreign Office (*Waichiaopu*) refused to consider, and these were left "for future discussion." The sinister action of Japan convinced many thoughtful Chinese that it was imperative to have a powerfully centralized government at Peking with Yuan as Emperor. This would further relieve China, at the death of Yuan, from danger of anarchy and endless civil war. Therefore the Advisory Council petitioned Yuan to hold an election for a citizens' convention, to see whether the people desire a return to the old form of government. This was done, and it was announced that 15 out of the 18 provinces and 1993 out of 2043 representatives of this Acting Parliament favored the change. Thereupon the Council of State petitioned Yuan to accept the throne. He declined at first, according to Oriental etiquette, and the petition was forwarded a second time. He then accepted, Dec. 11, 1915, with the reservation that he would continue to act as President until a suitable time for the coronation.

The monarchical idea failed to meet with favor in certain quarters. The ministers of Great Britain, Russia, and Japan twice warned the Chinese government against disturbing the tranquillity of the Far East, and suggested that it would be better to wait until the war in Europe was over. But Yuan Shih-kai and his advisers determined to go ahead with the project, and a date in early February, 1916, was finally chosen for the coronation. The revolt in the south, encouraged by foreign influences, continued to spread, and Yunnan, Kweichow, and Kiangsi provinces declared against the monarchy. A mutiny in Shanghai was suppressed, but with the continued fighting in the south against his authority, and because of the divided state of the country, Yuan Shih-kai found it necessary to postpone further the date for the coronation. On March 22, 1916, it was announced from Peking that the plans for the restoration of the monarchy had been abandoned and that China was a Republic for the second time. The revolt failed to end with the announcement that Yuan had relinquished the crown, and the leaders declared that he must be driven from power entirely. There is no doubt, however, that Yuan Shih-kai could have suppressed the rebellion easily had it not been for outside interference and pressure brought to bear against him, mainly from Japan. He died June 6, 1916, and was succeeded by the Vice President, Li Yuan Hung, whose accession satisfied the southern leaders. Several days before his death it was reported that Yuan had been poisoned, but an official statement said the cause of death was "stomach trouble."

A firm believer in the adoption of western methods of material progress for China, but with due regard for China's own customs and institutions, Yuan Shih-kai was a man of action rather than a scholar. In diplomatic ability, native shrewdness, and qualities of leadership, he was the successor of the great Li Hung Chang. Like the latter he possessed the gift of choosing efficient subordinates. During the critical period of change he succeeded in giving China a strong and stable government, and this despite tremendous difficulties. To rehabilitate the country he found it necessary to rule arbitrarily, with a stern but just hand. Foreign critics highly commend his administration, especially his suppression in great measure of official graft and corruption. He was a hard-working ruler, and surrounded himself with competent foreign advisers, among whom were Dr. George E. Morrison (q.v.), Dr. Ariga, Dr. Jeremiah W. Jenks (q.v.), and Dr. Frank J. Goodnow (q.v.), later president of Johns Hopkins University. Consult: J. O. P. Bland, *Recent Events and Present Politics in China* (Philadelphia, 1912); J. S. Thomson, *China Revolutionized* (Indianapolis, 1913); E. H. Parker, in *Asiatic Review*, vols. iv, viii (London, 1914, 1916); P. H. Clements, *Boxer Rebellion* (New York, 1915). See CHINA, *Modern History*.

YUCATAN, yōō'kȧ-tȧn'. A large peninsula projecting northeastward from the southeast extremity of Mexico, and separated from the western extremity of Cuba by the Yucatan Channel, 140 miles wide (Map: Mexico, O, P 7). With the peninsula of Florida it incloses the Gulf of Mexico. The peninsula of Yucatan is about 400 miles long and 200 miles wide (area about 80,000 square miles). It forms a portion of a great bank of coralline limestone raised above sea level in geologically recent times. The bank, covered with shallow water in which coral formation is still going on, extends 150 miles into the Gulf along the north and west coasts of the peninsula, and along its margin the sea bottom falls suddenly from a depth of 600 to one of 6000 feet. The land surface is accordingly low and level, undulations rising only a few hundred feet, except in the extreme southern part, where there are projecting spurs of the Central American Cordillera. Forests are confined mainly to these southern mountains, other parts being almost treeless, except in the marshy tracts along the coast, and of a monotonous aspect. This is scarcely due to the climate, which is hot and humid, but to the peculiar Karst formation of the limestone composing the peninsula, which is perforated by numerous caverns and underground channels. These receive the rainwater, so that the peninsula is

practically without running surface water, and the natives depend almost wholly upon underground reservoirs for water supply. Sisal hemp is the principal agricultural product. Politically the greater part of the peninsula belongs to Mexico, and consists of the states of Campeche and Yucatan (qq.v.) and the territory of Quintana Roo The southeastern part is divided between British Honduras and Guatemala The total population is estimated at about 370,000, most of whom are aborigines. Yucatan was the principal seat of the Maya civilization, the highest form of native civilization in North America at the time of the discovery. See MAYA; MAYAN STOCK, YUCATAN, ANTIQUITIES OF

YUCATAN. A state of Mexico, occupying the north part of the peninsula of Yucatan (q.v.) (Map: Mexico, O, P 7). Area, 15,937 square miles. The chief industry is the cultivation of henequen or sisal hemp, the bulk of which is exported to the United States Pop., 1910, 339,613. Capital, Mérida (q.v.). The size of the state was greatly reduced by the formation of the Territory of Quintana Roo in 1900.

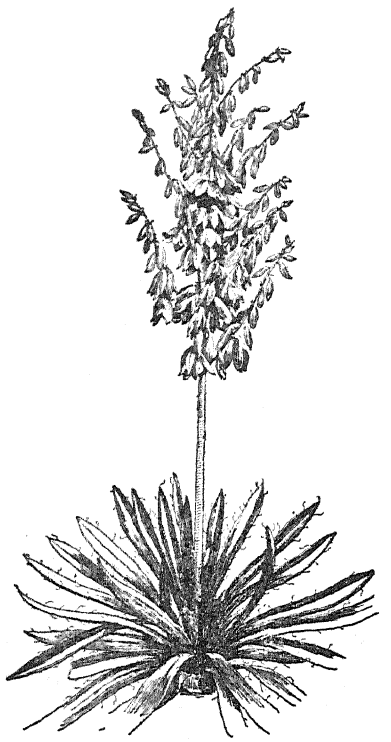
YUCATAN, ANTIQUITIES OF. The peninsula of Yucatan, which was divided into a number of independent states, was occupied by the Maya people at the time of the discovery of America. There is evidence to show that the ruined cities of the Maya race, in the State of Chiapas, the Republic of Guatemala, and in northern Honduras, are more ancient than the cities of Yucatan (See MAYA; MAYAN STOCK.) Shortly before the Spanish conquest the country was partly overrun by Nahua hordes (see NAHUAN STOCK), and the population decimated by famine, pestilence, and warfare, so that the ancient civilization appears to have been waning early in the sixteenth century. In no other part of Mexico are there so many remains of ancient cities attesting a large population at the time of building. At present the greater part of the country is covered with forest, completely concealing the ruins. According to some authorities climatic conditions have changed since the pre-Columbian period of occupancy, and many of the ancient cities could not support, at present, a large population. According to others the soil has been exhausted by inferior methods of farming. Peculiar conditions as to water supply evidently influenced the distribution of the larger centres of population. There are no surface rivers or lakes, except in the south, but water is found in underground streams, which make their way to the surface in caves. Near these caves, or cenotes, are found the greatest ruins, and the water supply was obtained in other portions of the country by cistern storage.

The Mayas of ancient times reached the highest level of civilization attained by any of the peoples of the New World. Their temples and palaces, their complicated system of hieroglyphic writing, and their astronomical knowledge, attest their superiority over other civilized tribes of ancient Mexico, although, owing to environment, their advancement along certain other lines was not so marked. Among the most important and best-known ruins in Yucatan are Uxmal, Chichén-Itzá (q.v.), Labna, Kabah, Mayapan, and Ake. The ancient temples and palaces were massive structures, but not for defense; this was to insure strength and permanency. None of the buildings had windows; their interior construction was characterized by the triangular arch, known as the Maya arch, in which the inclined surfaces in each apartment or covered space slope inward from the sides, and sometimes also from the ends, meeting at the top in a sharp angle, or approaching to within a foot or two the narrow way, when they are firmly held together by the superincumbent roof masonry. Many of the buildings now roofless were probably originally constructed without roofs Stone beams were used for short spans, narrow openings, and passageways The façades in many instances were composed of geometric designs and representations of huge grotesque masks The material used was the common limestone of the country, cut and carved with stone tools Mortar was extensively used; the floors and roofs were of stucco, and all of the stone work in the edifices was covered with a thin coating of the same which in many instances was painted red. In principle the construction was mortar and rubble rather than ashlar masonry The latter appears only as a veneer. In many of the buildings the white surface was covered with mural paintings in various colors, the most famous being the frescoes in one of the temples of Chichén-Itzá. Many of the lintels of the doors were of wood. These wooden lintels have been, in themselves, an element of weakness in the structures, for, had they not decayed, most of the great façades would have been preserved. There is a certain lack of unity in the general assemblage of the structures; the common system is seen in the grouping of four edifices about a central court. Some of the ancient buildings were very extensive, notably the so-called palace of Labna, which shows four periods of construction. The total length of this building is 375 feet, and it formerly contained about 50 rooms.

On the outskirts of the main group of buildings in these ancient cities were scattered the house sites of the common people who lived then, as the Mayas of the present day, in thatched-roofed huts of adobe. Excavations among the house sites reveal the presence of the three-stone fireplace or koben, which is still used by the Mayas. There are traces of ancient cement roadways, raised a few feet above the surface, leading from one town to another. The Mayas ranked among the first in ancient ceramic art; the most interesting specimens which have been exhumed bear incised hieroglyphic inscriptions. The calendar of the Mayas was similar to that of the Nahuas and Zapotecs (q.v.). Their system of hieroglyphic writing is also similar to those of Mexico in principle although unlike in appearance. Much study has been given to these hieroglyphics and it is now possible to decipher dates and calculations but not to decipher the names, etc, that accompany the dates and tell to what they refer. The modern Mayas of Yucatan retain no knowledge of the ancient lore of their ancestors, but among the Lacandones of the remote southern frontier of the peninsula ceremonies to their ancient gods are still performed. For a study of the hieroglyphics consult S. G. Morley in Bureau of American Ethnology, *Bulletin, No. 57* (Washington, 1915); also references under MAYAN STOCK.

YUC'CA, or SPANISH BAYONET (Sp., from the North American Indian name). A genus of plants of the family Liliaceæ, natives of the southern part of the United States, Mexico, and Central America, but now widely distributed. *Yucca filamentosa*, called Adam's needle, is often

cultivated in gardens on account of the singularity and splendor of its appearance. *Yucca gloriosa* is a native of the more southern parts of North America, but is hardy in the northern States. Its stem, which is 2 or 3 feet high, bears on the upper part a tuft or crown of sword-shaped evergreen leaves with



YUCCA FILAMENTOSA.

smooth margins, each leaf terminating in a sharp black spine. From the centre of this crown of leaves arises the flower stalk, of 3 feet or upward in height, branching out on every side so as to form a great panicle. The flowers are bell-shaped and drooping, white with a purple stripe on the outside of each segment of the perianth. The fibres of the leaves of *Yucca glauca* are used by the American Indians to make cloth, cordage, and baskets. The fibre of the yuccas is similar to that of the agaves and bromelias, and probably is often included under the name pita flax or pita fibre. *Yucca aloifolia* is common in the sand dunes of the South. A treelike form, *Yucca brevifolia*, is found in southern California. *Yucca baccata* is a common species from Texas to California. See YUCCA MOTH; Colored Plate of LILIACEÆ.

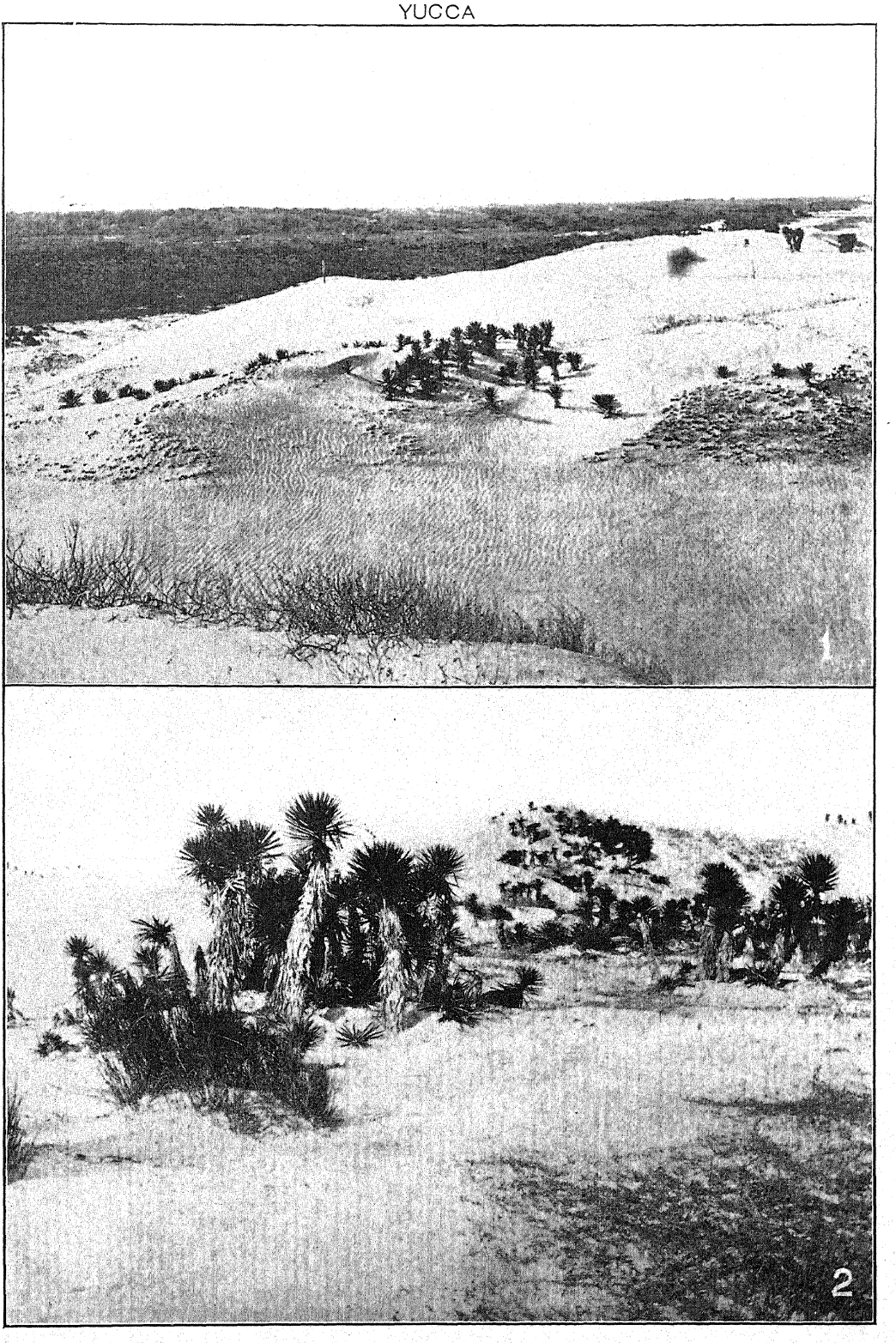
YUCCA MOTH. Any one of several species of the curious tineine genus *Pronuba*, of the family Prodoxidæ, all of the species of which are confined to yucca plants for food. The species of *Pronuba* are small white moths with narrow wings sometimes spotted with black. Their mouth parts are perfectly adapted for the fertilization of the yucca flowers, which are not fitted for self-fertilization, or for fertilization by other insects. The moth, having collected a mass of pollen, lays an egg in the pistil, and pushes the pollen into the orifice, thus insuring growth of the pollen tube and subsequent fertilization and the later development of the pod, in which the larva then develops. This instance of symbiosis (q.v.) is very remarkable. The yucca moths of the genus *Prodoxus* have no relation to the fertilization of the plant, but lay their eggs in the flower stem, in which their larvæ bore. Since some of the yuccas do not flower every year, these insects may pass more than a year in the pupal stage.

YUCHI, yōō′chē. See UCHEE.

YUDGHÂN, yud-gan′. A Messianic reformer of the eighth century. See MESSIAH.

YUE CHI. A nomad tribe originally consisting of 5 separate tribes, which inhabited the central part of Asia. They first appear in history during the middle of the second century B.C. They were driven westward (c.100 B.C.) by the Hiung-nu (a related tribe) and conquered Bactria (q.v.). During their occupation of this country they united to form a single tribe (called Kushans, from name of principal tribe) and became civilized. About 50 years before Christ they invaded India and took a little Greek and Persian civilization with them. They gradually annexed northern India, but were driven out at the close of the third century A.D. by the Guptas. Remnants of the Yue Chi which had remained in Bactria formed a kingdom in eastern Afghanistan, but were destroyed after the beginning of the fourth century by the Hûnas.

YUEN, yōō-ĕn′, or **YUAN,** yōō-än′ (1280–1367). A Mongol, and consequently an alien, dynasty that occupied the throne of China for 88 years—the twenty-third of the 25 dynasties that have ruled in that country since 2205 B.C., when the first one was founded. The Yuen was founded by Kublai Khan, grandson of Genghis Khan, and successor of Mangu, who in 1260 found the northern provinces of China in the hands of the Kin Tatars, and a native dynasty, the Sung (q.v.), in the south. Having successively vanquished these, he ascended the throne in 1280, chose his dynastic name of Yuen, and made Peking his capital. Though he displaced the Chinese high officials with uncivilized Mongols, in utter disregard of the Chinese practice of appointing only literati, he seems to have ruled wisely on the whole. He completed the grand canal between Hangchow and Tientsin; inaugurated road making and the planting of trees; introduced the use of paper money; and favored Buddhism, but proscribed Taoism, and ordered all Taoist books to be burned, except the *Tao-teh-King* of Lao-tse. He attempted the conquest of Japan, but the formidable armada and army he dispatched for that purpose were utterly annihilated by the Japanese and the terrific storms which they encountered. Of his eight successors only three are worthy of mention: Timur, his grandson (1294–1306), who proved himself honest and energetic and labored hard to correct abuses and improve the administration. Superfluous offices were abolished, the tax system was reformed and the lands of the powerful ecclesiastical establishments were taxed; but ill health proved a serious handicap, and he died at the age of 42. Kaisun, his successor (1307–10), was devoted to Buddhism, wine, and women, and accomplished little. His most important achievement was the redemption by the government of the children who in times of famine had been sold. Ayuli Palpata, the fourth Emperor (1311–20), also professed to have the welfare of the people at heart, but his devotion to Buddhism led to the expenditure



1. SAND DUNES WITH YUCCA, ETC., FLORIDA
2. THICKET OF YUCCA ALOIFOLIA SHOWING SHIFTING AND BUILDING UP OF DUNES, FLORIDA

vast sums on priests and ceremonies, and grinding taxation was the result. In 1367, during the reign of the ninth Emperor, Chu Yuan-chang, a temple servant, at the head of a large army overthrew the corrupt Yuen, and in the following year ascended the throne as the first of the Ming or Illustrious dynasty (1368–1643), and became known as Hung-wu (q.v.), making his capital south of the Yang-tse, in the present Nanking.

YUEN-SAN, yōō-ĕn'-san'. See WONSAN.

YUGA, yu'ga (Skt., yoke, period of time). In Hindu mythology and astronomy, the name of a long period of years corresponding to an age of the world. Four such eras are mentioned: *Krta-Yuga, Trētā-Yuga, Dvāpara-Yuga,* and *Kali-Yuga.* The first was the golden age of the world, but each succeeding period became shorter and more evil, until the last, or Kali-Yuga (q.v.). The Kali-Yuga is said to have begun in the year 3102 B.C. A description of these immense world periods is found in *Manu* (q.v.), the *Mahābhārata* (q.v.), and the *Purānas* (q.v.). Conceived as a day of the gods, each of these long mundane eras is believed to be preceded by a period called *sandhyā,* or twilight, and followed by a similar period *sandhyāmśa,* or portion of twilight. The precise length is given in divine years and reduced afterward to terms of human years. The Krita-Yuga consists of 4000 divine years, its Sandhya and Sandhyamśa each of 400. The Treta-Yuga consists of 3000, and its Sandhya and Sandhyamśa of 300 divine years each; the Dvapara-Yuga of 2000 divine years, with 200 such years as its Sandhya, and 200 as its Sandhyamśa; and the Kali-Yuga of 1000 divine years, with 100 each as its Sandhya, and its Sandhyamśa. Since a divine year comprises 360 solar years of mortals, a year of men being a day of the gods, these Yugas, with their Sandhyas and Sandhyamśas, would severally represent 1,728,000, 1,296,000, 864,000, and 432,000 or in the aggregate 4,320,000 solar years of mortals. This cycle is called a *Mahāyuga,* or great Yuga, and 1000 such make up a day and night of Brahma (q.v.). As a designation of time Yuga is confined almost wholly to philosophical and descriptive works, for it plays no actual rôle in the scientific works of Hindu astronomy. The term "Yuga" is sometimes, though exceptionally, applied also to other divisions of time. Consult: E. W. Hopkins, *Religions of India* (Boston, 1895); Sewell and Dikshit, *The Indian Calendar* (London, 1896); Thibaut, *Astronomie, Astrologie und Mathematik* (Strassburg, 1899).

YUKAGIRS, yōō-kä'gērz. A stock once consisting of many tribes, as Omoks, Anauls, and Cheliags, occupying much of Siberia east of the river Lena. They call themselves Andondomni, or men. They numbered in 1898 but 700 persons speaking their mother tongue. Some of the Tungusic Lamuts, their neighbors, however, speak Yukagir, while the Yukagirs of Verkhoiansk have adopted the Lamut. The Chuvanzes of the Aniuy and the upper Anadyr are classed with the Yukagirs. In physique the Yukagirs resemble the Tungus-Lamuts, but are more brachycephalic, and generally have lighter hair. Their skin is often quite light. Consult: Kohn and Andree, *Sibirien und das Amurgebiet* (Leipzig, 1876); Müller, *Unter Tungusen und Jakuten* (ib., 1882); Jochelson, *The Yukaghir and the Yukaghirized Tungus* (Leyden, 1910).

YUKI, yōō'kē (Wintun Indian, aliens, enemy). A group of tribes constituting the nucleus of the Yukian stock, centring in Round valley and on the headwaters of the Eel River, in the present Mendocino County, northwestern California. They were on friendly terms with their northern neighbors, the Wailaki, with whom they are much intermarried, but maintained constant aggressive warfare upon the more peaceful Pomo (q.v.) and Wintun (q.v.), and were bitterly hostile to the whites. Their houses were conical structures of poles and bark. They wore little clothing, and both sexes tattooed the face. The dead were usually buried in a sitting posture. They were estimated on good authority at over 5000 about 1850, but were reduced to 198 in 1910. The surviving divisions are the Coast Yuki, Redwood (Huchnom), Wappo and Yuki. Consult F. W. Hodge, *Handbook of American Indians* (Washington, 1907).

YUKON, yōō'kŏn. A Territory of Canada occupying the northwestern portion of the Dominion (Map: Alaska, M–O, 3, 4). The area is stated at 207,076 square miles, of which 649 square miles are water. The surface, whose features were little known until the last decade of the nineteenth century, is uneven in greater part, with the general elevation between 2000 and 3000 feet, and the whole country is filled with mountain ranges and rolling hills penetrated everywhere by large navigable rivers. There are a number of peaks rising considerably above the snow line in the north and in the southwest, the loftiest being Mount Logan (q.v.), close to the Alaskan boundary adjacent to Mount St. Elias, with an elevation of about 19,500 feet. The main divide of the Rocky Mountains, separating the watershed of the Yukon from that of the Mackenzie, forms the eastern boundary. The principal river is the Yukon. With respect to climate the Yukon is one of the coldest regions in the world. A maximum temperature of over 80° F. is frequently observed in summer, but the summers are very short, and frost occurs every month in the year. In winter a temperature of 50° below zero is common, and it has been recorded as low as 63° and 68°. The air is, however, dry, and the rainfall is not heavy, though it is sufficient to support large forests of spruce and poplar, which cover the valleys and mountain slopes up to an altitude of about 2500 feet. Some of the hardier crops, such as rye and barley, are easily raised, and some little truck farming of potatoes, turnips, lettuce, peas, and cabbage has been carried on in different localities. The geological structure is largely a continuation of that of British Columbia, consisting mainly of Archean ridges flanked by extensive Paleozoic strata, which contain some of the richest gold fields in the world. Beds of lignitic coal occur. Before the discovery of gold in 1896 the Yukon district was almost uninhabited. The population, which at the census of 1901 was 27,219, declined as the rich places of the Klondike (q.v.) became exhausted, and at the 1911 census was only 8512. In 1898 the district was organized as a separate Territory, and Dawson (q.v.) is now the capital. A railroad traversing the White Pass is now in operation between Skagway and the upper waters of the Yukon. The Territory is represented by one member in the Canadian House of Commons.

YUKON GOLD FIELDS. This region is described under the titles of the component sections, i.e., ALASKA, KLONDIKE, YUKON, etc.

YUKON RIVER. One of the largest rivers of North America. It is formed at Fort Selkirk,

Yukon Territory, Canada, by the junction of the Lewes and Pelly rivers, and flows northwestward into Alaska, which it traverses in a southwest direction, finally turning west and emptying into the Bering Sea through a large delta on the south shore of Norton Sound (Map: Alaska, G 3). Its total length, including the Lewes and Teslin, is about 2300 miles, and its catchment basin covers 330,000 square miles. The Lewes, which is generally considered the upper course of the main stream, rises in a cluster of lakes (Lindeman, Bennett) in the extreme northwest corner of British Columbia and on the northern foot of the Chilkoot Pass and flows northward to the Pelly confluence at Fort Selkirk. The upper courses of the river and its tributaries generally flow through narrow valleys inclosed between mountains of moderate elevation, and in some places taking the form of cañons. In Alaska the river flows for hundreds of miles through level, moss-covered tundras, where the width, between its low, marshy banks, is from 1 to 2 miles, though its depth is not great. The delta is of vast extent, having an area, including the portion inclosed by the Kashunuk arm, of 9000 square miles. The volume of discharge of the Yukon has been thought to be fully two-thirds that of the Mississippi, and great quantities of sediment are brought down. There are 26 outlets over 200 yards wide and numerous smaller channels. All are silted up, with a depth of only 2 to 9 feet on the bars, while the sea for many miles from shore is only a few feet deep. Seagoing steamers cannot enter the river, but proceed to St. Michael, about 70 miles to the north, where they unload into stern-wheel steamers, which ply regularly in summer to Dawson. A fleet of upper-river steamboats runs between Dawson and White Horse, the terminus of the White Pass and Yukon Railroad. Navigation is continuous between White Horse and the mouth of the river. The current is often very swift, and the descent very rapid. From Dawson to the sea, about 1400 miles, the fall is on the average nearly a foot per mile. The navigation of the whole river is free to Canadian vessels; the navigable season is comprised between late May and early October. The chief settlement on the Yukon is Dawson, at the confluence of Klondike Creek, the centre of the gold-mining region. The largest tributaries are the Porcupine, the Koyukuk, and the Tanana.

YULAN, yōō'lăn. See MAGNOLIA.

YULE (ME. *yol*, *yole*, December, from Anglo-Saxon *geól*, *gehhol*, December; Icel. *jōl*, Swed. and Dan. *jul*, Yule, the Christmas feast; Goth. *fruma jiuleis*, first Yule, i e., probably November). The original meaning of the word is yet unexplained. Some have considered it to be related to the Icelandic *hjōl*, wheel, indicating that at this period the sun wheels or turns the winter solstice. But this explanation is far from satisfactory. Fick (q.v.), on the other hand, connects it with the English yawl, as indicating the noise of Christmas revelry in Scandinavian countries. This etymology is likewise improbable. In England the word was originally used to indicate the two months of the winter solstice, December and January; in other words, the former yule (*se ærra geóla*) and the after yule (*se æftera geóla*). See CHRISTMAS.

YULE, SIR HENRY (1820–89). An English engineer and Orientalist, born at Inveresk, Scotland. In 1840 he entered the Bengal Engineers; he served in India on various public works, and from 1858 to 1862 was secretary to the government in the Public Works Department. In 1862 he was retired with rank of colonel, and from 1875 to 1889 sat in the Indian Council. Besides numerous articles in the *Journals* of the Royal Asiatic and Geographical societies he published. *Cathay and the Way Thither* (1866), *The Book of Ser Marco Polo the Venetian* (1871), and with Dr. Burnell, *Hobson-Jobson, an Anglo-Indian Glossary* (1886, 2d ed., 1903). In 1863 he brought out for the Hakluyt Society *Mirabilia Descripta*, and his last work for the society was the diary of Sir William Hedges (1887).

YUMA, yōō'ma. A city and the county seat of Yuma Co., Ariz., 180 miles southwest of Phoenix, on the Colorado River, at the mouth of the Gila, and on the Southern Pacific Railroad (Map: Arizona, A 5). Noteworthy features are the Elks Home, hospital, Federal building, courthouse and high school. Farming, fruit growing, and mining are the leading industries. Yuma is known for the extreme dryness of its climate. Its annual rainfall of 3.13 inches is the lowest recorded at any of the United States Weather Bureau stations. Pop., 1910, 2914.

YUMA (probably, sons of the river). The most important tribe of Yuman stock (q.v.), originally occupying a territory on both sides of the Colorado River, above and below the entrance of the Gila, in Arizona and California, and now gathered upon a reservation in the extreme southeastern corner of California to the number of 832 in 1910. See HAVASUPI.

YUMA APACHE. See YUMAN STOCK.

YUMAN (yōō'măn) **STOCK.** An important linguistic stock of the lower Colorado River region of California and Arizona, with portions of the adjoining Mexican States of Sonora and Lower California. Among the most important tribes are the Yuma, Mohave (Mojave), Walapi (Hualapai), Maricopa, Yavapai (Mohave—Apache), Havasupi, Cocopa, Cochimi, and Dieguenos (qq.v.). All the Yuman tribes, excepting those of the Lower California peninsula, were primarily agricultural and vegetarian, rather than hunters, and all had the arts of pottery and basket making. They were brave and warlike, but not predatory. Their ordinary dwellings were brush wikiups. The Yuman tribes of the Lower California peninsula seem to have been low among aborigines, but the Yuma (q.v.) and others of the Colorado were among the highest types. The Jesuit and Franciscan missions established among them between 1760 and 1780 made but little impression. From a probable total of perhaps 20,000 about 1760 they have dwindled to barely 5000, nearly all of whom are within the United States. The tribes of Lower California, estimated during the mission period at 12,000, have almost entirely disappeared.

YUNCA, yōōn'kă (from Quichua *Yucacuna*, dwellers in the hot country). A group of ancient cultured tribes, constituting a distinct linguistic stock, formerly occupying that portion of the coast of Peru extending from about lat. 4° S. to lat. 10° S., their capital being near the present Trujillo. According to their own traditions they had coasted down from the north in canoes. They were agricultural and built reservoirs and irrigating canals, some of them solidly constructed. The ruins of the great palace at Gran Chimu, with its massive walls, spacious terraces, and elaborate frescoes, are one of the wonders of ancient America. They were famed for skill in fashioning work in gold and

silver. They were brought under subjection to the Inca Empire of Peru some time before the arrival of the Spaniards, but their language, still spoken in some secluded valleys, bears no trace of Quichua influence, although surrounded by tribes of that stock Consult Carrera, *Arte de la lengua yunga de los valles del obispado de Trujillo* (Lima, 1644; new ed., ib, 1880). See PERUVIAN ARCHÆOLOGY.

YUNG-CHING, yōōng'chĭng', or **YUNG-CHENG**, chŭng (1677–1735). The reign title of the third Emperor of the Ta Tsing, the late dynasty of China. He was the fourth son of K'ang-hi and succeeded him in 1723 at the age of 45 He banished or imprisoned all his brothers except the thirteenth, who, until his death in 1730, was his chief adviser. The Roman Catholic missionaries fell into disfavor in this reign chiefly because in troublous times the converts followed none but their directions. An edict of expulsion from the country was changed at the last moment to one of banishment, first to Canton, and later to Macao, only those being retained at Peking who were needed in the government service; 300 churches were demolished or put to profane uses, and a persecution of the native Christians was begun. Yung-Ching's reign, which was short, was filled with famines, destructive floods, and earthquakes, which gave him opportunities for paternal care of his people. He died in 1735 and was succeeded by K'ien-lung. Consult H. A. Giles, *China and the Manchus* (London, 1912).

YUNG-LO, yōōng'-lō' (1360–1424). The reign title of Chu-ti, the third Emperor of the Ming dynasty He was the fourth son of Hung-wu (q v), the founder of the dynasty, and in 1403 superseded his nephew Hwei-ti, who had ascended the throne while Chu-ti was absent in the north on a great military expedition. Throwing off his allegiance to the son of his eldest brother, he marched south, overcame all opposition, entered Nanking, the capital, and assumed the Imperial dignity, his nephew disappearing in the disturbances which followed. Yung-lo proved himself a man of great energy and enterprise, but was bigotedly devoted to Buddhism and bestowed the best offices on priests. He patronized literature, and his name is connected with the *Yung-lo Ta Tien*—the "Great Canon of Yung-lo"—an encyclopædia in 22,877 books, besides the contents (60 books), which was prepared by a commission of three eminent scholars, with the assistance of a staff of 2194 literary workers. It was begun in 1405 and completed in 1407. It contained the substance of all the classical, historical, philosophical, and literary works down to that time, and embraced astronomy, geography, occult sciences, medicine, Buddhism, Taoism, and the arts. Many rare works have been preserved in it.

YUNG WING (1828–1912). A Chinese educational reformer. He was born near Macao, of humble parentage, entered a mission at eight years of age, and later the Morrison School, under the Rev. S. R. Brown, and was by him brought to America in 1847. He became a Christian, and devoted his life to the welfare of China. He graduated at Yale College (1854), the first of his race to take a degree from an American college. He conceived a plan for having Chinese youth of promise brought to America for education. He returned to China in 1855. In 1871 his plan was adopted by the government, and the sum of $1,500,000 granted. He was made chief commissioner of the Chinese educational mission, and then placed 112 Chinese young men under a 15 years' course of instruction in the United States He was made a mandarin of the second grade, intendant of the Province of Kiangsu, and was for a while Associate Minister to the United States He returned to the United States in 1902, and thereafter resided in Hartford, Conn. Consult his *My Life in China and America* (New York, 1909).

YUNNAN, yōōn'năn' (Chin., 'cloudy south,' from *yun*, clouds + *nan*, south, in allusion to the banks of fog overhanging the Province of Sze-chuen on the north). One of the 18 provinces of China proper, on the border of Upper Burma (Map: China, H 7). Estimated area, 153,000 square miles; estimated pop., about 11,700,000, composed of Chinese (many of them Mohammedans), Shans, and Lolos. Yunnan consists of a great central plateau 5000 to 7000 feet above sea level, diversified by ranges of hills and mountains, which in some places rise to heights of 7000 feet or more above the plateau. The drainage is partly to the Yang-tse in the north, partly southeast through the Si-kiang, but mostly southward through the Song-koi, the Mekong, and the Salween, which traverse its western parts from north to south. Its rivers have furrowed for themselves deep channels—through the prevailing red sandstones and shales. Lakes are numerous and some of them large. The province is rich in minerals; anthracite coal is widely distributed; copper is extensively mined; silver, lead, tin, zinc, and iron are found and worked; gold is found in the river sands, and salt pits are rather numerous. The chief industries are agriculture, mining, metal working, and lapidary work—jade cutting being one of the most active branches. The jade and other precious stones, however, come from Tammaw, in Upper Burma, and the west. The copper supply of the Empire comes principally from Yunnan, as well as the Chinese German silver, commercially known as *pack-tong* (white copper). The chief agricultural products are rice, wheat, maize, a poor quality of opium, tobacco, a little cotton and silk, tea, and aniseed. The tea grown in the Department of P'u-erh is noted throughout China as more refreshing than any other, and brings a high price. Two towns, Mong-tse and Sze-mao (q.v.), are open to foreign trade, and there is a British consul at Tēng-yueh-chow, on the western frontier. The province shares with Kwei-chow the supervision of a Tsung-tuh or Governor-General. The Governor resides at Yunnanfu (q.v.). A rebellion, begun in 1855 by the killing of 14,000 Mohammedans, lasted until 1873, when it was suppressed with much slaughter. Consult: L. Richard, *Comprehensive Geography of the Chinese Empire* (Shanghai, 1908); H. R. Davies, *Yun-nan, the Link between India and the Yang-tze* (Cambridge, 1909); A. T. Little, *Across Yunnan* (London, 1910).

YUNNANFU, yŭn'năn-fōō'. A city of China, capital of the Province of Yunnan. It stands in a great plain 6420 feet above the level of the sea, near the northeast shore of Lake Tien-ch'ih (Map: China, H 6). Its walls, which have a circuit of 3 miles and are pierced with six gates, inclose in the northern section many swamps and vegetable gardens. The population and the business are in the southern half; the streets are wide and clean, all garbage being collected daily by bullock carts, a most unusual thing in

China. As the extensive suburbs were destroyed during the so-called Mohammedan rebellion (1855–73), most of the business is done within the city. The great salt emporium still exists outside the south gate. The climate is healthful. There are heavy snows in winter. Pop., about 50,000.

YUOKON, yū'ō-kŏn'. An Indian village within the Arctic circle, at the junction of the Porcupine and Yukon rivers, Alaska. Formerly known as Fort Yukon (q.v.).

YURIEV, yur'yĕf. See DORPAT.

YURIEV, UNIVERSITY OF. The official name for the University of Dorpat, in Livonia, Russia. It had its inception in the Gymnasium founded by the Swedish government when it gained possession of Livonia. This institution was changed in 1632 into a university. When war broke out in the north it was transferred in 1699 to Pernau, where it declined rapidly and became extinct in 1710. In 1802 Paul I was led to establish a German university at Dorpat, to induce the students of the Baltic provinces to remain in Russia. Up to 1891 the university was a purely German institution, but since then the government has taken strenuous measures to Russify it. Since 1895 all instruction except in the theological faculty and in zoology is carried on in Russian. Professors were given two years within which to acquire the Russian language. The attendance in 1913 was 2684. The university library, established in 1802, contains over 250,000 volumes.

YUROK, yōō'rŏk (down stream, so called by the upper tribes). A group of tribes, including the Weitspec, Rikwa, and others, and constituting what is known as the Weitspekan linguistic stock, occupying the territory of the lower Klamath River from Trinity to the sea, in northwestern California. They are distinguished for their enterprising disposition, being now industrious laborers among the whites, saving money and accumulating household property. Their houses are square cabins of split logs set upright in the ground, with a small doorway. The women are skillful basket makers. Ordinary weapons in former times were the bow, lance, and knife. Chiefs have but little authority and the men marry but one wife. They bury their dead with the usual funeral rites. They have a number of dances, including one to celebrate the birth of a child. A careful estimate in 1870 made their number about 3000. They numbered 668 in 1910. Consult W. F. Hodge, *Handbook of American Indians* (Washington, 1907).

YURUCARE, yōō'rōō-kä'rā (Quichua, white men), or **YURACARE.** A group of tribes constituting a distinct linguistic stock, living in the forests on the eastern slope of the Andes, about the headwaters of the Beni River, Central Bolivia. They are noted for their light complexion and tall stature (nearly six feet), and for their handsome features. They are hunters and warriors, wild and roving, although some of them were collected into the Chiquito missions during the mission period ending with the expulsion of the Jesuits in 1767. Consult. Adam, *Principes et dictionnaire de la langue Yuracaré ou Yurujuré* (Paris, 1892); A. F. Chamberlain in *Journal de la Société des Américanistes de Paris,* new series, vol. vii (ib., 1910).

YUSCARAN, yus'ka-rän'. The capital town of the Department of El Paraiso, Honduras, 33 miles south-southeast of Tegucigalpa (Map: Central America, D 4). In the vicinity are gold and silver mines. Pop. (est.), 4100.

YUSSUPOV, yus'su-pŏf, NIKOLAI BORISOVITCH (1827–91). A Russian musical scholar and composer, specially interested in the violin. Having studied under Vieuxtemps (q.v.), he wrote a monograph on the violin entitled *Luthomonographie historique et raisonnée* (1856), valuable chiefly for its illustrations. Of another work of his, *Histoire de la Musique et de son avenir en Russie,* only the first part, *Musique sacrée suivie d'un choix de morceaux de chants d'église,* appeared in 1862. His principal compositions are a violin concerto, a programme symphony, *Gonzalvo de Cordova,* and a ballet, *Ballet d'Espagne,* which has inspired a number of violin duets by De Bériot. Yussupov maintained an orchestra, which was led by some distinguished conductors and to which fell the honor of first rehearsals of Glinka's famous opera *A Life for the Tsar.*

YUSUF-IBN-TASHFIN, yōō'suf-ĭb'n-täsh-fēn' (BEN-TASHUFIN or -TAXFYN) (c.1006–1106). A Moorish conqueror, second of the Almoravide (q.v.) dynasty in Morocco and founder of the Almoravide dominion in Spain. He was a cousin of Abu-Bekr, the founder of the dynasty, and succeeded him on the throne, his capital being at Morocco (c.1070). In 1086 he was called into Spain by Al-Mo'tamid, Emir of Seville, to assist in checking the advance of the Castilians under Alfonso VI, and routed the Spaniards at Zalaca (Sacralias), near Badajoz. Recalled to Ceuta by the death of his eldest son, he was unable to follow up his victory, and the Castilians again threatened the hold of the Moors in Spain. At the renewed solicitation of the Emir, Yusuf crossed again into the peninsula (1090). He beat back the Spaniards, made war upon the Moorish princes, and united the whole of the Mohammedan dominions in Spain to the Kingdom of Morocco. Consult: E. A. Freeman, *History and Conquests of the Saracens* (Oxford, 1856).

YUTHIA, yōō'thē-a. See AYUTHIA.

YUZGAT, yuz-gät', or **YOZGAD.** A town in the Vilayet of Angora, Turkey in Asia, capital of a sanjak, situated at an altitude of about 4400 feet, more than 100 miles east of Angora (Map: Turkey in Asia, C 2). The environs of Yuzgat are renowned for their horses and the annual horse fair. Pop., 15,000.

YVERDON, ē'vâr'dŏN'. A town of the Canton of Neuchâtel, Switzerland, at the southwest end of the Lake of Vaud, 23 miles southwest of the city of Neuchâtel (Map: Switzerland, A 2). Its ducal castle (1135) was occupied from 1805 to 1825 by the celebrated school of Pestalozzi. The castle contains the municipal school, a museum of Roman and Celtic antiquities, and a library. There are railroad shops and foundries. Pop., 1900, 7985; 1910, 8626.

YVETOT, ēv'tō'. The capital of an arrondissement in the Department of Seine-Inférieure, France, on the plateau of Caux, 31 miles by rail northeast of Havre (Map: France, N., F 3). The ruins of the Bernardine monastery are occupied by the court and jail. Cloth fabrics and hats are extensively manufactured. Yvetot was long an independent principality, locally called a kingdom. Its sovereignty came to an end in 1681. It has been immortalized by Béranger in his burlesque song, "Le roi d'Yvetot." Pop., 1901, 7352; 1911, 7126.

YVO CARNOTENSIS, ē'vō kär'nō-tĕn'sĭs. See IVO OF CHARTRES.

YZAK, HEINRICH. See ISAAK.

Z

Z The twenty-sixth and last letter in the English alphabet. *Z* is the Greek *zēta* (ζ), and, like *y* (q.v.), was introduced into the Roman alphabet in the reign of Augustus to translıterate Greek words In the Phœnician alphabet it was the seventh letter. For the development of the letter see ALPHABET.

Phonetic Character and Philological Value. As a phonetic chaıacter *z* is the voıced alveolar spırant. In its formation the tip of the tongue approximates the sockets of the upper front teeth and the air rushes over the flattened edge of the tongue with a sibılant sound, *zebra, zinc, gaze.* In English and other modern languages this sound ıs frequently represented by *s,* as in *noses, propose;* Fr. *plaisir,* Ger. *gesungen.* The letter *z* has also the hushıng sound of *zh* in *azure, seizure;* this latter sound is more frequently represented by *s,* as in *measure, treasure.* In derivation English *z* represents Anglo-Saxon *s,* which became voiced when unaccented, as *freeze,* AS. *freosan; sneeze,* AS. *sneosan.* Initially, however, *z* generally indicates a word of foreign origin, as in *zeal, zodiac, zenith,* from the Greek, Arabic, etc, but in the old exclamatıon *zounds* the *z* stands for *s* (God's wounds).

As a Symbol and Abbreviation. In algebra *z* stands for the third variable or unknown quantity, and in analytical geometry one of the system of point coördinates. Consult: Henry Sweet, *Primer of Phonetics* (3d ed., Oxford, 1907); Daniel Jones, *The Pronunciation of English* (Cambridge, 1909); Maurice Prou, *Manuel de paléographie latine et française* (2d ed., Paris, 1910); Sir E. M. Thompson, *Introduction to Greek and Latin Paleography* (London, 1912).

ZAANDAM, zän'däm', or **SAARDAM.** A town in the Province of North Holland, Netherlands, at the meeting of the canalized Zaan and the Y, 6 miles north-northwest of Amsterdam (Map: Netherlands, C 2). It is a typical Dutch town, famous for its cleanliness. The small brick or wooden houses are surrounded by stiffly arranged gardens in which the favorite tulip predominates. Along the banks of the Zaan—in the Zaanstreek—there were formerly more than 400 windmills, but the machinery is now mostly run by steam. These mills are employed in sawing wood, grinding corn, and manufacturing oil, cement, and paint. The cabin occupied for a week in 1697 by Peter the Great, while he worked as a ship carpenter, is an object of great local pride. During the seventeenth century the town had large interests in the whale fishery, and shipbuilding flourished. Pop., 1910, 24,575.

ZABEL, tsä'bel, EUGEN (1851–). A German author, born at Konigsberg, where he studied philosophy and philology. In 1876 he went to Berlin and became associate editor of the *Nationalzeitung.* Besides the monographs *Berthold Auerbach* (1882), *Ivan Turgenieff* (1884), *Graf Schack* (1885), *Anton Rubinstein* (1892), *Hans von Bülow* (1894), *Verestchagin* (1900), and *Tolstoi* (1901), he published *Litterarische Streifzüge durch Russland* (1887); *Im Reiche des Zaren* (1898); *Russische Litteraturbilder* (1899); *Europaische Fahrten* (2 vols, 1901); *Zur modernen Dramaturgie* (1902), of which *Theatergange* (1908) was a continuation; *Moskau* (1902); *St. Petersburg* (1905); *Russische Kulturbilder* (2d ed., 1906), and others. He is also the author of several short stories, as *Getrennte Herzen* (1888) and *Der Stammtisch und andere Chorellen* (1894), and comedies, as *Die Mitternachtssonne, Bauernfanger,* and *Verfehlter Beruf;* of translations from the Greek and modern languages; and of books of travel, including *Auf der sibirischen Bahn nach China* (1904).

ZABERN, tsä'bĕrn (Fr *Saverne*). A town in Alsace, 20 miles northwest of Strassburg, on the Zorn and on the Rhine-Marne Canal (Map: Germany, B 4). The manufactures include agricultural implements, grindstones, leather, and spectacle glasses. Pop., 1910, 8643. Conspicuous are the castle of the bishops of Strassburg, erected in its present form in 1779 and now used as a barrack, and the Hauptkirche, built in the late Gothic style and dating from the second half of the fifteenth century. Zabern, which was the Tres Tabernæ of the Romans, was destroyed by the Alemanni in 357, but in the same year was rebuilt and fortified by Julian. In the tenth century it belonged to the bishops of Metz and then to the bishops of Strassburg. At Zabern in 1525, 18,000 insurgent peasants were massacred In 1622 it withstood the Count von Mansfield; and subsequently was taken by the French, who in 1696 destroyed the fortifications.

In 1913 occurred the "Zabern Incident." This grew out of the attitude of the German officers stationed in the town towards the native Alsatians. A young lieutenant of noble birth remarked that he would give 10 marks to any one who would run his sword through an Alsatian blackguard. The lieutenant was upheld by his superiors and further earned the hatred of the town by striking with his sword a lame cobbler

who jeered at him in the street. As a result of this, antimilitarist meetings were held in different parts of Germany. The Kaiser ordered that the army was to be upheld without compromise or apology. The Reichstag passed a vote of no confidence in the government (293 to 54), but the coalition failed to hold together and the Chancellor was able to announce that his position rested solely upon imperial prerogative and that votes of censure implied no control of the government. The officers involved in the incident were acquitted after trial.

ZABRZE, zäbr'zhe. A village of Silesia, 95 miles southeast of Breslau. It lies in the coal-mining district and near one of the richest mines of Silesia, operated by the state. The place contains a number of machine shops, wire mills, and coke ovens. Pop., 1910, 63,373.

ZACATECAS, tsä'kä-tā'kas. An interior state of Mexico (Map: Mexico, G 6). Area, 24,757 square miles. The state belongs to the central plateau of Mexico and has a mean altitude of over 7000 feet. The western part belongs to the region of the Sierra Madre and rises to about 10,000 feet. The climate is temperate, but dry. Owing to its mountains, Zacatecas has only a limited area of cultivable land but is favorable for grazing. In the southern part, there are tracts of land adapted to cereals and cotton. The chief importance of the state lies in extensive silver deposits, which have been worked since 1548. From 1610 to 1810 at least 670,000,000 pesos were taken from the three famous mining centres of Zacatecas, Fresnillo, and Sombrerete. There are deposits of copper, lead, and quicksilver. The chief products are cotton and woolen goods, sugar, rum, and wine. The state is crossed from north to south by the national railways of Mexico. Pop., 1900, 462,190; 1910, 477,556. Capital, Zacatecas (q.v.).

ZACATECAS. A city of the State of Zacatecas, Mexico, 430 miles by rail northwest of the city of Mexico, in a lofty valley some 8000 feet above the sea (Map: Mexico, G 6). Owing to the narrowness of the valley in which it is situated, the city spreads in irregular blocks, with winding streets, up the sides of the encircling hills. The cathedral, in the heart of the city, with elaborately sculptured façade, unfinished towers, and costly interior, dates from the seventeenth century. The plazas of Juarez and of Villareal, and the paseos of the Alameda and of Cañada de San Francisco, add much to the charm of the city. There is a municipal palace, containing an attractive courtyard, the mint, and the Calderon Theatre. Zacatecas owes its settlement and subsequent prosperity to its silver deposits. In the reduction of the silver ore the ancient and wasteful *patio* process is still employed, though a few foreign firms have introduced modern methods. There are manufactures of pottery, some simple household weaving, and an extensive transit trade. Pop., 1910, 25,900. Zacatecas was founded in 1546 and became a city in 1585. The Franciscan friars from this city played an important part in the early history of Texas. The state and city opposed the centralizing policy of Santa Anna, but were overthrown by him, in 1835, before he departed on his memorable Texas campaign. In 1871 a battle between the government troops and a revolutionary force took place on the Hill of the Bufa. In 1914 Zacatecas was captured by the Constitutionalists after a bloody battle.

ZACATON, sä'kä-tōn'. *Epicampes macroura*, an American grass occurring from Texas to Central America, abundant in Mexico, especially in the states Jalisco and Mexico. The strong, wiry roots are extensively used for brushes, and considerable quantities are exported from Vera Cruz to Europe for this purpose. Recent experiments have shown that the grass is valuable as paper stock, comparing in this respect with esparto (q.v.). The name Zacaton or Saccaton is applied to other grasses, particularly to *Muhlenbergia distichophylla* and *Sporobolus wrightii*.

ZACCHÆUS, zā-kē'ŭs *or* zăk'ē-ŭs. 1. An officer put to death by Judas Maccabæus for treachery (2 Macc. x. 18–22). The Hebrew name was probably Zakkai, pure. 2. A chief publican, or superintendent of customs, at Jericho who climbed up into a fig-mulberry tree to see Jesus, who called him down and asked him to receive him and his companions in his house. Jesus probably learned his name and character from those around him. Zacchæus showed his gratitude by promising to give half of his wealth to the poor and restore four times the amount of which he may have wronged anybody. Doubts as to the historicity of the incident have been expressed by Keim, but they are not of a serious nature. Consult: Theodor Keim, *Geschichte Jesu von Nazara*, vol. iii (Zürich, 1872); Nathaniel Schmidt, *The Prophet of Nazareth* (2d ed., New York, 1907).

ZACH, tsäh, Franz Xaver, Baron von (1754–1832). A German astronomer, born in Pressburg, Hungary. He served for a short time as an officer in the Austrian army, then became private tutor in London, and in 1786 entered the service of Duke Ernst of Saxe-Gotha. The Duke built an observatory for him on the Seeberg, near Gotha, of which Zach was director (1787–1806). Afterward he assisted in the establishment of observatories at Naples and Lucca, and edited the *Monatliche Correspondenz zur Beförderung der Erd- und Himmelskunde* (28 vols., Gotha, 1800–13). He also published *Tabulæ Motuum Solis Novæ et Correctæ* (ib., 1792, supplemented 1804); *Tabulæ Speciales Aberrationis et Nutationis* (ib., 2 vols., 1806–07), and edited *Allgemeine geographische Ephemeriden für 1798 und 1799* (1796), and *Correspondance astronomique, géographique, hydrographique, et statistique* (14 vols., Geneva, 1818–26).

ZACHARIAS, zăk'ä-rī'as, Saint. Pope 741–752. He is notable as one of the Greek prelates by whom the destinies of Rome and Italy were much influenced in the seventh and eighth centuries, and was instrumental in the redemption of captives from the pagan masters by whom they had been held in slavery. Zacharias, by his interposition in more than one instance in favor of the city of Rome with the Lombard kings, contributed to that prestige of the Roman see which eventually led to its obtaining the leadership of Italy, and in the end the temporal sovereignty of Rome and the adjoining territory. He died at Rome on March 14, 752. His letters are in Migne, *Patrologia Latina*, vol. lxxxix, and his Greek translation of the *Dialogues of Pope Gregory the Great* is in the same work, vol. lxxvii. Consult H. K. Mann, *Lives of the Popes in the Early Middle Ages*, vol. i (London, 1902).

ZACHARIÄ VON LINGENTHAL, tsäh'ä-rē'ä fŏn ling'en-täl, Karl Salomo (1769–1843). A German jurist, born at Meissen. He was edu-

cated at Leipzig, and in 1792–94 at Wittenberg, where in 1797 he became professor of law. In 1807 he was called in the same capacity to Heidelberg. The reputation which he earned with his *Handbuch des kursächsischen Lehnrechts* (1796), and with *Die Einheit des Staates und der Kirche* (1797), was greatly increased through the publication of the *Handbuch des französischen Civilrechts* (2 parts, 1808; 8th ed., 4 vols., 1894–95) and of *Vierzig Bücher vom Staate* (5 vols., 1820–32, rev. ed., 7 vols., 1839–43). Consult the biography by Charles Brocher (Paris, 1870).

His son, KARL EDUARD (1812–94), born at Heidelberg, was distinguished as an adapter of Byzantine law, and through his writings really established the science of Græco-Roman jurisprudence. These include: *Delineatio Historiæ Juris Græco-Romani* (1839); *Innere Geschichte des griechisch-römischen Privatrechts* (1864; 3d ed., 1892); *Jus Græco-Romanum* (7 vols., 1856–84), the best collection of Byzantine law books; *Paralipomena ad Basilica* (1893); and an edition of *Justiniani Novellæ* (2 vols., with index, 1881–91).

ZACHTLEVEN, CORNELIS. See SAFTLEVEN, CORNELIS.

ZACK. See KEATS, GWENDOLINE.

ZACYNTHUS, zȧ-sĭn'thŭs. See ZANTE.

ZADOKITES, zā'dok-īts. The probable name of an ancient Jewish sect whose existence has been revealed through a document published by Schechter in 1910. This document consists of two manuscripts, written in Hebrew, one of the tenth century, 16 pages in length, the other, whose text partly overlaps the first, of the eleventh or twelfth century, occupying two pages; both were found in the Geniza of an old synagogue at Fostat, near Cairo, and are now in the library of Cambridge University. The members of the sect are designated as the covenanters in the land of Damascus (viii, 21; xix, 33), but apparently also as the sons of Zadok (iv, 3). From the historical allusions it is evident that a company of priests, Levites, and laymen emigrated from Jerusalem to Damascus and there established a new covenant, or religious community, under the leadership of a teacher of righteousness and interpreter of the law; that among these covenanters a schism broke out headed by a man of lies and a scoffer whose followers perished by the sword some 40 years after the death of the original founder of the sect; and that the covenanters looked forward to the coming of a Messiah from Aaron and Israel, consequently an anointed high priest born in the midst of this true Israel, not a descendant of David, of the tribe of Judah. The statement that this party originated 390 years after the destruction of Jerusalem by Nebuchadnezzar (i, 6) would be a valuable indication of the date of the schism, if there were not reason to suppose that it is simply a vague number borrowed from Ezek. iv. 5, and if the knowledge of the chronology of the Achæmenian period on the part of later Jewish writers were not so defective. In the case the emigration to Damascus is placed in the middle of the second century B.C., it must be chiefly on other grounds. While the Zadokites severely condemned the builders of the wall, by which the Pharisees, or their like-minded predecessors among the scribes, seem to be meant, they were often more strict themselves in their principles of interpreting and applying the law. Thus they treated marriage with a niece as incest, by analogy to the prohibition against marriage with an aunt; they condemned polygamy, quoting Adam, Noah, and the prohibition to the prince to multiply wives, and regarded remarriage after divorce as polygamy; and they construed the raising of an animal that has fallen into a pit or ditch as work forbidden on the Sabbath day. They considered themselves as the true Israel and as a priestly people, and therefore called even the laity sons of Zadok, had six laymen to four priests and Levites in the court of judges, appointed the inspector (mebakker) as regardless of descent as the Christians would a deacon or a bishop, and apparently resorted frequently to the ban to preserve the priestly purity. In addition to the law, which they regarded as having been hidden until it was brought to light again by Zadok, probably the contemporary of Solomon, they also valued the prophets highly, and cherished among their sacred books, not only the hagiographa, but apparently also such works as the *Book of Hagu*, the *Foundations of the Covenant*, the *Book of Jubilees*, and the *Testament of Levi*. They do not seem to have believed in a resurrection or in a life beyond the grave. Though there are points of contact with many dissenting bodies in Judaism, they cannot be identified with any hitherto known sect, not even with the Sadducees with whom, however, they may have been confused by Kirkisani (in 937) and other Karaites. The Zadokites pledged themselves not to enter the temple in Jerusalem to bring fire upon its altar; but in their own house of prostration in Damascus they appear to have offered sacrifices, as the Jews did at Elephantine and Leontopolis. The most probable date for the emigration from Jerusalem would seem to be the end of the high priestly dynasty of the Oniads in 170 B.C. and the desecration of the temple two years later by Antiochus IV. This is the well-considered view of Moore. Levi and Bacher have suggested the years immediately before 70 A.D., Gressmann and Lagrange the Bar Kokba period (132–135 A.D.). Charles thinks the work was written between 18 and 8 B.C. Margoliouth looks upon the Zadokites as a Jewish-Christian sect, and finds allusions to John the Baptist, Jesus, and Paul; but the absence of anything distinctively Christian, even of an Ebionitish type, renders this theory inadmissible. Consult: Solomon Schechter, "Fragments of a Zadokite Work," in *Documents of Jewish Sectaries*, vol. i (Cambridge, 1910); Israel Levi, in *Revue des études juives* (Paris, 1911); G. Margoliouth, in *Athenæum* (London, 1911); G. F. Moore, in *Harvard Theological Review* (Cambridge, Mass., 1911); J. Lagrange, in *Revue biblique internationale* (Paris, 1912); R. H. Charles, *Apocrypha and Pseudepigrapha of the Old Testament* (Oxford, 1913).

ZAFFARINES, zȧf'ȧ-rēnz'. A group of islands off the coast of Morocco. See CHAFARINAS.

ZAFFRE, zăf'ẽr (Fr. *zaffre, saffre, safre*, Sp. *zafre*, probably from Ar. *safrā*, yellow). An impure cobalt oxide prepared by roasting cobalt ore, reducing it to powder, and then mixing with two or three parts of fine sand or ground quartz. It is used as a blue color by enamelers and painters on porcelain and glass.

ZAGAZIG, zä'gȧ-zēg', or **ZAKAZIK.** A town of Lower Egypt, situated on the Muizz Canal, about 20 miles north of Cairo (Map: Egypt, C 1). It lies in a fertile region and carries on a

considerable trade in cotton and grain. It has also a number of cotton-spinning establishments. Pop., 1907, 34,999. In the vicinity is the site of the ancient Bubastis (q.v.).

ZAGOS'KIN, MIKHAIL NIKOLAIEVITCH (1789–1852). A Russian novelist and dramatist, born in the Government of Penza. After a few years in military service he devoted himself to literature, and in 1817 received a position in the directorship of the Imperial Theatre. In 1820, having become favorably known through several comedies, he was made director of a theatre at Moscow and in 1831 director of the court theatre there. Zagoskin wrote several volumes of essays on *Moscow and the Muskovites*, and novels, of which *Yuri Miloslavski* (1829) was the most popular. In 1834 this was translated into English as *The Young Muskovite, or the Poles in Russia*. His books are gracefully written and constitute a good portrayal of Russian manners at various periods.

ZAGREB, zä'grĕb. See AGRAM.

ZAHN, tsän, ERNST (1867–). A Swiss novelist. He was born and educated in Zurich. After spending some time in Italy and England, he returned to Switzerland in 1894 and with his father became proprietor of a restaurant at Göschenen. He occupied several local offices and the presidency of the Landrat of Uri. The University of Geneva gave him an honorary Ph.D. Among Zahn's numerous works are: *Herzenskämpfe* (1893); *Bergvolk* (1896); and *Neue Bergnovellen* (1898), these three being collections of excellent short stories of Swiss mountain folk; *Ernst Beham* (1898), a novel; *Albin Indergand* (1901), one of his best-known novels; *Die Clari-Marie* (1904), a novel; *Lukas Hochstrassers Haus* (1907), another of his popular novels; *Einsamkeit* (1909), artistically perhaps his best piece of work; *Die Frauen von Tannê* (1911), a novel; *Der Apotheker von Klein-Weltwil* (1913), a novel. Some of these went through many editions. His portraits, especially of proud unbending Swiss peasants, are well and faithfully drawn, but here and there are perhaps too melancholy in tone. Consult Erich Schmidt, in *Deutsche Rundschau* (Berlin, 1907).

ZAHN, THEODOR VON (1838–). A German theologian. He was born at Mörs, studied at Basel, Erlangen, and Berlin, lectured at Göttingen in 1868–71, and became professor at Kiel (1871), at Erlangen (1878), at Leipzig (1888), and again at Erlangen (1892). He stands at the head of the conservative New Testament scholarship of his time. Some of his more important writings are: *Der Hirt des Hermas untersucht* (1868); *Patrum Apostolicorum Opera* (1875–78; 5th ed., 1905); *Forschungen zur Geschichte des neutestamentlichen Kanons und der altkirchlichen Litteratur* (8 vols., 1881–1908); *Geschichte des neutestamentlichen Kanons* (2 vols., 1889–92); *Das apostolische Symbolum* (1892; Eng. trans., *The Apostles' Creed*, 1899); *Einleitung in das neue Testament* (2 vols., 1897–1900; 3d ed., 1906–07; Eng. trans., *Introduction to the New Testament*, 3 vols., 1909); *Brot und Salz aus Gottes Wort*, 20 sermons (1901; Eng. trans., *Bread and Salt from the Word of God*, 1905); *Grundriss der Geschichte des neutestamentlichen Kanons* (1901; 2d ed., 1904); *Das Evangelium des Lucas* (1913).

ZÄHRINGEN, tsā'ring-en. The reigning family of Baden. It traces its descent from Gebhard, eldest son of Guntram the Rich, Count of Breisgau, who lived in the early part of the tenth century. His younger brother Lanzelin is said to have been the founder of the Hapsburg line. In 1077 the line of Zähringen divided into the ducal or Zähringen branch, which became extinct in 1218, and the present branch of Baden. The dukes of Zähringen ruled over extensive possessions in what is now southern Baden and northern Switzerland. They had their seat in the castle of Zähringen, which now lies in ruins some 2 miles north of Freiburg. Consult Eduard Heyck, *Geschichte der Herzoge von Zähringen* (Freiburg, 1891).

ZAIMIS, zā'ē-mēs, ALEXANDER (1855–). A Greek statesman, born in Athens. He was educated at the universities of Athens, Leipzig, Berlin, Heidelberg (Ph.D.), and Paris. Elected a deputy in 1885, he was Minister of Justice in the Delijannis cabinet in 1890–92, and served as president of the Chamber of Deputies in 1895–97. After the defeat of the Greeks by the Turks in 1897 he was called to the premiership by King George, but in April, 1899, gave way to Theotokes of the Trikoupist party. He was again head of the ministry in 1901–02. In 1906–11, as High Commissioner of the Powers in Crete, he helped to bring about conditions that resulted in 1913 in the annexation of the island by Greece. When King Constantine blocked the pro-Ally policy of Venizelos (q.v.) during the European War, he called upon Zaimis to form a new cabinet in October, 1915, but the next month the new premier failed to receive a vote of confidence and resigned. He was again called to the premiership in June, 1916, succeeding Skouloudis. See GREECE, *Recent History*, and WAR IN EUROPE.

ZAINAB, zā'ē-nāb'. 1. One of Mohammed's wives. She was the wife of Zaid, the adopted son of the prophet. But Zaid yielded to his wishes and divorced her; a special revelation (Koran xxxiii, 37) gave a general permission which enabled Mohammed to marry her. 2. The wife of Abu Bekr ben Umar, one of the chiefs of the Lamtuna in south Morocco. In her husband's absence in 1058 she commanded the troops and assisted Yusuf ibn Tashfin (q.v.) in his ambitions. She secured a divorce from Abu Bekr and married Yusuf, who, upon the death of the Mahdi, in 1059, assumed the title Amir al Muslimin and became the real founder of the Almoravid Empire. Consult A. Müller, *Islam in Morgen- und Abendland* (Berlin, 1887), and Clement Huart, *Histoire des Arabes* (Paris, 1913).

ZAÏRE, zā'ēr'. 1. The best of Voltaire's tragedies and one of the best dramas of the French classic school. It was produced in Paris, Aug. 13, 1732, and owes much to Shakespeare's *Othello*. 2. An opera by Bellini, produced in 1829.

ZAIRE, zär. See CRUIVE.

ZAKAZIK, zā'kā-zēk'. A town of Egypt. See ZAGAZIG.

ZALDÍVAR, sāl-dē'vär, RAFAEL (1834–1903). A Salvador statesman, born at San Alejo. Educated in medicine and surgery, he so distinguished himself in epidemics of cholera (1857) and yellow fever that he was called in 1860 to the University of Guatemala as professor of physiology and hygiene. In the same year he was elected to the Chamber, and thereafter was a member of the Senate, Minister to Germany, and Minister of War. He was elected President in 1876, in 1880, and in 1884, and greatly im-

proved the finances and industries of the country He was Minister to the United States until shortly before his death, and withdrew because of an arbitration decision adverse to Salvador, growing out of a United States claim in behalf of the Salvador Commercial Company. He was transferred to Paris, where he died.

ZALEUCUS, za-lū'kŭs (Lat, from Gk. *Ζάλευκος, Zaleukos*) (seventh century B C). A celebrated law giver of Epizephyrian Locri, in southern Italy Of his life nothing is known, and most of the traditions in regard to him are untrustworthy. He flourished in the middle of the seventh century B C., and his code is reputed to have been the first written code which any Greek state ever possessed. It is said that the occasion for his legislation was given by an appeal which the people made to the Oracle of Delphi to remedy their troubles, whereon they were told to make laws for themselves. These laws, though most severe, were for a long time greatly celebrated. So averse were the people to a change that if any one proposed a new law, he was obliged to appear in public with a noose around his neck; and if his proposal was rejected the noose was tightened and the proposer strangled on the spot. See GERACE, LOCRIS.

ZALIN'SKI, EDMUND LOUIS GRAY (1849–1909) An American artillerist and inventor, born at Kurnik, Prussian Poland His parents early came to the United States and settled at Seneca Falls, N. Y. Zalinski served in the Civil War, and in 1866 he was appointed second lieutenant in the Fifth United States Artillery, attaining the rank of captain in 1887, and being retired in 1894. In 1872–76 he was professor of military science in the Massachusetts Institute of Technology. He then studied at the Artillery School at Fortress Monroe, Va., where he graduated in 1880, and at the School of Submarine Mining at Willets Point, N. Y. He was one of the first officers of his arm of the service to devote himself to its improvement through the investigation of scientific subjects His *magnum opus* was the pneumatic dynamite gun, long since superseded. From 1888 to 1890 he was in Europe for the United States army, investigating British and Continental ordnance methods and equipment See AIR GUN; ORDNANCE.

ZALUSKI, zä-lōōs'kē, JÓZEF ANDRZEJ (1702–74). A Polish bishop and scholar. He was born of an influential family, and at an early age took orders, becoming canon of Plock and a dignitary of the ecclesiastical courts. After the death of Augustus III he espoused the cause of Stanislas Leszczynski, and with him fled to Lorraine, where he held several benefices He soon returned to Warsaw, however, where he was made Bishop of Kiev. He collected a library of about 250,000 volumes and several thousand manuscripts, to which after 1747 he gave the public free access. This library he bequeathed to the Polish nation, but in 1795, on the final partition of Poland, it was removed to St. Petersburg, where it became the nucleus of the Imperial Library. Zaluski did much toward the awakening of Polish literature. His writings included a *Specimen Historiæ Polonicæ Criticœ* (1733), and a bibliographical chronicle, *Bibljoteka historyków,* edited by Muczkowski (1832).

ZA'MA (Lat., from Gk. *Ζάμα*). In ancient geography, the name of two places about five days' journey southwest of Carthage and somewhat less than 30 miles apart. Inscriptions show that the eastern Zama was near the modern Sidi Amor Djedidi, and the western at Djama. At one of these places the final battle of the Second Punic War was fought in 202 B C. The Romans, under the command of the youthful P. Cornelius Scipio Africanus, defeated completely the Carthaginian forces under Hannibal (q v.). Mommsen holds that the western town, Zama Regia, gave its name to the battle, but this view is not universally accepted.

ZAMACOIS, thä'ma-kō'ēs, EDUARDO (1843–71). A Spanish genre painter, born at Bilbao. He studied chiefly under Madrazo in Madrid, and in Paris under Meissonier, whose art his own somewhat resembles. His works are set in sumptuous interiors, and display great technical dexterity, brilliancy of color, and subtle humor. Many are in the United States, including· "The King's Favorite" and "Sleeping Hunter" (Metropolitan Museum, New York); "Spain 1812—French Occupation" and "Waiting at the Church Door" (Walters collection, Baltimore); and "Fortuny's Model" (Ex-Senator W. A. Clark, New York).

ZAMACOÏS, zä'mä'kō'ēs', MIGUEL (1866–). A French dramatist and poet, son of Eduardo Zamacois, the Spanish painter. He was born at Louvenciennes. He studied at the Beaux-Arts and began his career as a painter. Later he wrote for numerous journals, notably the *Figaro,* and illustrated some of his articles. About 1894 he turned to writing poetry, in which field his work is reminiscent at times of Banville (q v.). Among numerous plays by Zamacois are: *Sang de navet* (1901), *Au bout du fil* (1903); *Bohémos* (1904); *Le gigolo* (1905); *Les bouffons* (1907); *La fleur merveilleuse* (1910); *L'Arche de Noé* (1911).

ZAMAKHSHARI, zä'mäk-shä'rē (Ar. *Abū 'l-Kāsim Mahmūd ibn 'Umar al Zamakhsharī*) (1074–1143). A noted Arabic philologist and exegete. He was born at Zamakhshar, in Persia. According to the usual custom, he traveled extensively for study and spent considerable time in Mecca, from which he acquired the surname Jar Allah, the neighbor (or client) of Allah. He belonged to the sect of the Mutazilites. (See MOHAMMEDAN SECTS.) His principal works, so far as they have been edited by Europeans, are: a commentary on the Koran, edited by Lees (Calcutta, 1856); an Arabic grammar of classic character, edited by Von Broch (Christiania, 1879); an Arabic-Persian Lexicon, edited by Wetzstein (Leipzig, 1844); the *Golden Necklaces,* a collection of moral sayings which has been frequently translated, e.g., by Fleischer (Leipzig, 1835) and by De Meynard (Paris, 1876). Consult: Carl Brockelmann, *Geschichte der arabischen Litteratur,* vol. i (Weimar, 1898); R. A. Nicholson, *A Literary History of the Arabs* (New York, 1907); C. Huart, *Histoire des Arabes* (Paris, 1913).

ZAMBAL, tsäm'bäl. A Malay people closely related to the Tagalog but who, because of long-continued opposition to Spanish rule and the less accessible nature of their country, have advanced more slowly toward civilization. They are found chiefly in the Province of Zambales, on the west coast of Luzon north of Manila Bay. See PHILIPPINE ISLANDS.

ZAMBALES, thäm-bä'läs. A province of Luzon, Philippine Islands, situated on the west coast of the island (Map: Philippine Islands, C 3). Area, including dependent islands, 2125 square miles. Parallel with the shore rise the

Zambales Mountains, whose highest peak reaches 5453 feet. The rivers are unimportant, the roads few and almost impassable during rains. Rice is the most important crop, corn and sugar cane less so. The live-stock industries are good. There are some mines of copper and coal, and the timber resources are extensive. Territory originally forming the northern part of the province was annexed to Pangasinán in 1904. Pop., 1903, 104,549. The Augustinians began work there in 1584, and the Recollets in 1712.

ZAMBEZI, zăm-bē'zi *or* zam-bā'zē, or **ZAMBESI.** A large river of Africa, the fourth in size on the continent. It rises on the boundary between Portuguese West Africa (Angola) and the Belgian Congo in lat 11° S., long 24° E., and flows to the eastern sea in a great double curve forming the letter S (Map: Africa, G 6). First its course lies within Portuguese West Africa, then it crosses the British colony of Rhodesia from north to south and for a short distance separates the latter and German Southwest Africa, after which it traverses Rhodesia in an easterly direction and finally flows through Portuguese East Africa into the Mozambique Channel in lat. 19° S. Its total length is about 1650 miles. The sources are in a marsh of the great plateau, 5000 feet above the sea, close to the sources of the Kassai. The upper course is a low-lying, marshy and unhealthy but fertile valley, about 25 miles wide, which is annually inundated, but after the river has reached the British territory its valley becomes narrow, and its course broken by falls. Shortly after turning eastward it plunges in the great cataract known as the Victoria Falls (q.v.) into a deep transverse rift in the basalt floor, and for the next 40 miles it rushes through a deep and narrow gorge bounded by forest-covered ridges, then for 800 miles it is in general navigable, though broken by rapids as it passes through rocky gorges, and obstructed by sandbanks. The last great interruption is the Kebrabasa Rapids in the Portuguese territory, 400 miles from the sea, from that point to the delta the river is navigable. The delta has an area of several thousand square miles and a coast extension of 100 miles, but the channels are shifting and obstructed. Two of the arms, the Chinde and the Kongoni, are available for navigation, the former carries a depth of 19 feet, the latter 14. Among its chief tributaries are the Shire, which drains Lake Nyassa, and the Kuando. The latter river is also believed to receive water from the Kubango (q.v.) during the wet season, in which case the Kubango becomes the longest tributary of the Zambezi system. Although the total navigable length of the river and its tributaries exceeds 4000 miles, it is of little importance as a commercial route, since the navigable portions are broken into short stretches separated by rapids, and the river is so shallow and obstructed that at low water only small boats can pass. The upper course of the river was first explored by Livingstone in 1854–55. Consult: *Proceedings of Royal Geographical Society* (London, 1890); Coillard, *On the Threshold of Central Africa* (ib., 1897); R. C. F. Maugham, *Zambesia: A General Description of the Valley of the Zambesi River from its Delta to the River Aroangwa, with its History, Agriculture, Flora, Fauna, and Ethnography* (ib., 1910); id., *Wild Game in Zambesia* (ib., 1914).

ZAMBOANGA, thăm'bō-ăn'gȧ. A province in the island of Mindanao, Philippine Islands (Map: Philippine Islands, D 7). Its area, including dependent islands, is 3056 square miles. Three peninsulas, inclosing the Dumanquilas and Sibuguey bays, jut into the Celebes Sea. The westernmost of these is traversed by a low range of mountains, whose highest peak is 1752 feet. The climate is the most healthful of the Philippines, with but little variation in temperature and with a pleasant sea breeze. The plain of Zamboanga is the only cultivated portion, where by means of irrigation a little hemp and rice are produced. Gutta-percha is also a product of the province. The southern portion contains the only settlements of note, of which Zamboanga (q.v.) is the capital. The population consists mainly of the Visayan, Subano, and Moro races. Pop., 1903, 44,322.

ZAMBOANGA. The largest town of the island of Mindanao, Philippine Islands, and the capital of the Province of Zamboanga (Map: Philippine Islands, C 7). The present town, built since the American occupation, with a church, fort, and hospital, is surrounded by a plain covered with coconut groves and rice fields. It is an important market for hemp, copra, and gutta-percha, and is a general commercial point between the waters of the Celebes and Sulu groups and has regular steamer connection with Manila. Its climate is healthful. The town was settled in 1635 as a military basis against the pirates and Moros. Pop., 1903, 3281.

ZAMIA, zā'mĭ-a (Lat., fir cone left to decay on the tree, from Gk. *ζαμία, zamia, ζημία, zēmia,* harm, damage). A genus of cycads restricted to the tropics and subtropics of the western hemisphere. It comprises about 30 species, which range from southern Florida to Chile. The stem is tuberous, covered by an armor of persistent leaf bases, and bears a crown of large pinnate leaves. The central part of the stem contains much starch, especially in old plants, and a kind of sago or arrowroot is made from it. The cones are usually solitary and terminal, the plant being dicœcious. *Zamia* is regarded as perhaps the most specialized of the cycad genera, the most primitive being *Cycas,* which holds an equally prominent place in the oriental tropics. As in all cycads, there is very little development of woody tissue. The only common species in the United States is *Zamia integrifolia,* the coontie, which abounds in low grounds in southern Florida.

ZAMOJSKI, zä-moi'skē. One of the most distinguished families of the Polish nobility.—Jan Zamojski (1541–1605) was born at Skokow, was educated at Strassburg and Padua, and became a leader in Polish affairs. He assisted in the election of Henry of Anjou to the Polish throne (1573) and became grand chamberlain of the King. When Henry returned to France, Zamojski joined the party of Stephen Báthory, and on the latter's election (1575) became Grand Chancellor. He was commander in chief during the war with Russia, 1580–82, and secured favorable terms of peace. On the death of Báthory, in 1586, he threw his influence in favor of the election of Sigismund III, though he himself might have secured the crown. He rendered his country great services by his defense of the borders against the Turks, the Cossacks, and the Swedes. He died at Zamosc in 1605. He was a munificent patron of literature, and himself wrote *De Senatu Romano* (Venice, 1562) and *Testamentum Joannis Zamori* (Mainz,

1606) —ANDRZEJ ZAMOJSKI, COUNT (1716–92), was born at Zdiezun, served for a time in the Saxon army, and reached the rank of major general. On his return to Poland in 1754 he was raised to high offices, becoming Chancellor in 1764 He laid down this post in 1767. He was one of the first nobles to emancipate his serfs. He drew up a code of laws in 1776, the principles of which were incorporated in the constitution of 1791. He died at Zamosc, Feb. 10, 1792. Consult Mazade, *Le comte André Zamoyski et le marquis Wielopolski, deux portraits* (Paris, 1863).—ANDRZEJ ZAMOJSKI (1800–74) was the grandson of the preceding, and studied at Geneva and Edinburgh. In 1823 he entered the Polish civil service, and in 1831 was Minister of the Interior in the revolutionary government. After the failure of the patriotic movement Zamojski returned to his estates, carried on an agricultural paper, started a private bank, introduced steam navigation on the Vistula, and was at the head of a great agricultural association which was regarded with disfavor by the Russian government, and was suppressed in 1862. Zamojski was banished and went to Paris

ZAMORA, thä-mō'rä. A town in the Province of Zamora, Spain, 130 miles northwest of Madrid, on the right bank of the Duero, which is here spanned by a magnificent fourteenth-century bridge of 16 pointed arches (Map: Spain, C 2). The town, on the slope of a hill, is picturesquely marked by its church towers. The cathedral is a twelfth-century structure in Romanesque style. La Magdalena (twelfth century) and the parish church of San Pedro and San Ildefonso are worthy of note. The municipal building dates from 1622. The palace of the provincial deputation has a session chamber with many paintings of the early history of Zamora. The public hospital is an important structure. Among the leading manufactures of the city are serges, linens, leather, hats, brandies, and pottery. Pop, 1900, 16,417; 1910, 16,955. Zamora is of ancient but uncertain origin. It figured in the wars between the Christians and the Mohammedans. It was at times the residence of the kings of León and Castile and the meeting place of the Cortes It was prominent during the War of the Communes.

ZAMOSC, zä'mōsch (Russ. *Zamostye*). A district town in the Government of Lublin, Russian Poland, 55 miles southeast of Lublin. It manufactures bent furniture. Pop., 1910, 14,633, chiefly Poles.

ZAMOUSE, zä-mōōs'. The West African buffalo (q.v.).

ZAMPIERI, tsäm'pē-ā'rē, DOMENICO. See DOMENICHINO.

ZAMUCUS. See SAMUCAN.

ZANARDELLI, dzä'när-dĕl'lē, GIUSEPPE (1826–1903). An Italian statesman, born at Brescia, and educated in law at the University of Padua. He took part in the rising against Austria in 1848–49, and in 1851–58 was a private tutor at Brescia. In 1860 he was elected to the new Italian Parliament at Turin, and from that time he was a prominent liberal member of the Chamber. When the Left first came into power with Depretis (q.v.) in 1876, Zanardelli accepted the portfolio of Public Works, but resigned in 1877. He was Minister of the Interior in 1878, and in 1881–83 was Minister of Justice, a post he again filled in 1887–91 and in 1897–98. He became Premier at the fall of Saracco in 1901, and held office till October, 1903, when he resigned, dying shortly after.

ZAN'CLE. See MESSINA

ZANDEH, zän'dĕ See NIAM NIAM.

ZANDONAI, dzän'dō-nä'ē, RICCARDO (1883–). An Italian dramatic composer, born at Sacco in Trentino. He received his first instruction from Gianferrari at Rovereto, and from 1898 to 1901 was a pupil of the conservatory at Pesaro. He is the composer of the operas *Il Grillo del Focolare* (1908), *Conchita* (1911; produced in San Francisco, 1912), *Melenis* (1912), *Francesca da Rimini* (1914). A *Messa da Requiem* was produced at the Pantheon in March, 1916. He also wrote some instrumental pieces for orchestra and chamber music.

ZANE, EBENEZER (1747–1811). An American pioneer, born in Berkeley Co, Va. (now West Va.). In 1770 he made the first permanent settlement on the Ohio River (where Wheeling now stands), building there a blockhouse called Fort Henry, which was several times attacked by Indians during the Revolution. He owned the land on which the present Zanesville stands, and assisted in laying out the original settlement there.

ZANELLA, dzä-nĕl'la, GIACOMO (1820–88). An Italian poet and critic, born at Chiampo (Veneto). He was educated at the Seminary of Vicenza, and was ordained in 1843 He taught in the Seminary of Vicenza, then in a lyceum at Venice (1857), later in Padua, where (1866–76) he was professor of Italian literature in the university His verse, of which the *Conchiglia fossile* is the best, is inspired by simple ideals of religion and morals, by classic memories, and patriotic fervor. In the revolution he was the most prominent example of the prete garibaldin type. His prose works include: *Storia della letteratura italiana* (1880); *Vita de Andrea Palladio* (1880); *Paralleli letterari* (1885). Consult Biadego, *Saggio bibliografico degli scritti a stampa di Giacomo Zanella* (Lucca, 1888); A. Zardo, *Giacomo Zanella nella vita e nelle opere* (Florence, 1905); A. Graf, *Poesia di Giacomo Zanella* (ib., 1910).

ZANESVILLE, zānz'vĭl. A city and the county seat of Muskingum Co., Ohio, 60 miles east of Columbus, at the confluence of the Muskingum and Licking rivers, and on the Baltimore and Ohio, the Zanesville and Western, the Ohio Electric, the Ohio River and Western, the Pennsylvania, and the Wheeling and Lake Erie railroads (Map: Ohio, G 6). It has an attractive situation, flanked by lofty hills, and is well laid out. Among the noteworthy features are the bridges spanning the Muskingum and Licking rivers, the county courthouse, city jail, Soldiers' and Sailors' Memorial Hall, John McIntire Library, high school, and the buildings of the various fraternal organizations. There are six parks. Zanesville is situated in a region engaged in farming, and having extensive deposits of limestone, clay, and coal. Good water power for manufacturing is derived from both rivers. The manufacture of tile, pottery, terra cotta, tubes, and fire-clay products is the leading industry The Baltimore and Ohio Railroad maintains shops here, and there are also foundries and machine shops, farm-implement works, flouring mills, lumber and planing mills, and manufactories of soap and candles, iron and steel, paving material, malt liquors, etc. Pop., 1900, 23,538; 1910, 28,026; 1915 (U. S. est.), 30,406; 1920, 29,569.

ZAN'GA. A revengeful Moor in Edward Young's tragedy *The Revenge*. The part was made famous by Macready and John Kemble

ZANGWILL, ISRAEL (1864–1926). A British author born of Hebrew parents in London. He was educated at the Jews' Free School, Spitalfields, in the East End of London. He traveled and lectured in Great Britain, Ireland, Holland, Palestine, and the United States. Of the English Men's League for Women's Suffrage he was elected vice president, and he became prominent in the Zionist Movement (q.v.). In literature he met with success in the essay, the humorous sketch, the drama, and the novel, especially the novel depicting Jewish scenes and characters. His Jewish studies comprise mainly, *Children of the Ghetto* (1892), *Ghetto Tragedies* (1893); *The King of Schnorrers* (1894), grotesques and fantasies; *Dreamers of the Ghetto* (1898), containing admirable sketches of great Jewish thinkers, as Spinoza and Lassalle; *They that Walk in Darkness* (1899), *The Mantle of Elijah* (1900); and *Ghetto Comedies* (1907). Among his other writings are: *The Premier and the Painter* (1888), *The Bachelor's Club* (1891); *The Big Bow Mystery* (1892); *The Old Maids' Club* (1892), *Merely Mary Ann* (1893); *Without Prejudice* (1896), collected essays; *The Celibates' Club* (1905); *Italian Fantasies* (1910). Zangwill also wrote verse and he did notable work as a dramatist He will be remembered especially for *The Melting Pot* (1908), an impressive play dealing with immigration problems. *Children of the Ghetto* was also produced successfully Among other of his plays, all in published form, are *The War God* (1911), *The Next Religion* (1912), and *Plaster Saints* (1914).

ZANONI, zȧ-nō'nĭ. A mystical historical novel by Bulwer Lytton (1842). A first sketch, entitled "Zicca," appeared in *The Monthly Chronicle* during the preceding year.

ZANTE, zăn'tē *or* zan'te, now officially designated by its ancient name of Zakynthos. The southernmost Ionian island situated 8 miles south of Cephalonia and 9 miles west of the Peloponnesus (Map: Greece, B 6). Area, 277 square miles. The western part of this beautiful island is characterized by chalk mountains reaching a height of about 2700 feet. The eastern part is a rich plain flanked by the peak of Skopos. The island is subject to earthquakes. Its springs of mineral pitch have been known since the time of the ancient Greeks. The soil is fertile. Two-thirds of the area is in vine. Wine, olives, and fruits are exported. Zante is noted for currants, the shipments of which are, however, not so valuable as formerly. The principal import is Russian wheat. The capital is Zante. Since the earthquake of 1893 the island has not regained its former properous condition. Pop., 1907, 42,502. In ancient times Zacynthos was an independent state; became a member of the confederacy of Delos; passed under the rule of Macedon, and then of Rome; and became identified with the destinies of the Ionian Isles, with which it was annexed to Greece in 1864. At the end of the eighteenth century the island was the centre of Greek artistic life.

ZANTE. The capital and chief port of the Greek island and nomarchy of Zante (Map: Greece, B 6). It is situated on the east shore of the island at the foot of a mountain crowned by a citadel built by the Venetians. It has a good harbor, a custom house, and an arsenal, and manufactures carpets and gold and silver articles It shares, however, in the general backward condition of the island. Pop, 1907, 13,580.

ZANTHOXYLUM, (Neo-Lat, from Gk. ξάνθος, *xanthos*, yellow + ξύλον, *xylon*, wood), often spelled *Xanthoxylum* A genus of more or less prickly trees and shrubs, belonging to the dicotyledonous family Rutaceæ It comprises about 150 species, natives of temperate and tropical regions, four species occurring in the United States. The northern species is *Z. americana*, known as prickly ash or toothache tree. It is a shrub or small tree whose pinnate leaves suggest those of the ash, and occurs from Quebec to Virginia, and westward to western Ontario, South Dakota, and Kansas. *Z. clava-herculis*, known as Hercules' Club or southern prickly ash, occurs along streams from the coast of southern Virginia to Florida, and westward to Texas and Arkansas.

ZANZIBAR, zan'zĭ-bär' *or* zăn'zĭ-bär. A sultanate and British protectorate of East Africa (Map: Africa, J 5). The protectorate, proclaimed in November, 1890, in conformity with conventions by which Great Britain ceded Helgoland to Germany and renounced all claims to Madagascar in favor of France, consists of the islands of Zanzibar and Pemba and some adjacent islets The sultanate was formerly of much greater extent, including on the mainland of Africa a strip of coast 10 miles deep from Warsheikh to Tunghi Bay. This coastal territory was divided among Great Britain, Italy, and Germany in 1890. The area of the protectorate is stated at 1020 square miles. The island of Zanzibar is separated from the mainland by a channel 22½ miles wide at its narrowest part; it is about 48 miles long by 15 broad and has an area of 640 square miles. About 30 miles to the northeast is the island of Pemba (q.v.), with an area of 380 square miles. The east coast of Zanzibar island is steep, forbidding, and difficult of access. The region to the west is generally flat and arid, poorly covered with trees, presenting a Karst formation, and characterized by coral stone West of this portion is the rich, cultivated part of the island, with rows of hills diversified in sections by swamps. It is well watered with flowing streams. The west coast is easy of approach. It is supplied with bays with deep water near the shores, which are fringed by islets. The climate is generally favorable, fevers threatening only in the interior. The mean annual temperature is 79.7° F. The annual rainfall is about 58 inches in Zanzibar and 83 inches in Pemba. The flora is equatorial, but some of it not well known. Among the fauna are the civet cat, monkeys, python, chameleon, and iguana. The fisheries are productive. Agriculture and trade are the leading pursuits. Sugar cane and manioc are raised. Sorghum and red pepper figure prominently. In the clove industry the protectorate leads the world. In Zanzibar and Pemba together about 60,000 acres are under cloves, and in recent years the annual production has been about 14,000,000 pounds. The coco palm flourishes and contributes largely to the exports. The town of Zanzibar is one of the finest ports in Africa. Trade is mostly with Great Britain. In 1905 the port was visited by ocean-going vessels with a tonnage of 427,113; in 1913, 834,100. The exports are largely cloves, rubber, ivory, copra, and chillies; the imports, rice,

piece goods, and coal. Imports and exports in 1913, £1,103,347 and £1,048,866. The British administer justice and all other branches of authority, only a shadow of power being left to the Sultan. Zanzibar is the capital and only large town (pop., 35,000). The 1910 census showed a population of 197,199, estimate of Dec. 31, 1913, 199,462, of whom 116,307 in Zanzibar island and 83,155 in Pemba. The black population, though mostly Swahili, is very heterogeneous Europeans number about 250 and East Indians about 10,000, through their hands passes almost the entire trade. Arabs, who number about 10,000, are the principal landlords and employers of labor About one-half of the inhabitants are former slaves from the adjacent coast, who till the fields and do the domestic service. The ancient race is the Mohammedan Wahadimu, who have been forced back into the forbidding coral districts. Slavery was abolished by compensation in 1897. The prevailing religion is Islam; most of the natives are Sunnis of the Shafi school, while the Sultan and his relatives belong to the Ibadhi sect. There are three Christian missions. Consult: H. S. Newman, *Banani: The Transition from Slavery to Freedom in Zanzibar and Pemba* (London, 1898); W. W. A. FitzGerald, *Travels in the Coastlands of British East Africa* (ib., 1898); R. N. Lyne, *Zanzibar in Contemporary Times* (ib, 1905); J. E. E. Craster, *Pemba: The Spice Island of Zanzibar* (London, 1913).

ZAPARO, sä-pä'rō. An important group of tribes in Ecuador, constituting a distinct linguistic stock, in the country between the Upper Napo and Pastasa, frequently coming down to the Marañon (Amazon). The tribes are continually at war with one another, but unite against a common enemy. They are indolent, good-tempered, and hospitable, hardy, dexterous in throwing the lance, and daring boatmen. They live under roofs raised upon posts, with no conveniences except hammocks for sleeping. A few tribes cultivate the ground Their weapons are the club, lance, and blowpipe with poisoned arrows. Their language, of which considerable material has been collected, is agreeable in sound and simple in construction. They are variously estimated to number from 10,000 to 20,000. Consult Beuchat and Rivet in *Journal de la Société des Américanistes de Paris*, new series, vol. v (Paris, 1908).

ZAPATA, sä-pä'ta, Emiliano (c 1869–). A Mexican revolutionary leader, born in the State of Morelos. He was early a small landholder, whose possessions were confiscated during the Diaz régime. He became a political agitator, was banished to Quintana Roo, but lived to return to his native state. At the time of the Madero revolt in 1910, Zapata also took up arms against Diaz and issued the Plan of Ayala, a programme of agrarian reform. From 1911 to 1916 he waged a warfare in the states of Morelos and Guerrero against those who were in control of the capital, successively refusing to join Madero, Huerta, and Carranza, as they would not accept the Plan of Ayala. For a time during 1914 he coöperated with the Convention and Villa (q.v.), but when he occupied Mexico City (November 24), he declared he would set up his own government. The following year he was in possession of the capital for brief periods in March and July. During 1915–16 he had an army of about 10,000 men and was often operating near the capital. At that time he claimed to be fighting to free Mexico of foreigners, to return to the Indians the lands taken from them by the governments of Diaz, Madero, and Carranza, and to give Mexico an honest president (himself), who would render justice to all classes. See Mexico, *History*.

ZÁPOLYA, zä'pōl-yŏ. An Hungarian royal family of Slavic descent.—Stephen Zápolya, Voivode of Transylvania, was one of the generals of Matthias Corvinus He took part in the conquest of the Archduchy of Austria, and was made its Governor. He died in 1499.—His son, John Zápolya (c.1487–1540), Voivode of Transylvania, was elected King of Hungary by the National party after the death of Louis II at Mohács in 1526. His rival was Ferdinand of Austria. The claimants to the throne waged war against each other at intervals for several years, John Zápolya being supported by the Sultan Solyman the Magnificent. In 1538 the Treaty of Grosswardein was made, by which the kingdom was divided between them John Sigismund Zápolya, son of John Zápolya (1540–71), was recognized by Sultan Solyman as King of Hungary, but had to be satisfied with Transylvania and eastern Hungary. His subjects joined the reformed religion. He was succeeded by Stephen Báthory. Consult Mihály Horváth, *Kurzgefasste Geschichte Ungarns* (Ger. trans., 2d ed., 2 vols, in 1, Budapest, 1876), and Gyula Andrássy, *The Development of Hungarian Constitutional Liberty* (Eng. trans., London, 1908).

ZAPOTEC, sä'pō-tĕk'. An important ancient cultured nation of southern Mexico, occupying the greater portion of the present State of Oaxaca, where their descendants still number more than 250,000. It was long believed that the Zapotecan linguistic stock included the Mixtec and the Mazatec, but later studies have shown this to be unlikely. They formed an independent state, as civilized as the Aztec, and were sedentary and agricultural, living in villages and cities with houses built of stone and mortar. The ruins of Mitla (q.v.), among the most remarkable on the American continent, are ascribed to the Zapotec, and according to their own tradition were originally sepulchral in purpose. Their records were kept by means of a hieroglyphic calendar, upon the general plan of that in use among the neighboring nations. The modern Zapotec are intelligent, industrious, and progressive. They still hold to many of their ancient beliefs and rites, among which are the burial of money with the dead. Consult Mechling, "The Indian linguistic stocks of Oaxaca, Mexico," in *American Anthropologist*, vol. xiv (Lancaster, Pa., 1912), and for a general review of Zapotecan civilization, Eduard Seler, "Wall Paintings of Mitla," in Bureau of American Ethnology, *Bulletin No. 28* (Washington, 1904).

ZAPOTLANEJO, sä-pōt'lä-nā'hŏ. A town in the State of Jalisco, Mexico, 22 miles east of Guadalajara. Near the town occurred the battle on the bridge of Calderon, Jan. 17, 1811, in which the Royalist Calleja inflicted a crushing defeat upon the revolutionary forces under Hidalgo (q.v.). Municipal pop., 1910, 20,750.

ZAPUPE, sä-pōō'pä. A Mexican fibre plant belonging to the genus *Agave*. The fibre has been introduced into commerce as a substitute for sisal (q.v.). The plant is strictly tropical and succeeds well under varied conditions of climate and soil. It is produced most abun-

dantly about Vera Cruz, Mexico, and is said to have been in cultivation in Tuxpan since about 1900.

ZARA, zä'rä (Slav *Zadar*). The capital of the Austrian Crownland of Dalmatia, on the coast of the Adriatic, 130 miles southeast of Trieste (Map: Austria, D 4). It is built in the form of an oval, on a narrow promontory, separated from the mainland by a moat, across which is a drawbridge. The ramparts afford a fine promenade to the inhabitants. There is a spacious and well-protected though somewhat shallow harbor. The streets generally are narrow and ill paved, and the drainage defective; the town is not well supplied with water. Of its churches, the most noteworthy are its cathedral, founded by Enrico Dandolo, Doge of Venice, and the church of its patron saint, Simeon. There is a lofty marble column, which is all that is left standing of the ancient Roman temple. The commerce of late has shown considerable increase. Many of the inhabitants are engaged in fishing and in the coasting trade. The chief manufactures are rosoglio, maraschino, leather, silk, and linen fabrics. Pop. (town), 1910, 13,074. Zara is the Iadera, or Diadora, of the ancients. In the Middle Ages Venice and Hungary long contended for the possession of the town, which was a place of commercial importance. In 1202 the Venetians, with the aid of the Crusaders, reduced it, but they subsequently lost it. In 1409 they purchased it from Ladislas, King of Naples, claimant of the crown of Hungary. It subsequently shared the fortunes of Dalmatia (q.v.)

ZARA, zä'rä. The heroine of Congreve's tragedy *The Mourning Bride*, from whose lines in the third act has been derived the proverbial warning, "Hell hath no fury like a woman scorned."

ZARAFSHAN, zä'rä-f-shän'. See ZERAFSHAN.

ZARAGOZA, thä'rä-gō'thä. See SARAGOSSA.

ZARATHUSTRA, zä'ra-thōōs'tra. See ZOROASTER.

ZAREMBA, zä-rĕm'bä, SIGISMUND VLADISLAVOVITCH (1861–). A Russian composer, born at Zhitomir, son of Vladislav Ivanovitch Zaremba, also a composer. He studied with his father (piano) and Sattel and Alois (cello). From 1896 to 1901 he was director of the Imperial Russian Music Society and conductor of the symphony concerts at Voronesh. After that he lived in St. Petersburg. His compositions, which are distinguished by spontaneity and melodiousness, include a suite for string orchestra, a polonaise for full orchestra, a Slavic dance, a string quartet, piano music, romances, etc.

ZARLINO, dzär-lē'nō, GIUSEPPE (1517–90). An Italian composer and musical theorist, born at Chioggia. In 1537 he became a member of the Franciscan Order, and in 1541 went to Venice in order to complete his studies with Willaert. He became *maestro di cappella* at St. Mark's in 1565, and held the position until his death. His extant compositions number only 21. Among these are *Modulationes* (1566); three *Lectiones pro Mortuis* (1563); and a mass. His theoretical works are *Istituzioni harmoniche* (1558), in which Zarlino recognizes the natural opposition of the major and minor triads, taken up later by Tartini, and more successfully by Hauptmann, and also gives clear and practical demonstrations of double counterpoint and canon, illustrated by a number of examples in notes; *Dimostrazioni harmoniche* (1571); and *Sopplimenti musicali* (1588). See HARMONY.

ZARNCKE, tsärn'ke, FRIEDRICH (1825–91). A German philologist and historian of literature. He was born at Zahrenstorf, in Mecklenburg-Schwerin, and was educated at the universities of Leipzig, Berlin, and Rostock. In 1850 he founded at Leipzig the *Litterarisches Centralblatt fur Deutschland*, in 1852 became privatdocent at the university, and in 1858 was made full professor. His contributions to the study of comparative literature were of especial value, notably in the fields of saga and romance. Among the more important of his numerous publications are: *Der deutsche Cato* (1852); *Sebastian Brants Narrenschiff* (ed., 1854); *Zur Nibelungenfrage* (1854); *Das Nibelungenlied* (ed., 1856; and after); *Mittelhochdeutsches Worterbuch* (1863), with W. Muller; *Ueber den althochdeutschen Gesang vom heiligen Georg* (1874); *Der Graltempel* (1876); *Der Priester Johannes* (1876–79); *Christian Reuter* (1884), *Kleine Schriften* (2 vols., 1897). Consult Vogt, "Friedrich Zarncke," in *Zeitschrift fur deutsche Philologie*, vol. xxv (Halle, 1892).

ZARY'TUS. See BIZERTA.

ZARZUELA, thär'thōō-ā'lä. In Spain, a short two-act musical drama of a light order resembling our comic opera or operetta. It is interspersed with a great deal of spoken dialogue. The name is derived from the Spanish town of Zarzuela, where during the seventeenth century the first works of this kind were produced at the royal castle.

ZARZUELA. See CRUZ CANO Y OLMEDILLA.

ZASLAVL, zäs-läv'l' (Russ. *Iziaslavl*). An ancient town of Volhynia, southwest Russia, about 80 miles west of Zhitomir. It has extensive sugar mills and paper mills. Pop., 1911, 14,448.

ZASULITCH, za-sōō'lêch, VIERA IVANOVNA (1851–1921). A Russian revolutionist. In 1869, though only an acquaintance of one who was indirectly connected with the revolutionary plot of Netchaev, she was arrested and imprisoned for two years, after which she was placed under police surveillance and for several years was sent about from place to place in eastern Russia. In 1876 she was freed from prison, but the flogging of the student Bogolyubov by order of General Trepov, head of the secret police, whom the student refused to salute, aroused her. On Feb. 5, 1878, she called at Trepov's office and shot him, but not fatally. At her trial on April 12 she claimed that her object was to direct the government's attention to the outrage. The jury, of which eight were government officials, unanimously acquitted her. The spectators, mostly of high social standing, met the verdict with approval, and the press commended it. Yielding to public opinion, the government removed Trepov, promoting him to the post of general of cavalry. Four newspapers received warning, political offenses were almost entirely exempted from trial by jury, and on June 11 the Supreme Court of Appeals canceled the acquittal on the ground of informality. In 1880 Zasulitch escaped abroad, and lived chiefly in Switzerland, taking an active part in the Russian revolutionary propaganda. In 1905, encouraged by the amnesty granted by the Czar, she returned to Russia. She wrote on social, political, and literary subjects, her papers being collected in two volumes (1906).

ZAUBERFLÖTE, tsou'bĕr-flē'te, DIE (Ger.,

The Magic Flute). An opera by Mozart (q.v.), first produced in Vienna, Oct 7, 1791; in the United States, Nov. 21, 1859 (New York).

ZDONSKAWOLA, zdōōn'y'-skȧ-vō'lya. A town in the Government of Kalish, Russian Poland, about 40 miles west of Lodz. It has manufactures of cotton and woolen goods. Pop., 1910, 23,452.

ZE'A, or **KE'A** (Lat. *Cea*, from Gk. *Kía*, *Kía*, *Kéos*, *Keōs*). The northwesternmost island of the Cyclades, 13 miles east of Cape Colonna, 14 miles in length, and 8 in greatest breadth (Map: Greece, F 6). Its surface rises from the coast in terraces, culminating in the centre in Mount St Elias, about 1700 feet in height. The climate is healthy, and the soil fertile The products are wine, fruit, barley, cotton, and silk. Attention is paid to the rearing of cattle and silkworms. Pop., 1909, according to Baedeker, 3863. The island anciently possessed four towns, Iulis, Coressia, Carthæa, and Poieëssa, but there is now only one, Zea, situated on the northwest slope of the mountain, about 3 miles from the coast, on the site of the ancient Iulis Near it is a colossal lion, and there are other less important remains of the ancient city. A few remains are still to be found on the sites of the other three ancient towns The harbor of Zea, Port St. Nicholas, about 3 miles from the town, admits the largest vessels, and is much used.

ZEA, zē'a. See PIRAEUS.

ZE'A. See MAIZE.

ZEA, sā'a, FRANCISCO ANTONIO (1770–1822). A Colombian naturalist, author, and statesman, born in Medellín and educated at Popayán and Bogotá. In the latter city he became associated with the Spanish botanist Mutis. While a tutor of natural history in the College of San Bartolomé at Bogotá he was sent to Spain and imprisoned for two years at Cadiz for circulating the political pamphlet *Los derechos del hombre* (1795). He was released on condition that he should not return to his country. Upon the recommendation of Mutis he was well received in scientific circles at Madrid, and was granted a pension to continue his studies in Paris. After his return to Madrid in 1801 he was appointed director of the botanical garden, and assumed the editorship of the *Semanario de Agricultura* (1805) and of *El Mercurio de España*. He was repeatedly refused permission to return to his native country, but finally managed to do so in 1815 as a result of his association with the French. With Bolívar (q.v.) he took an active part in the war of independence, founded the *Correo del Orinoco* (1818), became a member and the president of the first Constituent Assembly at Angostura (1819), and was elected Vice President of Venezuela and later of the new Colombian republic (1819). In 1820 he was sent to Europe as Minister to England and France, with instructions to negotiate loans in behalf of the new government. So ruinous were the terms he made that his credentials were canceled, and he retired to England in disgrace. There he died, at Bath, in 1822. His publications include: *Memoria sobre la quina según los principios de Mutis* (1800); *Las ruinas de la Nueva Granada* (1805); *Descripción del Salto de Tequendama* (1805); *Historia de Colombia* (1821); and *Colombia* (1822).

ZEALAND, zē'land, **ZEELAND**, or **SEELAND** (Dan. *Sjælland*). The largest and most important island of Denmark. It lies between the Cattegat and the Baltic, and is separated by the Sound from Sweden, and by the Great Belt from Fünen (Map: Denmark, E 3). Length, 81 miles; extreme breadth, 67 miles, area, 2682 square miles. The surface is low and gently undulating; the coasts, which are rock bound on the southeast, are indented by bays and fiords, the chief of which is the Roskilde-Isefiord in the north. The rivers are small, the largest being only 50 miles long, but there are several lakes. The island is exceedingly fertile. Agriculture and cattle breeding are the principal employments. The chief city is Copenhagen (q.v.). Pop. (including the islands of Moen, Amager, and other neighboring islets), 1911, 1,096,897.

ZEALAND, Dutch **ZEELAND**, zā'lant. A province of the Netherlands, occupying the southwestern region of the country (Map: Netherlands, B 3). Zealand consists mostly of islands, embracing Schouwen, Walcheren, Tholen, and North and South Beveland. They are formed by the estuary of the Scheldt, whose wide arms—the Hond or West Scheldt, and the Ooster Scheldt—traverse the province Area, 690 square miles. Dikes and dunes line the borders of the province. The islands are extremely low, and for the most part farmed. Grain and vegetables are raised. There are oyster fisheries, some manufactures, and a commerce in grain. Pop, 1910, 233,478; 1912, 236,149. Capital, Middelburg.

ZEALOT (Gk. *ζηλωτῆs*, *zēlōtēs*, an emulator, enthusiastic follower, or admirer, from *ζῆλος*, *zēlos*, emulation, zeal, from *ζεἰν*, *zein*, to boil, seethe). A term applied by Luke (vi. 15; Acts i. 13) to Simon, one of the 12 Apostles, probably to distinguish him from the better known Simon Peter. In the list in Mark (iii. 18) and in Matthew (x. 4) this Simon is called the Cananæan (*Κανανaῖos*). The two words, zealot and Cananæan, are equivalents, the latter being simply the Greek reproduction, with ending denoting sect, of the Aramaic *Qana'n* from *Qān'*, to become red, to burn, to be zealous. The Zealots were a more or less closely organized party among the Jews, embracing the more fanatical elements of the population, whose watchword was complete political independence of Roman control. Simon, previous to his discipleship, probably had some connection with this party. The details of their early history are unknown. It was their lawless violence that precipitated the great war with Rome (66–70 A.D.) which resulted in the destruction of the Jewish nation.

ZEBRA (African name). The name in general of all the African striped species of the horse family (Equidæ), of which four species are usually recognized, viz., the true or mountain zebra (*Equus zebra*), Burchell's zebra (*Equus burchelli*), Grévy's zebra (*Equus grevyi*), and the quagga (*Equus quagga*). The last-named was only partly striped and is extinct. (See QUAGGA.) The true zebra is now nearly extinct. (See EXTINCT ANIMALS.) It was an inhabitant of South Africa, and especially of mountainous districts, where it roved in small bands. It was the smallest of the group, standing a trifle over 4 feet high at the withers, and had relatively long ears, a comparatively short mane, and a scantily haired tail. Its ground color was white (brownish on the face), and the stripes were black, and arranged as shown on the Plate accompanying the article EQUIDÆ. Originally abundant in Cape Colony,

all that remain of this species are a few carefully protected herds.

The zebra now most often seen in South Africa and in menageries, is Burchell's, which the Boers call "quagga" (q.v.). See also Colored Plate accompanying article HORSE. Many hybrids have been produced between this zebra and both the horse and the ass; but the results are not encouraging. For the interesting phenomena of Ewart's experiments with these hybrids see HYBRIDITY, TELEGONY.

The third species, Grévy's zebra, inhabits the hilly regions from the Victoria Nyanza north and east to Central Somaliland. It is taller and slimmer than the true zebra, and like it is striped down to the hoofs; but in other respects it more resembles Burchell's. It is distinguished from both by the much greater number of stripes, which are very narrow, deep black, and separated by narrow white streaks; the pattern of striping is its own, also, the transverse black lines reaching much farther across the sides, and the oblique stripes on the haunches being short. These zebras prefer hill forests and are known in their region as mountain zebras in distinction from the plains-roving Burchell's. Several varieties have been described and named, as Chapman's, Grant's, Selous's, etc., but all seem referable to this single species, which was probably the one called by the ancients hippotigris. The habits of all zebras are much the same as those of wild asses, or of wild horses, and it is believed that Grévy's zebra comes nearest of all existing Equidæ to some of the more recent extinct horses, as Hipparion. It is, indeed, very difficult to distinguish one of these so-called species from another, or from the horses, except by the variable and transitory external characters. Their flesh is most excellent food, and their hides have value for leather, as well as for making rugs and ornamental articles, and zebra hunting is an attractive sport. Consequently the race is rapidly decreasing.

ZEBRA CATERPILLAR. The larva of a noctuid moth (*Mamestra picta*), named in reference to the colors of the black and yellow striped larva which feeds upon the leaves of many garden fruit bushes, vegetables, and flowers. The moths issue in May and deposit the eggs for the summer generation. The caterpillars from these eggs mature early in June, and a second generation of moths appears in August, the offspring of which are frequently so numerous as to cause considerable damage to autumnal crops. They hibernate as pupæ. When young the caterpillars feed in companies, but when older separate. They are readily destroyed when young by pyrethrum powder, and later by an arsenical spray. See HOP INSECTS

ZEBRA MOTH. See ZEBRA CATERPILLAR.

ZEBRA PARRAKEET. See PARRAKEET.

ZEBRA SWALLOWTAIL. See SWALLOWTAIL.

ZEBRA WOLF. See DASYURE.

ZEBÚ, sā'bōō. See CEBÚ.

ZEBU, zē'bū. See HUMPED CATTLE.

ZEB'ULUN, or **ZEBULON** (Heb. *Zebūlūn*). The tenth son of Jacob and the sixth of Leah (Gen. xxx. 19–20; xxxv. 23). The allotment of the tribe of Zebulun was in the northern part of Palestine (Josh. xix. 10–16), and appears to have reached to the seacoast (Gen. xlix. 13). The tribe, owing to its remote situation, played a minor part in history; its most notable recorded achievement was the support which it furnished to Deborah (q.v.) in the rising against Sisera (Judg. iv. 6, v 14–18). When Tiglath-pileser IV (745–728 B.C.) carried off the northern tribes (2 Kings xv 29), Zebulun was probably included (cf Is ix. 1). The territory of Zebulun was the scene of a part of the early ministry of Jesus (Matt. iv 13).

ZECHARIAH, zĕk'a-rī'a (Heb. *Zĕkaryāh*, or *Zĕkaryāhū*, Yahwe remembers). A frequent Old Testament name. The most notable of those bearing it are: (1) ZECHARIAH, the son of Jehoiada. He was high priest in the first part of the reign of Joash (q.v.), King of Israel (c.797–782 B.C.). The Chronicler represents Joash as straying from the true religion upon the death of his mentor Jehoiada, Zechariah rebukes the apostasy, whereupon he is stoned to death in the temple. The Talmud has traditions upon the subject. It has been supposed that Jesus referred to this martyr in Matt. xxiii 35, Luke xi. 51, but these passages clearly refer to another Zechariah, son of Berechiah, who was put to death in the manner indicated immediately before the siege of Jerusalem by the Romans. (2) ZECHARIAH, KING OF ISRAEL (740 B.C.). He was the son of Jeroboam II (q.v.) and last of Jehu's dynasty. After six months' reign he was assassinated by Shallum, who usurped the kingdom (2 Kings xv. 8–12). (3) ZECHARIAH THE PROPHET. He was the son of Berechiah, son of Iddo, and one of the prophets who stimulated the rebuilding of the Temple in the time of Darius I Hystaspis (521–485 B.C.). He is mentioned along with Haggai in Ezra v. 1, vi. 14, as inciting to the work upon the Temple. The books of Haggai and Zechariah place this prophetic activity in the second year of Darius, 520 B.C. (Hag i. 1; Zech. i. 1), while Zech. vii. 1 indicates a further activity of the prophet in the fourth year of Darius (518 B.C.). The message of these prophets was effective, but we know nothing further concerning their careers.

As for the book ascribed to Zechariah, there is no doubt concerning the authenticity of the first eight chapters. These well illustrate the condition of the returned exiles. The prophecies of the second year (chap. i–v) begin with a call to repentance (i. 1–6). There follows a series of eight visions (i. 7–vi. 8), fraught with messages of promise and consolation. The first (i. 7–17) gives assurances that Yahwe will build the temple and enlarge the city. The second (i. 18–21) foretells the destruction of Israel's enemies. The third (chap. ii) reveals the future wonderful growth of the city. The fourth (chap iii) presents dramatically the legal rehabilitation of Israel in Yahwe's favor in the person of Joshua the high priest, accompanied with a promise of a king. The fifth (chap. iv.) mystically figures the divine grace that is to come through the two anointed men, Joshua and Zerubbabel, the respective priestly and royal leaders of the people. The sixth (v. 1–4) pictures the curse which will miraculously purge the restored community of its sinners. The seventh (v. 5–11) exhibits the removal of the guilt of the land to Babylonia. The eighth (vi. 1–8) shows the divine accomplishment of judgment upon Babylonia. In the prophecies of the fourth year (chap. vii–viii) we have some utterances concerning the observance of fasts. In the ancient prophetic spirit, in reply to an inquiry from certain people concerning the necessity of the fasts connected with the anniversaries of Jerusalem's destruction, Zechariah condemns the godless kind of fasting, and

requires instead justice and mercy between man and man (chap. vii). The prophet took a notable place in the revival of the hopes and work of the Jewish community. He expected a new order of things as the result of the rebuilding of the temple. Over against a certain crabbedness of imagery in the visions we find some noble notes of prophecy in the call to repentance and the discussion of the fasts.

Chapters ix–xiv breathe a different spirit and exhibit another historical environment; accordingly their authorship by the prophet Zechariah is now denied by many scholars The chief reasons adduced are the following· Chapters i–viii, despite occasional obscurities, reproduce the historical circumstances of the reign of Darius Hystaspis, chapters ix–xiv bear no reference to this epoch, but on the contrary indicate periods of very different circumstances, whose details are in general as obscure as those of the genuine Zechariah are clear. There are references to Assyria (a name applied in later times to Syria), Egypt, the Aramæan states, and especially to the Greeks (ix 13) as the militant foes of Judaism, which point to a later period than that of the Persian Empire. The Levites receive a leading place alongside the house of David, and there is a stress laid upon ceremonial holiness which is rather typical of the reform of Ezra. The prophets are depreciated, a phenomenon characteristic of the later ages, when spiritual activity was in the hands of the scribes and prophets wrote anonymously; in fact, there is a scrupulous anonymity preserved throughout these chapters. An opposition between Jerusalem and Judah is represented, indicating a period when Jerusalem had regained its original political supremacy, a condition which did not ensue until the time of Nehemiah. The last chapters are apocalyptic, a characteristic of thought obtaining from the time of the Exile, to be sure, although chapters i–viii are devoid of it. The genuine Zechariah is prosaic in style; the subsequent chapters move in poetic diction. Finally, their authenticity does not follow from their present inclusion in the Book of Zechariah, because (as in the case of Isaiah xl–lxvi) the simple facts of anonymity and accidental collocation after a work of a known author would tend to their addition to the preceding book. Indeed a comparison of the identical titles of ix. 1, xii. 1, and Mal. i. 1 (which is properly anonymous; see MALACHI) forces the conclusion that these several prophetic sections were so many anonymous publications once grouped together for this very reason; but the third came to be ascribed by mistake to a prophet Malachi, and the first two were then absorbed by Zechariah.

This appendix to Zechariah may be divided into two sections, ix–xi and xii–xiv. Chapter ix announces a judgment upon the neighboring nations, the advent of the expected King, and Yahwe's interference for the salvation of his people In chapter x Yahwe promises to remove the unfaithful leaders of Israel, and himself to take action for the restoration of all Israel. Chapter xi describes symbolically Yahwe's rejection of the spiritual leaders and his discipline of the people, of whom a remnant is to be saved. Most scholars connect with this section the fragment xiii 7–9. Chapters xii–xiii present an involved and obscure line of events. Judah and Jerusalem are engaged in a dread struggle with the Gentiles, Judah itself being at first arrayed against the capital. Yahwe interferes, and there follows a period of penitent mourning with a purging of the idols and the prophets from the land In chapter xiv is given an apocalyptic figure of the last great attack upon Jerusalem, which is at first successful, until Yahwe's personal appearance saves his people. This is accompanied and followed by a transformation of the land of Judah Finally, all nations are described as going up as worshipers to Jerusalem, a curse resting on those who refuse.

The last three chapters are now generally ascribed to a late post-exilic period Great uncertainty prevails as to chapters ix–xi Some hold to their pre-exilic origin with considerable redditing; the prevailing view assigns them to the post-exilic age, and many scholars regard the whole appendix as a work of the Maccabæan period But the problems contained in chapters ix–xiv have by no means been satisfactorily elucidated The figurative language of this section, understood in a Messianic sense, is much employed in the Gospels.

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ZEDEKIAH, zĕd'ē-kī'ā (Heb. *Sidkiyyāh*, or *Sidkiyyāhū*, Yahwe is my vindication). The last King of Judah (2 Kings xxiv. 17; xxv.; 2 Chron. xxxvi. 11 et seq.; Jeremiah, passim). At his first capture of Jerusalem (597 B.C.) Nebuchadnezzar deposed King Jehoiachin, carried him away to Babylon, and left as king in his place his uncle Mattaniah, the third of the sons of Josiah, changing his name to Zedekiah The best part of the people had been carried off into captivity, and Jehoiachin was still the legitimate king to the people, so that Zedekiah's position was a sorry one Jeremiah openly announces the divine preference for the exiles, and can see no good in the shadow monarchy of Zedekiah. Upon the withdrawal of the Babylonian army the neighboring states began a conspiracy against Nebuchadnezzar and attempted to seduce Zedekiah; and within Jerusalem there was a strong party led by prophets who were eager to throw off the Babylonian yoke (Jer. xxvii, xxviii). Zedekiah himself is said to have gone to Babylon in his fourth year (Jer. li. 59), probably to vouch for his loyalty. But in 588 B.C. he could no longer resist the pressure of the Patriots, and revolted He still consulted Jeremiah, who, however, resisted all his advances. Zedekiah thus appears as a well-meaning but weak man, unfitted for his circumstances. After a valiant defense of a year and a half Jerusalem was taken by storm in 586 B.C. Zedekiah with some followers escaped eastward to the Jordan, but was captured, and carried to the presence of Nebuchadnezzar in Syria, where judgment was given upon him for his treason. His sons were slain before him, his eyes were put out, and he was carried in fetters to Babylon. Consult: R. Kittel, *Geschichte der Hebraer* (2d ed., 2 vols., Gotha, 1909–12; Eng. trans. of 1st

ed., London, 1888–91), C. F. Kent, *History of the Hebrew People* (2 vols., New York, 1896–97), Julius Wellhausen, *Israelitische und jüdische Geschichte* (7th ed., Berlin, 1914).

ZEDLITZ, tsāt'lits, JOSEF CHRISTIAN, BARON (1790–1862). An Austrian poet. He was born at Johannisberg, in Austrian Silesia, and was educated at the Gymnasium of Breslau. He served with distinction in the army, but resigned in 1809 and devoted himself to literary pursuits. In 1837 he received a position in a department of the Ministry for Foreign Affairs at Vienna, and after 1851 he was in the Austrian diplomatic service. He was one of the leaders of the Romantic movement in Austria. His dramas, such as *Der Stern von Sevilla* (1830), and *Kerker und Krone* (1834), a dramatic continuation of Goethe's *Tasso*, are not of great value, but his lyrics and ballads, especially *Nachtliche Heerschau* (1829), are characterized by much originality and grace. His most famous work is *Todtenkränze* (1827), a collection of elegies, but many of his best poems are contained in other volumes, such as *Gedichte* (1832) and *Soldatenbüchlein* (1848). He translated Byron's *Childe Harold* (1836).

ZEDOARY, zĕd'ō-ā-rĭ (Fr. *zédoaire*, Sp., Port. *zedoaria*, from Pers. *zadwār, zidwār, jadwār, zedoary*). The popular name of certain species of *Curcuma* (see TURMERIC), natives of the East Indies, the root stocks (rhizomes) of which are aromatic, bitter, and pungent, and are commonly used in the East like ginger. Their use in Europe and America is limited. The round zedoary of the shops is the product of *Curcuma zedoaria* and *Curcuma aromatica*, natives of both India and China, having palmate root stocks, straw colored within. Long zedoary is produced by *Curcuma zerumbet*, a form of *Curcuma zedoaria*, a native of various parts of the East Indies, having long palmate root stocks, yellow within. See GINGER.

ZEE'LAND. See ZEALAND.

ZEEMAN, zā'man, PIETER (1865–). A Dutch physicist, born at Zonnemaire, Holland. In 1885–90 he studied at Leyden, where he became assistant at the Physical Institute, and lecturer at the university. In 1900 he was appointed professor of physics at the University of Amsterdam. His discovery in 1896 of the phenomenon known by his name (see LIGHT; ZEEMAN EFFECT), brought him the Baumgartner prize at Vienna and the Wilde prize at Paris. In 1902 he received also, with H. A. Lorentz, the Nobel prize in physics. He published: *Messungen uber das kerrsche magneto-optische Phanomen* (1893); *Experimentaluntersuchungen uber Teile, die kleiner als Atome sind* (1900); *Researches in Magneto-Optics* (1913).

ZEEMAN EFFECT. The name of an interesting phenomenon discovered in 1897 by Dr. P. Zeeman of the University of Amsterdam. He observed that the spectrum of a source of light was changed by the source being placed in a strong magnetic field. Each line in the original spectrum is split up into several lines, when the source is viewed from a direction at right angles to the lines of magnetic force and also when viewed along the lines, but differently in the two cases. The light in these component lines is polarized also. The great importance of the discovery lies in its bearing upon the ultimate cause of the ether vibrations which produce light. Reference should be made to Zeeman's original papers, which have been translated into English in E. P. Lewis, *Effects of a Magnetic Field on Radiation*, "Scientific Memoir Series," vol. viii (New York, 1900). Consult also Cotton, *Le phénomène de Zeeman* (Paris, 1900), and Pieter Zeeman, *Researches in Magneto-Optics* (London, 1913). See LIGHT; SPECTROSCOPY, SUN.

ZEGGERS, DANIEL. See SEGHERS.

ZEISBERGER, tsīs'bĕrK-ẽr, DAVID (1721–1808). A Moravian missionary in America, born in Moravia. He was educated in Herrnhut, Saxony, and in 1738 removed to Oglethorpe's colony in Georgia. In 1740 he settled in Pennsylvania, where he became one of the founders of Bethlehem. From 1743 until his death he labored unremittingly among the Indians, and his service has few parallels in the history of the country. He was greatly beloved and trusted by the tribes among whom he lived, and was made a sachem by the Iroquois and adopted by the Monsey-Delawares. His personal influence was the principal factor in restraining the Delawares from joining their former allies during the Revolutionary War. After the massacre of a band of his converts at Gnadenhutten in 1782, he led the rest of his followers into Michigan, thence into Canada, and in 1798 to the Tuscarawas, where the town of Goshen was founded. He published: *A Delaware and English Spelling Book* (1776); *A Collection of Hymns for the Christian Indians* (1803); and *Sermons for Children* (1803). Since his death have been published his *Dictionary in German and Delaware* (1887) and *Diary of David Zeisberger, 1781–98* (1888). Consult also E. A. De Schweinitz, *Life and Times of David Zeisberger* (Philadelphia, 1870).

ZEISLER, FANNIE. See BLOOMFIELD-ZEISLER.

ZEISS, tsīs, CARL (1816–88). A German optician. He was born at Weimar, was educated for the medical profession, and in 1846 founded the famous optical manufactory at Jena that bears his name. His son entered the business with him, but retired soon after Carl Zeiss's death. The business was incorporated as the Carl-Zeiss-Stiftung in 1889, and it gained an international reputation for the manufacture of optical instruments of all kinds. Consult Auerbach, *Das Zeisswerk und die Karl Zeiss-Stiftung in Jena* (3d ed., Jena, 1907).

ZEISSBERG, tsīs'bĕrK, HEINRICH VON (1839–99). An Austrian historian, born in Vienna and educated at the university of that city. He was professor of history at Lemberg (1865–71), Innsbruck (1871–72), and Vienna (1872–97). From 1891 to 1896 he was director of the Institute for the Study of Austrian History, and in 1896 became director of the Imperial Library. Among his numerous works were *Die polnische Geschichtschreibung des Mittelalters* (1873), *Der österreichische Erbfolgestreit 1457–1458* (1879), *Quellen zur Geschichte der deutschen Kaiserpolitik Oesterreichs während der französischen Revolutionskriege, 1793–1797* (1889), *Belgien unter der Generalstatthalterschaft Erzherzog Karls* (1893–94), *Erzherzog Karl von Oesterreich* (1896).

ZEIST, zīst. A town in the Province of Utrecht, Netherlands, 9½ miles east of Utrecht (Map: Netherlands, D 2). It is the seat of an interesting Moravian community, established here in 1746, which holds property in common and supports a school. Pop., 1910, 8964.

ZEITBLOM, tsīt'blōm, BARTHOLOMÄUS (c.1450–c.1519). A German painter, the chief master of the school of Ulm, where he is on official record from 1484 to 1517. He was born in

Nordlingen and was the pupil and son-in-law of Hans Schuchlein, but, unlike his master, was singularly free from Dutch and Flemish influence Zeitblom's paintings are distinguished by artistic feeling and clear, cool, delicate color. His single figures are restrained and often beautiful; his treatment of drapery is simple and graceful, but he lacked dramatic power. His principal works include the altarpiece from the church at Heerberg (1497), and four panels from the Eschach altarpiece (1495), depicting "The Two Saint Johns," the "Annunciation," and "Visitation," all in the Royal Gallery, Stuttgart, the great altarpiece with "Scenes from the Passion" and the "History of St John the Baptist," in the church at Blaubeuren, four panels with the "Legend of St. Valentine," in the Augsburg Gallery; a "Pietà," in the Germanic Museum at Nuremberg; the "Handkerchief of St Veronica," in the Berlin Gallery, and "St. Margaret," and "St. Ursula," in the Munich Pinakothek.

ZEITGEIST, tsīt'gīst'. See GEIST

ZEITOUN, zā-tōōn'. A town of Asiatic Turkey, in the Vilayet of Aleppo, in the eastern Taurus Range, 20 miles northwest of Marash. It is built in a deep gorge surrounded by inaccessible crags, and is inhabited almost exclusively by Armenian Christians, who have made the town famous for having maintained its practical independence of Turkey up to recent times. In 1878 the Turkish government succeeded in investing the town and built a fort commanding the position. Even since that year there have been several revolts, the most notable being on the occasion of the Armenian massacres in 1895, when the intervention of the Powers secured honorable terms for the inhabitants. In the massacres of 1915 the Armenian population of Zeitoun was practically wiped out of existence. Pop, variously estimated at from 5000 to 17,000.

ZEITZ, tsīts. A town of the Province of Saxony, Prussia, 23 miles south-southwest of Leipzig, on the right bank of the White Elster (Map: Germany, E 3). There are manufactures of cotton, machinery, perambulators, soap, woolens, sugar, bicycles, furniture, pianos, hosiery, and gloves. In the neighborhood are extensive mineral-oil works and lignite deposits. Pop., 1900, 27,389; 1910, 33,093.

ZELAYA, sā-lā'yä, JOSÉ SANTOS (1853–). A Nicaraguan dictator. He was elected President of Nicaragua in 1894 and held this office till 1909, when he was forced to resign. (See NICARAGUA, *History.*) During his 15 years' administration he made the production of every important commodity in the country a monopoly, and he himself received perquisites or shares of stock, sometimes a controlling interest. The fortune acquired in this way he invested abroad, so that when his downfall came it was secured to him; it was supposed that he had about $500,000 in New York banks. Although he made claims to liberality, Zelaya really suspected and opposed all foreign attempts to gain for his country the advantages of commerce, education, and religious freedom. In 1909 occurred the execution of two American citizens, soldiers in the army of the revolutionary leader Estrada. In a sharp note Zelaya was called to account by the United States government, and shortly afterward, Estrada's efforts succeeding, he fled from Nicaragua, first to Mexico and later to Spain. In November, 1913, he appeared in New York City, his identity being unsuspected by the immigration authorities. The Nicaraguan government at once asked for his extradition, on a charge of murder A warrant was issued for his arrest, but he had hurriedly left his hotel, and it was not till two weeks later that he was found in an apartment house Zelaya was placed in the Tombs, but he escaped extradition by promising to return at once to Spain. In the latter country an attempt was made on his life in 1914 by a Nicaraguan who sought personal vengeance. The ex-dictator again came to New York in 1916, with the expectation of returning to Central America, probably to Costa Rica.

ZELENY, zĕl'en-ī, JOHN (1872–). An American physicist. He was born at Racine, Wis., and was educated at the University of Minnesota (B S., 1892; Ph.D., 1906), where he was professor of physics from 1892 to 1915 Meanwhile, he studied also at the University of Cambridge (B A, 1899). In 1915 he became professor of physics at the Sheffield Scientific School (Yale). His monographs and articles deal with ionic velocities in gases, the conduction of electricity through gases, and similar subjects.

ZELL, tsĕl, MATTHAUS (1477–1548). The first Protestant preacher of Strassburg. He was born in Kaiserberg, studied at Erfurt and Freiburg, and became preacher at Strassburg in 1518. He supported the Reformation, and when forbidden by the ecclesiastical authorities to occupy the pulpit, preached in the street Consult his biography by A Erichson (Strassburg, 1878). His wife, KATHARINA ZELL (died 1562), assisted in her husband's religious work both as a speaker and as a writer, and became widely known as a benefactress of the poor

ZELLER, tsĕl'lĕr, EDUARD (1814–1908). A German theologian and historian of philosophy, born at Kleinbottwar, in Wurttemberg. He studied theology at Tubingen and Berlin, and became privatdocent at Tubingen in 1840. His call to a theological chair at Bern in 1847 was the occasion of fierce controversy and opposition from the orthodox. In 1849 he accepted a chair at Marburg; in 1862 became professor of philosophy at Heidelberg, and in 1872 at Berlin In 1894 he retired from active professional work and settled at Stuttgart His principal work is *Die Philosophie der Griechen* (1844–52). From the time of its first publication this work was accepted by scholars as one of the best if not the best on the subject. It is truly monumental. Parts of the work have appeared in a fifth edition; others in a fourth; the rest in a third (Eng. trans. of almost the whole work under different titles for each volume, London, 1881 et seq). This work was briefly summarized in *Grundriss der Geschichte der griechischen Philosophie* (6th ed., 1901; Eng. trans., 1881). His other works are the notable book on the Acts of the Apostles (1854), *Das theologische System Zwinglis* (1853), his essays (1865–84), *Religion und Philosophie bei den Romern* (1866), his edition of the works of D. F. Strauss (1876–78), and *Geschichte der deutschen Philosophie seit Leibniz* (1872; 2d ed., 1875); *Vortrage und Abhandlungen* (1875–84). His early philosophical works were dominated by the Hegelian spirit, but later he broke away and in 1862 demanded a return to Kant. Consult G. S. Hall, *Founders of Modern Psychology* (New York, 1912).

ZELLER, zĕl'lăr', JULES SYLVAIN (1820–1900). A French historian, born in Paris and educated at the University of Paris and in Germany. He taught history at Rennes, Bordeaux,

and Strassburg, in 1854 was appointed professor of history at Aix, in 1858 in the Ecole Normale at Paris, and shortly afterwards to a position in the Sorbonne. In 1863 he became Duruy's successor as professor of history in the Polytechnic School and in 1870 rector of the Strassburg Academy. From 1876 to 1888 he was general superintendent of higher education in France. He was a voluminous, but not a particularly accurate or well-balanced historian. His publications include *Ulric de Hutten* (1849); *Les empereurs romains* (1863); *Entretiens sur l'histoire* (1865–69); *Les tribuns et les révolutions en Italie* (1873); and *Histoire de l'Allemagne* (1872–91), his most important work.

ZELLERFELD, tsĕl'lĕr-fĕlt. See CLAUSTHAL.

ZELTER, tsĕl'tĕr, KARL FRIEDRICH (1758–1832). A German composer, born in Petzow-Werder. He studied music with Kirnberger and Fasch and became the leader in Rellstab's Liebhaber-Concerte. From 1791 he assisted Fasch in conducting the Singakademie, and in 1800 succeeded him. In 1807 he organized a school for orchestral practice, and in 1809 the Berlin Liedertafel, the first organization of its kind, for which he composed nearly one hundred male choruses, many of which are still popular. He also founded, in 1819, the Royal Institute for Church Music, of which he was director until his death. Goethe and he were close friends, and their correspondence, *Briefwechsel zwischen Goethe und Zelter in den Jahren 1796–1832*, was edited by Riemer (Berlin, 1833–34), and recently by M. Hecker (Leipzig, 1913). Felix Mendelssohn was his pupil. He also wrote the *Life* of Fasch (1801). Consult L. Sieber, *K. Fr. Zelter und der deutsche Männergesang* (Basel, 1862).

ZEMINDAR, zĕ-mĕn'dăr (Pers. *zemīndār* from *zemīn*, land, and *dār*, hold). The title given in India from Mohammedan times to the landlords who held property as a fief from the government or from a superior lord. Under the British government the zemindar system of tax collection was continued in Bengal, Behar, Orissa, and Madras. Consult Sir H. S. Maine, *Early Historical Institutions* (London, 1875); id., *Village-Communities in the East and West* (ib., 1890).

ZEMSKI SOBOR, zyĕm'skĭ sō-bōr'. The name given to the assembly of the whole country in Russia. It is comparable to the States-General (q.v.) in France. It originated during the time of the struggle between the czars and the great Boyars (q.v.). The last monarch to use it extensively was Peter the Great. The last time it was called was in 1767, when Catharine the Great called it to consider the conditions of the country. Its activities were confined to economic discussions and had no political significance.

ZEMSTVO, zĕmst'vō. A form of district and provincial assembly in Russia created under Alexander II (1864), and endowed with powers of self-government in the fields of local economic and social interests. The zemstvos were established in 34 governments or provinces of Russia proper. They had a representative council and an executive board. The latter comprised all large landowners and representatives of the small landowners (including clergy), residents of towns, and peasants. They devoted themselves to the building of schools and hospitals, the introduction of improvements in agriculture, the establishment of a comprehensive system of fire insurance, combating the drink evil, etc. Their powers were greatly restricted under Alexander III, but they remained, nevertheless, important centres of liberal thought. For their rôle in recent events, see RUSSIA, *History*.

ZENANA, zĕ-nä'nä (Pers. *zenāna*, belonging to women, from *zen*, woman, Gk. *γυνή*, woman). The name applied in India to the female quarters. In Bengal, where is the typical zenana, the dwelling consists of two houses built each round its own court. The one on the street is occupied by the men. In the rear building, which contains the zenana, the first floor is for cow sheds, storage, and cook rooms; above are cells, 10 to 12 feet square, each having a door and a small grated window opening upon piazzas which, in one, two, or three tiers, surround the inner court. The conditions are generally miserable when judged by Western standards, and it has been the special object of the Zenana Mission in India, since 1855, to ameliorate this system and to improve the status of Hindu women.

ZEND AVESTA. See AVESTA.

ZENGER, JOHN PETER (c.1680–1746). An American publisher. He was born in Germany, went to New York about 1700, and entered the printing business. In 1733 he began to publish the New York *Weekly Journal*, which he made the organ of the popular party in the colony. So much did the government feel his attacks that it was resolved in Council that certain of his papers and two ballads should be burnt by the hangman, while he was arrested on a charge of libel and was imprisoned for about eight months. His friends employed to defend him Andrew Hamilton (q.v.). In the trial the defense admitted the fact of publication, but maintained that since the statements were true there was no libel. The Chief Justice, who presided, contended that "you cannot be permitted to give the truth of a libel in evidence." Hamilton asserted that the jury had the right to determine both the law and the fact. The result was that the jury, imbued with the popular opinion, gave a verdict of not guilty. This triumph of freedom of the press has been termed "the morning star of that liberty which subsequently revolutionized America." Consult Livingston Rutherford, *John Peter Zenger* (New York, 1904).

ZENITH (OF. *zenith*, *cenith*, Fr. *zénith*, from OSp. *zenith*, Sp. *zenit*, zenith, from Ar. *samt*, way, from *samata*, to pursue one's way). The name given to that point of the heavens directly overhead. It is defined in astronomy as that point of the celestial sphere where it would be pierced by a plumb line produced indefinitely upward at the place of observation. It is the opposite of nadir (q.v.).

ZENITH TELESCOPE. An instrument especially adapted for the measurement of small differences in the zenith distances of celestial objects. It consists of a vertical column revolving about a vertical axis and carrying a horizontal axis, to one end of which the telescope is attached and to the other a weight to counterpoise the telescope. To this horizontal axis is also attached a striding level. The vertical column carries also a vernier and a clamp. The distinctive features of the instrument are a spirit level and a micrometer. The spirit level is attached by means of a pivot and a bar to the telescope and at right angles to the horizontal axis so that it is free to move in the plane of the telescope and consequently may be inclined to the optical axis at any angle, read off by

means of a vernier attached to the bar carrying the spirit level. When the bubble of the level is in the middle of the tube, this circle, graduated from 0° to 90° in each direction, will give the zenith distance of the star toward which the telescope is directed. The micrometer consists of one or more movable threads carried by a single micrometer screw with a graduated head reading to the required accuracy

The zenith telescope was invented by Capt. Andrew Talcott, of the United States Engineers (1834), to carry out practically the principle that when the meridian zenith distances of two stars (one north and the other south of zenith), at their upper culminations, are equal, the colatitude is the mean of their north polar distances This method of finding the latitude is known as Talcott's method. Since two stars having exactly the same meridional zenith distance can rarely be found, two having nearly the same are selected. Refraction is consequently almost eliminated. The telescope is first pointed to the star which first comes to the meridian, and the spirit level is set horizontal. As the star passes the field of view its distance north or south of the central horizontal wire is measured by the micrometer. The instrument is then revolved 180° and the second star observed in the same manner In revolving the instrument care must be taken that the angle between the level and the telescope is not disturbed. The latitude is then given by the formula

$$\phi = \left(\frac{\delta_s + \delta_n}{2}\right) + \left(\frac{\zeta_s - \zeta_n}{2}\right),$$

where δ_s and δ_n are the declinations of the two stars, and $\zeta_s - \zeta_n$, the difference of their zenith distances, determined by the micrometer measurement Consult W. Chauvenet, *Manual of Spherical and Practical Astronomy* (Philadelphia, 1863).

ZENJAN, zĕn-jän'. A town of Persia. See ZINJAN.

ZENKER, tsĕŋ'kĕr, FRIEDRICH ALBERT VON (1825–98). A German physician, celebrated for his discovery of trichinosis. He was born in Dresden, and was educated in Leipzig and Heidelberg. Attached to the city hospital of Dresden in 1851, he added, in 1855, the duties of professor of pathological anatomy and general pathology in the surgico-medical academy of that city. In 1862 he became professor of pathological anatomy and pharmacology at Erlangen. Three years afterwards he assumed with Ziemssen (q.v.) the editorship of the *Deutsches Archiv fur klinische Medizin*. In 1895 he retired from active service. His important discovery of the danger of trichinæ dates from 1860. In that year he published "Ueber die Trichinenkrankheit des Menschen" (in vol. xviii of Virchow's *Archiv*).

ZE'NO (Lat, from Gk. Ζήνων, *Zēnōn*) (c.488 B.C.–?). An Eleatic philosopher, born at Elea (Velia), a town of Lucania in Southern Italy. He was a favorite pupil of Parmenides (q.v.). At the age of 40 he accompanied his master to Athens, where he resided some time and numbered among his pupils Pericles and Callias. Tradition says that after his return to Elea he joined a movement to deliver the city from the tyrant Nearchus, and that, when the attempt failed, he was captured and put to torture. Of this, however, the evidence is not satisfactory. As a follower of Parmenides he supported his doctrines by indirect demonstration, in which he attempted to point out that belief in the real existence of changing phenomena led to contradiction. He tried to establish the truth of the unity of being by showing that the hypotheses of motion, multiplicity, and sense have inherent contradictions. To the real existence of motion he objected that motion cannot begin, because the moving body cannot arrive at any place from that in which it is until it has passed through the unlimited number of intermediate spaces. Now, as it is at any given moment in a particular place, it cannot leave that position, therefore the flying arrow is in reality at rest. His second argument was the famous proof that Achilles cannot overtake the tortoise because at any moment he only reaches the place previously left by the tortoise; his other arguments are similar. He likewise argued against the reality of space, for, if all that exists were in a given space, that space itself would be included in another space, and so on without limit Against sense perception he said that if a measure of grain in falling produced a sound, every single grain and smallest fraction thereof must produce a sound; but if the latter be not true, then the whole measure, whose effect can be nothing but the sum of the effects produced by its parts, can produce no sound. Zeno's arguments against the reality of motion were answered by Aristotle in his *Physics*, but the argument still had considerable influence on the development of metaphysics in the latter period.

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ZENO (fourth and early third century B.C.). The founder of Stoic philosophy (see STOICS). He was born at Citium, in the island of Cyprus. He is said to have lived to a great age. He was the son of a merchant, and was himself engaged in trade during the earlier part of his life, but according to tradition a shipwreck caused him to reside for a time at Athens, where the works written by the disciples of Socrates in regard to their master filled him with admiration, and he became a pupil of Crates the Cynic. His earliest writings, according to tradition, contained much that savored of the harshness and bluntness of the Cynic doctrine. Failing to find sufficient satisfaction from Cynic philosophy, he turned to the Megarian Stilpo, from whom he learned the art of disputation, and later to Xenocrates and Polemo of the Academy. Not long after 310 B.C. he founded his own school in the Painted Porch (Ποικίλη Στοά), at Athens, where, according to Apollonius, he taught for 58 years. Diogenes Laertius mentions a number of works by him, no one of which has been preserved. He and his followers strove to realize the virtuous wise man for whom the idealized Socrates was a model. The ethics of the school, which were strongly influenced by Cynicism, were most productive in that they discriminated carefully between what was simply right and good and what was agreeable. Their physics were strongly in

thenced by the teachings of Pythagoras and Heraclitus. The Athenians held Zeno in great regard during his life, and after his death honored him with a tomb built at public expense and a bronze monument, because of the temperance and virtue which he had shown in his own life as well as in his teachings.

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ZENO (426–491). Byzantine Emperor from 474 to 491. He was a native of Isauria. By his marriage with Ariadne, daughter of Leo I, he acquired a powerful position in the Empire as leader of the Imperial guard and the Asiatic troops. In 474 he became regent for his son Leo, after the death of his father-in-law, and in the same year Emperor through the death of his son. In 475–477 he was engaged in repressing the rebellion led by Basiliscus, his wife's uncle. At first he was driven from Constantinople, but finally won the victory with the help of the Ostrogoths, whom, however, he was subsequently obliged to fight, until, in 488, he persuaded Theodoric to leave the Eastern Empire for the conquest of Odoacer in Italy. His reign was notable for the peace which he made between the orthodox party and the Monophysites by means of the so-called "Henoticon" of 482. Consult *Cambridge Medieval History*, vol. i (New York, 1911).

ZENO, dzā'nō, Apostolo (1668–1750). An Italian poet and scholar, born at Venice. With Maffei and Vallisnieri he founded, in 1710, the first Italian critical journal, the *Giornale de' letterati d'Italia*. He went to Vienna as Court poet in 1718 at the invitation of Charles VI remaining there till 1729, when he returned to Venice. He was a prolific writer of melodramatic librettos, especially for music by Handel, Pergolesi, Paisiello, and Marcello. His dramas were published in 1744 by G. Gozzi. In the eyes of his own time he was the leading arbiter of literary elegance and scholarly authority. His works include: *Compendio del vocabolario della Crusca* (1705); *Istorici delle cose veneziane* (1718–22); and *Dissertazioni istorico-critiche e letterarie agli istorici italiani* (1752–53). Consult Max Fehr, *A. Zeno und seine Reform des Operntextes* (Zurich, 1912).

ZENO, Niccolò and Antonio. Two Venetian brothers, navigators and adventurers of the fourteenth century. They came of a rich patrician family and late in the fourteenth century (probably between 1375 and 1380) Niccolò went on a voyage into the North Atlantic, where he was wrecked, and remained for some time on the island of "Frislanda," probably one of the Faroe group, although believed by some to be Iceland. Later, in company with Antonio, he is said to have visited Engroneland (Greenland). On their return they reported rumors of an island far to the west, where dwelt a civilized people who possessed Latin books and could not speak the Norse tongue. Their country he called Estotiland, variously claimed to be Labrador, Newfoundland, and New England. Farther to the south, he said, lived tribes of cannibals, and still farther people with great towns and splendid temples. Niccolò died in the north about 1391, and Antonio returned to Venice with an account of their voyages and the stories they had heard, together with a map they had constructed of the regions mentioned. The manuscript and the map lay unnoticed in the family palace in Venice until 1558, when a descendant published them under the title, *Dei commentarii del viaggio*. The whole question of these voyages, the truth of their stories, etc., has been the subject of much discussion. Consult: Placido Zurla, *Dissertazione intorno ai viaggi e scoperte settentrionali di Nicolò e Antonio Fratelli Zeni* (Venice, 1808); *The Voyages of the Venetian Brothers, Niccolò and Antonio Zeno*, edited and translated for the Hakluyt Society by R. H. Major (London, 1873); Justin Winsor, *Narrative and Critical History of America*, vol. i (Boston, 1889); F. W. Lucas, *Annals of the Voyages of the Brothers Niccolò and Antonio Zeno . . .* (London, 1898).

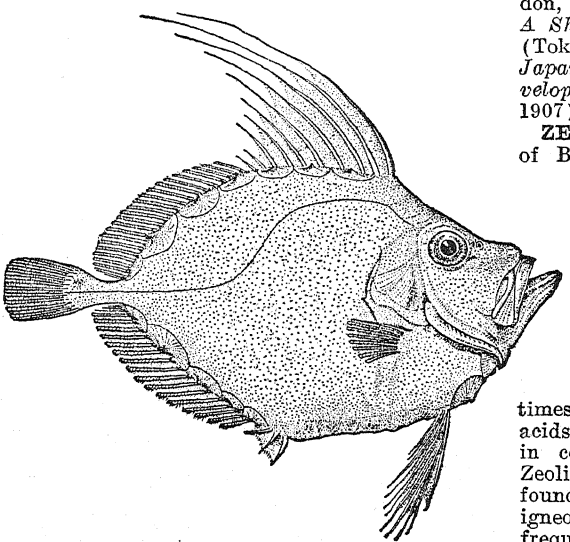
ZENOʹBIA (Lat., from Gk *Ζηνοβία*). Queen of Palmyra (q.v.). She was the wife of Odenathus, lord of Palmyra, who had been recognized in 264 A.D as King and Imperator in the East by the Roman Emperor Gallienus (q.v.), and whose sway extended over almost all the eastern provinces. In 267 Odenathus and his son Herodes were murdered, and a younger son, Vahballathus, succeeded his father, though the actual government was in the hands of Zenobia, who ruled as an independent sovereign, caring little for the Roman emperors, with whose armies she repeatedly came into conflict. She even attempted to establish her dominion in Egypt, but in this she failed. When Aurelian came to the throne in 270 he at first continued to recognize the title and rights of Vahballathus, and even permitted Zenobia to assume the title of Augusta. In 271 Vahballathus died, and Zenobia continued to rule, in the name of her two younger sons. Attempting to extend her power over Asia Minor, she drew upon herself the anger of Aurelian, who marched against her with a large army and, after twice defeating her troops, besieged her in Palmyra (early in 272). (See Aurelianus, Lucius Domitius.) Her hopes of being relieved by the Persians and Arabians being disappointed, she attempted to escape by flight, but was captured (spring of 272). Before the conqueror her courage failed, and she saved her own life by imputing the blame of the war to her counselors, especially the celebrated Longinus (q.v.), who was accordingly put to death. Zenobia was led in triumphal procession at Rome, and was presented by her conqueror with large possessions in the Villa of Hadrian, near Tibur (Tivoli), where she passed the rest of her life. She was a woman of great courage, spirit, and beauty. With purity of morals in private life, she combined prudence, justice, and liberality in her administration. Her literary acquirements were considerable; she spoke Latin, Greek, Syriac, and Coptic. Consult Ware's historical romance, *Zenobia* (New York, 1837), often reprinted; and the article "Septimius, 17," in Friedrich Lübker, *Reallexikon des klassischen Altertums*, vol. ii (8th ed., Leipzig, 1914).

ZENOBIA, OR THE FALL OF PALMYRA. An historical romance by William Ware (1837),

contributed to the *Knickerbocker Magazine*, New York.

ZE'NO OF SI'DON (c.150–c.78 B.C.). An Epicurean philosopher, and after about 100 B.C. leader of the school. In his old age he had both Cicero and Philodemus as pupils at Athens, Several of Philodemus's writings, recovered at Herculaneum, give us the best idea of Zeno's attitude that it is possible to possess in default of his works. His additions to Epicurean philosophy concerned the nature of inductive reasoning. Cicero confirms this by his reference to him in *De Natura Deorum*, i, 34, where he calls him one of the most logical of the Athenian philosophers.

ZENOP'SIS (Neo-Lat., from Gk. Ζην-, *Zēn-*, stem of Ζεύς, *Zeus*, Zeus, Jupiter + ὄψις, *opsis*, appearance). A genus of small pelagic, silvery fishes of the John Dory family (Zeidæ), naked



ZENOPSIS OCELLATUS.

except for several bony and spinous bucklers. The single species known (*Zenopsis ocellatus*) inhabits the North Atlantic, and is extremely rare.

ZE'NOS, ANDREW CONSTANTINIDES (1855–). An American biblical and classical scholar, born of Greek parents in Constantinople, Turkey. He was educated at Robert College in his native city and at Princeton University. He was pastor of the Presbyterian Church at Brandt, Pa., in 1881–83, and afterwards held chairs at Lake Forest University (1883–88), Hartford Theological Seminary (1888–91), and McCormick Theological Seminary, Chicago, where he became professor of biblical theology in 1894. He published an edition of Xenophon's *Anabasis* (1888), with F. W. Kelsey; a translation of Socrates's *Ecclesiastical History* for Schaff's "Post Nicene Fathers" (1890); *Elements of Higher Criticism* (1895); *Compendium of Church History* (1896; rev. ed., 1915); *The Teaching of Jesus Concerning Christian Conduct* (1905); *Standard Bible Dictionary* (1909), with M. W. Jacobus and E. E. Nourse.

ZEN-SHU, zĕn-shōō' (Sinico-Japanese, from Chin. *ch'aan-tsung*, from *ch'an*, from Skt. *dhyana*, contemplation, meditation + Chin. *tsung*, school, sect). The Japanese name of a Buddhistic sect, founded in China in 520 A.D. by Bodhidharma, the twenty-eighth Indian and the first Chinese Buddhist patriarch, and in one development of Bodhidharma's doctrines introduced into Japan in 729, and in another in 1168. Those who belong to this school are known as Quietists, because their way of attaining to the degree of enlightenment that leads to Nirvana consists not in good works, but in fixed contemplation. "Look carefully within and you will find the Buddha," is the central idea of the system. Bodhidharma himself is said to have sat gazing at a wall in this form of introspection for nine years, until his lower extremities rotted off. There are three principal divisions of the Zen-shu in Japan—the Rin-zai, Soto, and Obaku. In 1897 their temples numbered 20,824; in 1911, 20,833. For the Chinese features of the sect consult Joseph Edkins, *Chinese Buddhism* (London, 1880), and for the Japanese, Bunyu Nanjō, *A Short History of the Twelve Japanese Sects* (Tokyo, 1887); W. E. Griffis, *The Religions of Japan* (New York, 1895); and Knox, *The Development of Religion in Japan* (New York, 1907).

ZENTA, zĕn'tō. A town in the County of Bács-Bodrog, Hungary, on the right bank of the Theiss, 120 miles south-southeast of Budapest (Map: Hungary, F 4). Pop., 1900, 28,588; 1910, 29,654, mostly Magyars. It is celebrated for the victory of Prince Eugène over the Turks in 1697.

ZE'OLITES (from Gk. ζέειν, *zeein*, to boil + λίθος, *lithos*, stone). A family of minerals including hydrated silicates of alkalies or alkaline earths, which frequently contain aluminium and sometimes magnesium. They are all soluble in acids, and most of them gelatinize in acids in consequence of the silica being liberated. Zeolites are all secondary minerals and are found largely in cavities and fissures in basic igneous rocks, as basalt, diabase, etc., and less frequently in granite and gneiss. According to Dana, they may be divided into six groups, as follows: the mordenite, including ptilolite and mordenite; heulandite, including heulandite, brewsterite, and epistilbite; phillipsite, including phillipsite, harmotome, stilbite, gismondite, laumontite, and laubanite; chabazite, including chabazite, gmelinite, levynite, analcite, faujasite, and edingtonite; natrolite, including natrolite, scolecite, mesolite; and thomsonite, including thomsonite and hydronephelite. The zeolites are soft, ranging from 3.5 to 5.5 on the scale of hardness. Several, including natrolite and thomsonite, take a fine polish, and have occasionally been cut as gems. When heated by means of the blowpipe, the zeolites swell up or boil.

ZEPH'ANI'AH (Heb. *Ṣĕphanyāh* or *Ṣĕphanyāhū*, Yahwe hides or defends). The prophet whose work is contained in the ninth book of the Minor Prophets. Nothing is known of him personally except that he was the descendant in the fourth generation of Hezekiah, and, since this name is not common, it has been supposed by some, without distinct historical warrant, that this Hezekiah was the King of Judah. Zephaniah is said to have prophesied in the reign of Josiah, King of Judah (c.637–608 B.C.). From the allusions to political events and social conditions in the book it appears that the prophet's activity must have fallen before the Reformation in Josiah's eighteenth year. (See JOSIAH.) If

the reign of his prophesying was the expected invasion of the Scythians, as seems probable, he began to deliver oracles in the year 625 B.C. The book may be divided into three parts: (a) Chapter i, containing an announcement of a general destruction of the world, which, however, is directed more particularly against the idolaters and apostates in Jerusalem and Judah. (b) In the second part (ii. 1–iii. 7) the prophet urges to repentance as the only means of escaping the threatened doom, which will bring destruction also to the Philistines, to Moab, Ammon, Ethiopia, and even to Assyria. Turning again to Jerusalem he dwells upon the evils found therein, especially the corruption of her judges and great men. (c) The third part (iii. 8–20) is of a conciliatory character. The purified remnant will dwell in safety in their own land, and a blissful future is in store for both land and people after the reproach now resting upon them shall have been removed. The authenticity of the book has been questioned, and it at least shows traces of editing long subsequent to the period with which it deals. The language is forcible and picturesque, and the contrast between the sombre tone of the first two chapters and the buoyant one of the last is striking evidence of the writer's mastery of style. Consult: F. A. Strauss, *Patricina Zephaniae* (Berlin, 1863); F. Schwally, in *Zeitschrift für alttestamentliche Wissenschaft* (Giessen, 1890); A. B. Davidson, "Nahum, Habakkuk, and Zephaniah," in the *Cambridge Bible for Schools and Colleges* (Cambridge, 1896); S. R. Driver, "Nahum—Malachi," in the *Century Bible* (London, 1906); Max Heller, in *Die Religion in Geschichte und Gegenwart* (Tübingen, 1913).

ZEPHANIAH, APOCALYPSE OF. See APOCRYPHA, *Old Testament Apocrypha*.

ZEPHAROVICH, tsā'fa-rō'vĭch, VICTOR, KNIGHT VON (1830–90). An Austrian geologist and mineralogist, born in Vienna. He studied in Vienna and at the mining academy of Schemnitz, Hungary, was employed as section-geologist in the Imperial Geological Institution in Vienna in 1852–57, then was appointed professor of mineralogy in the University of Cracow, in 1861 at Graz, and in 1864 at Prague, where he established a mineralogical institute (1880). He made valuable contributions to mineralogy and crystallography. His works include *Mineralogisches Lexikon für das Kaisertum Oesterreich* (2 vols., 1859–72) and *Krystallographische Wandtafeln* (1877).

ZEPPELIN, tsĕp'e-lēn' *or* zĕp'e-lĭn, FERDINAND, COUNT VON (1838–1917). A German airship inventor and builder. He was born on July 8, 1838, at Constance, Baden, and was educated at the Stuttgart Polytechnikum, at the military school at Ludwigsburg, and in the University of Tübingen. He became a cavalry officer in the Württemberg army in 1858, and in 1863 went to the United States, where he fought with the Union army in the Civil War. While in America he made his first ascent in a captive balloon at St. Paul, Minn. In 1866 he served with the Württemberg troops against Prussia, but in 1870–71 followed his King on the side of Prussia against France. At the beginning of the war Count Zeppelin led a famous reconnaissance into the French territory, and later was present at the battles of Froeschwiller and Sedan, and at the siege of Paris. In 1887–90 he was a member of the Bundesrath for Württemberg, and after 1887 assisted also in the reorganization of the German army. He retired from the army as lieutenant general in 1891. In 1892 Count Zeppelin built a dirigible balloon of great size, able to carry several passengers. In 1900 he succeeded in making three ascensions on the shore of Lake Constance, but the airship was wrecked. With new funds, raised in part by a lottery, he constructed an airship at Friedrichshafen in 1905, but was unable to drive it against the wind. However, an attempt made in October, 1906, was successful. In 1909 a Zeppelin manufactory of airships was incorporated at Friedrichshafen. In the same year Count Zeppelin made a record flight in his dirigible *Zeppelin III* from Friedrichshafen to Berlin, and on July 8, 1913, celebrated his seventy-fifth birthday by steering his twentieth airship, the *Zeppelin L–5*, on its maiden voyage. During the European War the Zeppelins made many raids upon England, and the factory at Friedrichshafen turned out scores of airships. Count Zeppelin was awarded the Iron Cross in 1915, and in the same year was elected to the First Chamber of Württemberg. Consult R. P. Hearne, *Zeppelins and Super-Zeppelins* (New York, 1916). See AERONAUTICS, *Zeppelin Airships*, and *German Dirigibles;* MILITARY AERONAUTICS, *Dirigibles;* WAR IN EUROPE.

ZERAFSHAN, zĕr'ăf-shan', or ZARAFSHAN (gold distributor). A river of Russian Turkestan. It rises at the foot of an enormous glacier in one of the Pamir (q.v.) valleys on the west boundary of Ferghana, and flows westward through the Territory of Samarkand into Bokhara. About the city of Samarkand it is diverted into many irrigating canals, being much reduced, and after suffering a similar loss at the city of Bokhara it is lost in the desert before reaching the Amu Darya, of which it would otherwise be a tributary. It is about 400 miles long.

ZERAM', *Port. pron.* zā-rān'. See CERAM.

ZERBST, tsĕrpst. A town of the Duchy of Anhalt, Germany, 68 miles southwest of Berlin, on the river Nuthe, a tributary of the Elbe (Map: Germany, E 3). Close by is the beautiful ducal castle, built in the seventeenth century, containing the archives of Anhalt from 941 on. The church of St. Nicholas, begun in the eleventh century, is a fine specimen of Gothic architecture. The chief manufactures are articles in gold and silver, and silk, plush, cloth, wax, soap, machinery, chemicals, stoneware, and carriages. There are breweries famous for their bitter beer. Pop., 1900, 17,094; 1910, 19,210. Zerbst is of Slavic origin. The town dates from 1007. From 1603 to 1793 it was the capital of the Principality of Anhalt-Zerbst.

ZERDA, zĕr'dȧ. See FENNEC.

ZERMATT, tsĕr-măt'. A celebrated mountain resort in the southern part of the Canton of Valais, Switzerland, situated on the left bank of the Visp at an altitude of 5315 feet (Map: Switzerland, B 2). It is the starting point for ascents of the Riffelberg and the Gorner Grat, which are connected by an electric mountain railway with Zermatt, as well as of the Matterhorn (q.v.) and the entire Monte Rosa group. Pop., 1910, 786.

ZERO (Fr. *zéro*, from It., Sp. *zero*, from Ar. *ṣifr*, *ṣafr*, cipher, from *ṣafira*, to be empty). In mathematics, a symbol written 0, and signifying the absence of quantity or number. The common symbol is not found before the seventh century, in India. The term is also applied to

the infinitesimal. (See INFINITY AND THE INFINITESIMAL, NEGATIVE QUANTITY.) In thermometry the term is applied to certain fundamental points of temperature on the thermometer scale. In the earliest thermometers (q v) the zero point was fixed at the normal temperature of a healthy man, and any variation from this point was indicated on an arbitrary scale. The temperature of spring water was also selected as a fundamental point A mixture of snow and salt furnished the zero point on Sagredo's thermometer, where the temperature of the hottest summer day was denoted by 360. Fahrenheit also used the mixture of ice and salt to determine the zero in his thermometer, while Réaumur put his zero at the temperature of melting ice. About the same time De l'Isle constructed thermometers in which the zero was the temperature of freezing water, and also instruments where the zero was at the boiling point. The zero of the modern centigrade thermometer is fixed at the temperature of melting ice.

ZERO, ABSOLUTE. See THERMOMETRY.

ZERRAHN, tsĕr-rän', CARL (1826–1909). A German-American musician and conductor, born at Malchow, Mecklenburg. He studied music in Hanover and Berlin, and came to America during the Revolution of 1848. Here he became first flute in the Germania Musical Society, which gave concerts in the principal cities of the United States From 1854 to 1895 he was conductor of the Handel and Haydn Society, Boston. For years he gave at his own financial risk the only orchestral classical concerts in Boston. In 1865 he was appointed conductor of the Harvard Symphony concerts, serving until they were discontinued in 1882. He was elected conductor of the Oratorio Society of Salem, Mass. (1868), and as the conductor of many musical festivals held throughout New England exercised an important influence. He also became a professor at the New England Conservatory of Music. Zerrahn was especially successful in the presentation of oratorios and the management of large choruses. See CHORAL SOCIETIES.

ZERUB'BABEL, or **ZERUBABEL** (Heb., from Babylonian *Zaru Babil*, seed or offspring of Babylon). The Governor of Jerusalem at the time when the second temple was built. He was probably born in Babylon. In Ezra iii. 2, 8, and Hag. i. 1, he is called the son of Shealtiel, who was a son of Jehoiachin. He may have been the immediate successor of Sheshbazzar or Sin-apal-uzur, the Shenazar of 1 Chron. iii. 18, who was one of the sons of Jehoiachin and was the first Governor of Jerusalem appointed by Cyrus. According to III Esdras, Zerubbabel was one of Darius's pages who was granted permission to return to Jerusalem and build the temple as a reward for his cleverness in argument. The story is probably without any historic foundation. Through the influence of Haggai and Zechariah the people of Jerusalem were induced to build a new temple more fit to be the house of Yahwe than the simple shrine which had probably served that purpose since the destruction of Solomon's temple by Nebuchadnezzar in 586 B C The erection of the new sanctuary was begun in 520 B.C., and the temple was dedicated in 516 B.C. During the years it was building the prophets cherished the hope that its completion would usher in a new era of prosperity for Jerusalem and that Zerubbabel would become King of the restored commonwealth. Even in Babylonia the Jews seem to have shared these expectations, and Haldai was sent to Jerusalem, at the head of a deputation, with gold that was made into a crown and held in readiness for the day of coronation. Visions of Zechariah show that in prophetic circles there was some anxiety lest this expected restoration of the Davidic dynasty might interfere with the growing importance attached to the high-priestly office. It is the opinion of some scholars that the temple was rebuilt, not chiefly by exiles who may have returned from Babylonia in the days of Sheshbazzar, since Haggai and Zechariah make no mention of it, but by the Judæans, who were the descendants of the people left in the land when Nebuchadnezzar carried away some of the more important families. As Zerubbabel is not named in the account of the dedication (Ezra vi. 15 sqq.), it has been supposed that he was recalled by Darius, who may have feared the effect of having a descendant of the old Davidic dynasty as Governor in Jerusalem. It is probable, however, that Zerubbabel went to his grave without ever having sat on the throne of his forefathers, and no descendant of David ever seems to have occupied that throne after the fall of the dynasty in 586 B.C

Bibliography. B Stade, *Geschichte des Volkes Israel* (Berlin, 1888); H. E. Ryle, *Ezra and Nehemiah* (Cambridge, 1893); J. Marquart, *Fundamente israelitischer und jüdischer Geschichte* (Göttingen, 1896); C. C. Torrey, *The Composition and Historical Value of Ezra-Nehemiah* (Geneva, 1896); Eduard Meyer, *Entstehung des Judentums* (Halle, 1896); Nathaniel Schmidt, in *The New World* (Boston, 1898); T. K. Cheyne, *Jewish Religious Life After the Exile* (New York, 1898); Ernst Sellin, *Serubbabel* (Leipzig, 1898); id, *Studien zur Entstehungsgeschichte der jüdischen Gemeinde* (ib., 1901); Siegfried, *Ezra-Nehemia* (Göttingen, 1901); Bertholet, *Ezra-Nehemia* (Tübingen, 1902); Ernst Sellin, *Die israelitisch-jüdische Heilandserwartung* (ib, 1909); C. C. Torrey. *Ezra Studies* (Chicago, 1910).

ZER'UMBET. See GINGER.

ZESEN, tsā'zen, PHILIPP VON (1619–89). A German poet and romancer. He was born at Priorau, near Dessau, studied at Wittenberg and Leipzig, and in 1643 founded at Hamburg the *Deutschgesinnte Genossenschaft*, a literary society the members of which tried in somewhat naïve and extreme fashion to purify the German language of barbarisms. Until 1683, when he settled in Hamburg, Zesen lived the life of a wanderer, and was well known in several courts of Europe. His works on German grammar and versification, though not without contemporaneous influence, are now forgotten, but one of his novels of adventure, *Die adriatische Rosemund* (1645; edited by Jellinek, 1899), has considerable merit. Vol. xiii of Müller's *Bibliothek deutscher Dichter des 17. Jahrhunderts* (Leipzig, 1837) gives a good selection from his works. Consult Gebhart, *Untersuchungen zur Biographie P. Zesens* (Strassburg, 1888); Dissel, *P. von Zesen und die Deutschgesinnte Genossenschaft* (Hamburg, 1890).

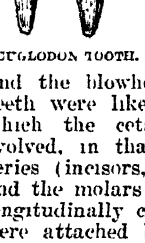
ZET'LAND. See SHETLAND ISLANDS.

ZETTERSTEDT, tsĕt'ĕr-stĕt, JOHAN VILHELM (1785–1874). A Swedish naturalist, born in East Gothland. He was educated at Lund, where he became successively tutor of botany (1810), assistant in the natural-history department (1812), and professor of botany (1839). His works include *Dissertatio de Fœcundati-*

one Plantarum (1810–12); *Orthoptera Sueciæ* (1821); *Fauna Insectorum Lapponica* (1828); *Monographia Scatophagarum Scandinaviæ* (1835); *Insecta Lapponica* (1838–40), and *Diptera Scandinaviæ Disposita et Descripta* (14 vols., 1842–60).

ZETZSCHE, tsech'she, KARL EDUARD (1830–94). A German mathematician and physicist, born in Altenburg. He studied in Dresden and Vienna, and in 1856 entered the Austrian telegraph service. In 1858 he became teacher in the industrial high school at Chemnitz, and in 1876 professor of telegraphy in the Polytechnic Institute at Dresden. In 1880 he was appointed telegraph engineer in the Imperial Post Office at Berlin, and in 1887 retired from public service. He wrote: *Die Kopiertelegraphen, Typendoubletelegraphen und die Doppeltelegraphie* (1865); *Die elektrischen Telegraphen* (1869); *Katechismus der elektrischen Telegraphie* (6th ed., 1883); *Abriss der Geschichte der elektrischen Telegraphie* (1874), *Die Entwickelung der automatischen Telegraphie* (1875); *Handbuch der elektrischen Telegraphie* (together with Fridich, Hennеberg, and Kohlfürst) (1877–95). Consult Voretzsch, *Zur Erinnerung an K. E. Zetzsche* (Altenburg, 1894).

ZEUGLODON, zū'glō-dŏn (Neo-Lat., from Gk. ζεύγλη, *zeuglē*, strap or loop of a yoke, from ζευγνύναι, *zeugnynai*, to join + ὀδούς, *odous*, tooth). An extinct whale, the earliest known fossil cetacean, found in Eocene deposits of various parts of the world. It was a great serpent-like creature with body 50 to 70 feet long and from 6 to 8 feet in diameter at the thickest part of the trunk. The head was 4 feet long, the trunk 10 feet, and the tail had a length of 40 feet. The skull was elongated and flattened, resembling that of the crocodile, and the blowhole was near its middle. The teeth were like those of the Carnivora, from which the cetaceans are supposed to have evolved, in that they were disposed in three series (incisors, 3; canines, 1; and molars, 5), and the molars were peculiar in that they had longitudinally compressed, serrated crowns and were attached by double roots. The vertebræ of the tail were much larger than those of the trunk. The limbs consisted of small paddles, like those of the fur seal, just back of the head, and of very much reduced hind limbs, which are supposed to have been hidden under the skin and to have been totally useless. Zeuglodon bones are common in the Eocene marls of the Gulf States of North America, and they are known also from the Eocene deposits of various parts of Europe, Asia, Africa, Australia, and New Zealand. This wide distribution indicates that the animal was a powerful swimmer and capable of a very cosmopolitan existence. Consult: S. P. Woodward, *Outlines of Vertebrate Palæontology* (Cambridge, 1898); F. A. Lucas, "Animals of the Past," in American Museum of Natural History, *Handbook Series*, No. 4 (New York, 1913). See CETACEA; WHALE.



ZEUGLODON TOOTH.

ZEUNE, tsoi'ne, JOHANN AUGUST (1778–1853). A German geographer and philanthropist, born at Wittenberg. In 1802 he taught geography in his native city, and then in Berlin from 1803 until 1810, when he became professor of geography in the university. In 1806 he founded an institution for the blind in Berlin, which became well known. He wrote: *Gaa, Versuch einer wissenschaftlichen Erdbeschreibung* (1808; 3d ed., 1830); *Ueber Basaltpolarität* (1809); *Belisar, über den Unterricht der Blinden* (1808; 4th ed., 1834), a translation of the *Nibelungen* into modern German (1813, 2d ed., 1836). *Ueber Schadelbildung* (1846).

ZEUNER, tsoi'nĕr, GUSTAV (1828–1907). A German physicist and engineer, born at Chemnitz. He received his education at the School of Mines, Freiberg, became teacher first in the industrial school at Chemnitz, later in the School of Mines, Freiberg, and in 1855 professor of mechanics and engineering in the Polytechnic Institute at Zurich, and was director of that institution in 1859–68. From 1871 to 1873 he was director and professor of mechanics and mining engineering in the School of Mines at Freiberg, then was called in the same capacities to the Polytechnic Institute in Dresden, the organization of which he completed. He resigned from the directorship in 1890 and from the professorship in 1897, when he retired. He became chiefly known for his work in connection with thermodynamics and steam engines, and wrote: *Die Schiebersteuerungen mit besonderer Berucksichtigung der Lokomotivsteuerungen* (1858; 6th ed., 1904; trans. into French and English); *Grundzuge der mechanischen Warmetheorie* (1860; 3d ed., under the title *Technische Thermodynamik*, 1887–90; 5th ed., 1906); *Ueber das Wanken der Lokomotiven* (1861); *Das Lokomotivenblasrohr* (1863); *Abhandlungen aus der mathematischen Statistik* (1869). He also edited, together with Weisbach and Bornemann, the *Zivilingenieur* (1853–57).

ZEUS. See JUPITER

ZEUS (JUPITER) OTRICOLI. The antique bust of Zeus found at Otricoli, and now in the Vatican Museum. Only the mask survives, the back of the head being cut away. It is of Carrara marble and probably the work of a Greek sculptor in Italy after an original of the Hellenistic age. It is of leonine aspect, majestic and dignified, but lacks the serenity of the Phidian epoch. See Plate with article JUPITER.

ZEUSS, tsois, JOHANN KASPAR (1806–56). The founder of modern Celtic philology, born at Vogtendorf, near Kronach in Oberfranken. He studied at Munich from 1832 to 1839, was a teacher in the Gymnasium there, and then became professor of history in a secondary school in Speyer. In 1847 he was called to a professorship in the Lyzeum at Bamberg. His *Grammatica Celtica* (1853; 2d ed. by Ebel, 1868–71) was one of the greatest philological achievements of the century. His other works include *Die Deutschen und die Nachbarstämme* (1837; new ed., 1904); *Die Herkunft der Bayern von den Markomannen* (1839); *Traditiones possessionesque Witzenburgenses* (1842); *Die freie Reichstadt Speier vor ihrer Zerstörung* (1843). Consult Glück, *Erinnerung an Kaspar Zeuss* (Munich, 1857); E. Kuhn, *Johann Kaspar Zeuss* (ib., 1906).

ZEUTHEN, tsoi'ten, HIERONYMUS GEORG (1839–). A Danish mathematician, born at Grimstrup. He studied at Copenhagen University (Ph.D., 1865) and under Chasles in Paris. From 1886 to 1910 he was professor at Copenhagen University and at the Polytechnic Institute. For many years (1871–89) he edited the *Tidsskrift for Mathematik*, which exerted a wide influence. He contributed numerous math-

ematical treatises to the publications of Copenhagen University and the journals of scientific societies. In his special fields he gained an international reputation

ZEUX'IS (Lat., from Gk *Zeūxis*). A famous Greek painter who flourished near the end of the fourth century B.C. He is called a native of Heraclea, though which of the cities of that name is meant cannot be determined He visited Athens and Lower Italy, but seems to have made his headquarters during a considerable time at Ephesus. He took up the new chiaroscuro of Apollodorus of Athens and developed it, excelling rather in his coloring and expression than in fineness of drawing, in which he was surpassed by Parrhasius (q v). His human figures were criticized by some for their large heads and limbs, though others praised these qualities. Among his famous works were an "Alcmena" given to Agrigentum, a "Pan" presented to Archelaus, and a youthful "Hercules" strangling the serpents in the presence of the anxious Alcmena and Amphitryon. His "Helen" was painted as a present for the people of Crotona, after he had decorated the temple of Hera Lacinia near that city. Lucian describes in detail a painting representing a female centaur suckling her young, while in the background the wild father aroused and frightened his children by holding over them a lion's cub. Zeuxis seems to have studied to find new and strange situations. It is noticeable that great monumental groups, like those of Polygnotus, do not appear in his works. The nearest approach is perhaps found in his "Zeus Surrounded by the Gods." He belonged to the new school of artists who painted smaller works for private patrons, rather than decorations for public halls. See Pliny, *Historia Naturalis*, xxxv, 61–64; Quintilian, xii, 10, 4.

ZEVI, or **ZEWI,** zā'vē. SABBATHAI. See MESSIAH.

ZGIERZ, zgyĕrzh. A manufacturing town in the Government of Piotrkow, Russian Poland, about 10 miles north of Lodz. It is noted for its extensive woolen and cotton mills. Pop., 1910, 23,208.

ZHITLOVSKY, zhĭt-lŏf'skĭ, CHAIM (1865–). A Jewish writer and communal worker, born at Vitebsk, Russia. His *Thoughts on the Historical Fate of Judaism* (1887) first attracted attention to him. Among his works in Yiddish are: *The Jewish Nation and the Jewish Language*, a series of articles published in 1903; *Socialism and Nationalism* (1907); and *Philosophy: What It Is and How It Developed* (1910), the first systematic exposition of philosophy in the language. His writings were collected in four volumes in 1912. Zhitlovsky was the first expounder of Jewish nationalism and he was also one of the founders of the Jewish Socialist Labor party. From 1907 he lived in New York, where in 1909 he founded the monthly *Das Neue Leben.*

ZHITOMIR, zhĭt'ŏ-mēr'. The capital of the Government of Volhynia, west Russia, situated at the confluence of the Kamenka with the Teterev, 85 miles west-southwest of Kiev (Map: Russia, C 4). Zhitomir is noted for its manufacture of gloves, and produces also bent-wood furniture, ready-made clothes, and tobacco. It carries on a brisk trade in agricultural products and timber. Pop., 1911, 92,600, chiefly Jews and Poles.

ZHUKOVSKY, zhụ-kôf'skĭ, VASILY ANDREIEVITCH (1783–1852). A Russian poet, born in the Government of Tula He first attracted attention, when, in the campaign of 1812, he turned to patriotic verse. Zhukovsky introduced to his countrymen the Romantic literature of England and Germany, some of which he rendered in unexcelled verse For this he is generally considered the founder of the Romantic movement in Russia, but he more properly belonged to the sentimental school of Karamzin (q v.), whom he gratefully acknowledged his literary master. In his original poems and translations Zhukovsky showed such mastery over form that even Pushkin could do no more in this direction. Selections from his verse are available in English in John's *Specimens of the Russian Poets* (1821-23).

ZICHY, zĭch'ē, EUGEN, COUNT (1837–1906). An Hungarian explorer, born at Mihály After studying in Germany and traveling there and in England, he gave his attention particularly to the canalization of the Hungarian lowlands and, as president of the Home Industry Association, was very active in promoting the development of trade. In 1892 and in 1895–96 he visited the Caucasus and Central Asia, and in 1897–98 Siberia, China, Tibet, and Mongolia. He published *Voyages au Caucase et en Asie centrale* (1897), and the participants in his third expedition issued *Dritte asiatische Forschungsreise des Grafen Eugen Zichy* (6 vols., 1900–06).

ZICHY, zĭch'ē, GÉZA, COUNT VON VÁSONYKEÖ (1849–). An Hungarian pianist and composer, born at Sztára. Although deprived of his right arm at the age of 15 by an accident while hunting, he nevertheless took up music as a profession, chiefly under the guidance of Liszt, and as a virtuoso with the left hand created a sensation on his first appearance in 1878. Thereafter he appeared frequently, but only for charitable purposes. During the great European War he played throughout Austria and Germany to prove to the disabled what could be accomplished with only one arm. The foremost critics agree that Zichy's playing can be measured only by that of the greatest virtuosos of his time. The amount he realized for various charities is estimated at several millions of marks. He became president of the Hungarian National Conservatory, and from 1891 was intendant of the Royal Opera House and the National Theatre at Budapest. His compositions include the operas *Alár* (1896) and *Meister Roland* (1899), choral works, studies and solo pieces for the left hand, and songs.

ZICHY, MIHÁLY, COUNT (1826–1906). An Hungarian painter and illustrator. He was born at Zala, Somogy County, studied under Marastoni at Budapest and Waldmüller in Vienna, and in 1847 removed to St. Petersburg, where he was appointed Russian court painter in 1859. One of his best historical canvases on a large scale is "Empress Elizabeth of Austria at the Coffin of Francis Deák," in the National Museum at Budapest, which contains several other works by him. He is also represented in the Alexander III Museum, St. Petersburg. Zichy likewise painted genre and symbolical scenes, but is best known for his illustrations of great Hungarian writers, particularly Madach (*Tragedy of Man*) and Arany (*Ballads*). He was a fine draftsman, and possessed a vivid imagination and some realistic power, but was inclined to the sensational.

ZIDON. See SIDON.

ZIEGLER, tsē'glĕr, CLARA (1844–1909). A German actress, born in Munich. Having made her début at Bamberg in 1862, she contracted engagements successively at Ulm, Munich, and at the Stadttheater in Leipzig, where she scored triumphs, especially as Brunhilde (Hebbel's *Nibelungen*), Isabella (*Bride of Messina*), Maid of Orleans, and Elisabeth (Laube's *Essex*). In 1868–71 she was a member of the royal theatre in Munich and in 1876 married her former instructor, Adolf Christen. Thereafter she appeared in starring engagements on nearly all the principal stages of Germany, Holland, and Russia. Her other rôles were Iphigenie, Medea, Sappho, Penthesilea, Judith, and Thusnelda (Halm's *Fechter von Ravenna*), and she also impersonated successfully characters in high-class comedy. As a playwright she produced the comedies *Flirten* (1895), *Furcht vor der Schwiegermutter* (1897), and *Der Turner von Sankt Peter* (1897). For her biography, consult Mayerhofer (Bamberg, 1887).

ZIEGLER, JAKOB MELCHIOR (1801–83). A Swiss cartographer, born in Winterthur. He studied mathematics and natural sciences at Geneva and Paris. From 1828 to 1834 he was teacher of mathematics in Winterthur, and in 1834 became inspector of forests. He was known for his excellent surveying and map making of the mountainous regions of his native country. He published: *Topographische Karte der Kantone Sankt Gallen und Appenzell* (1852); *Atlas über alle Teile der Erde nach Karl Ritters Lehre* (1864); *Hypsometrischer Atlas mit Erläuterungen und Höhenverzeichnissen; Hypsometrische Karte der Schweiz* (1866); *Topographische Karte der Insel Madeira* (1856); *Topographische Karte des Kantons Glarus* (2d ed., 1869); *Topographische Karte des Unterengadin* (1873); *Ueber das Verhältnis der Topographie zur Geologie* (1876). Consult Geilfuss, *Leben des Geographen J. M. Ziegler* (Winterthur, 1884).

ZIEGLER, THEOBALD (1846–). A German philosopher, born at Göppingen, Württemberg. He studied at Tübingen, taught at several Gymnasia, and was professor at Strassburg from 1886 to 1911, when he retired. His most important writings include: *Studien und Studienköpfe aus der neuern und neuesten Litteraturgeschichte* (1877); *Lehrbuch der Logik* (2d ed., 1881); *Geschichte der Ethik* (2 vols., 1881–86; 2d ed., 1892); *Sittliches Sein und sittliches Werden* (1890; Eng. trans., 1892; Russ trans., 1895); *Die soziale Frage eine sittliche Frage* (1891; 6th ed., 1899); *Das Gefühl* (1893; 5th ed., 1912); *Geschichte der Pädagogik* (1895; 3d ed., 1909); *Die geistigen und sozialen Strömungen des 19. Jahrhunderts* (1899; 4th ed., 1911; Russ. trans., 1903; Dutch trans., 1912); *Friedrich Nietzsche* (1900); *Der deutsche Student am Ende des 19. Jahrhunderts* (1895; 12th ed., 1912); *Allgemeine Pädagogik* (4th ed., 1913); *Schiller* (2d ed., 1909); *David Friedrich Strauss* (2 vols., 1908); *Ueber Universitäten und Universitätsstudium* (1913); *Menschen und Probleme* (1914); *Der Krieg als Erzieher* (1914).

ZIEHEN, tsē'en, GEORG THEODOR (1862–). A German psychologist and psychiatrist, born at Frankfort-on-the-Main. From 1881 to 1885 he studied at Würzburg and Berlin, taking degrees in philosophy and medicine. After some years of hospital and educational experience he became professor and director of the psychiatrical clinic at Utrecht in 1900, was called in 1903 to Halle, and in 1904 went to Berlin as professor of psychiatry and nervous diseases. Besides serving as an associate editor of the *Zeitschrift für Psychologie und Physiologie der Sinnesorgane*, he published *Leitfaden der physiologischen Psychologie* (1891; 10th ed., 1914); *Das Centralnervensystem der Cetaceen* (1892, with Kukenthal), *Psychiatrie* (1894), *Das Centralnervensystem der Monotrema und Marsupialier* (1897–1905); *Psychophysiologische Erkenntnistheorie* (1898); *Psychotherapie* (1898); *Handbuch der Anatomie des Centralnervensystems* (1899–1913); *Ueber die allgemeinen Beziehungen zwischen Gehirn- und Seelenleben* (1902); *Die Geisteskrankheiten des Kindesalters* (1902–06); *Das Gedächtnis* (1908), *Prinzipien und Methoden der Intelligenzprüfung* (1909); *Handbuch der Gehirnkrankheiten im Kindesalter* (1912); *Erkenntnistheorie auf psychophysiologischer und physikalischer Grundlage* (1913); *Zum gegenwärtigen Stand der Erkenntnistheorie* (1914); *Die Grundlagen der Psychologie* (1915).

ZIELINSKY, zyĕ-lyĭn'skĭ, THADDAUS (1859–). A Russian classical scholar, born at Kiev. He studied at the universities of Leipzig, Munich, and Vienna. In 1881–83 he traveled in classic lands, and in 1887 became professor of classical philology at the University of St. Petersburg. His publications include: *Die letzten Jahre des zweiten punisches Krieges* (1880); *Die Gliederung der altattischen Komödie* (1885); *Cicero im Wandel der Jahrhunderte* (1897; 3d ed., 1912); *Das Clauselgesetz in Ciceros Reden* (1904); *Das Ausleben des Klauselgesetzes* (1906–); *Die Antiken und Wir* (1903; Eng. trans., *Our Debt to Antiquity*, 1909); *Der konstruirte Rhythmus in Ciceros Reden* (1913). Zielinsky was the pioneer in the study of rhythm in Latin prose. For a criticism of his work consult *The Year's Work in Classical Studies*, ix, 61–65 (London, 1915).

ZIEM, zē'ĂN', FÉLIX (1821–1911). A French landscape painter. He was born at Beaune (Côte d'Or), studied at the art school of Dijon, and later traveled in Italy and the Orient. He was a precursor of Impressionism and was the last of the Romantic school to portray the life and color of Mediterranean and Oriental countries. His specialty was Venice, and he rendered in prismatic and iridescent colors the singular charm of Adriatic scenery; but his style lacks variety. He also painted charming flower pieces. Ziem is excellently represented in the Luxembourg and the Petit Palais in Paris. He is also represented in the Metropolitan Museum, New York, the Walters Gallery, Baltimore, and other collections of the United States. Consult his biography by Fournier (Beaune, 1897), and *F. Ziem*, in "Les Peintres Illustres" (Paris, n. d.).

ZIEMSSEN, tsēm'sen, HUGO WILHELM VON (1829–1902). A German physician, born in Greifswald. He studied there, at Berlin, and at Wurzburg. In 1863 he was called to Erlangen as professor of pathology and director of the clinic, and in 1874 to Munich as director of the general hospital. He made advances in electrotherapeutics, introduced the cold-water treatment for typhoid fever and lung inflammation, and became an authority on diseases of the larynx and digestive canal. Among other works he published *Klinische Vortrage* (1887–1900). In collaboration with prominent specialists he published his great *Handbuch der speciellen Pathologie und Therapie* (17 vols., 3d ed., 1886 et seq.) and the *Handbuch der allgemeinen Ther-*

apie (4 vols., 1880–84), both translated into English. He edited with Zenker (q.v.) the *Deutsches Archiv fur klinische Medizin.*

ZIETEN, tsē'ten (**ZIETHEN**), HANS JOACHIM VON (1699–1786). A Prussian general, one of the ablest of Frederick the Great's soldiers. He was born on the estate of Wustrau, in Brandenburg. His fame was acquired in the first two Silesian wars. As colonel of the celebrated regiment of Hussars he made his way as far as Stockerau, near Vienna, and afterwards covered the retreat of Prince Dietrich of Anhalt into Silesia (1742). During the second war he became major general and made his famous march through the enemy's country to Jägerndorf in order to join the Margrave Charles (1745). He then won the battle of Hohenfriedberg In 1756 the King appointed him lieutenant general, and during the Seven Years' War he attained the height of his fame. At Reichenberg, Prague, Kolin, and Leuthen he came off victorious, and at Torgau he accomplished the supreme feat of storming the heights of Siptitz. Consult the biographies by Hahn (5th ed., Berlin, 1878) and Count zur Lippe-Weissenfeld (ib., 1880).

ZIGZAG (Fr. *zigzag*, from Ger. *zickzack*, variant reduplication of *Zacke*, prong, tooth). A decoration characteristic of the Norman style of architecture. It consists of one or more mouldings running in zigzag lines, and is used with great effect on the faces and soffits of arches, especially the stepped arches of church portals. The zigzags are sometimes undercut as well as decorated with various surface patterns.

ZILEH, zē-lē' (ancient *Zela*). A town in the Vilayet of Sivas, Asiatic Turkey, about 30 miles west-southwest of Tokat. The hill, called by Strabo the Mound of Semiramis, is crowned by the ruins of a mediæval castle. In ancient times the town was the seat of the temple of Anaïtis (q.v.) and was inhabited and ruled by priests. Pop., 20,000.

ZILLER, tsĭl'lĕr, TUISKON (1817–82). A German educator, born at Wasungen, in Saxe-Meiningen. He studied philology and law at the University of Leipzig In 1854 he was made professor of philosophy and pedagogy at Leipzig, and soon became one of the leading representatives of Herbartian theory. In 1861 he founded a pedagogical seminary at Leipzig, and in 1868 his pupils established with his help the Society for the Scientific Study of Pedagogy. He was a pioneer in pedagogy, and as such had a profound influence upon later students of the new science. Among his publications were: *Einleitung in die allgemeine Pädagogik* (1856; 2d ed., 1901); *Grundlegung zur Lehre vom erziehenden Unterricht* (1865; 2d ed., 1883); and *Allgemeine philosophische Ethik* (1880; 2d ed., 1886). Consult Lange, *Tuiskon Ziller* (Leipzig, 1884), and Fröhlich, *Die wissenschaftliche Pädagogik Herbart-Ziller-Stoys* (Vienna, 1892).

ZIMB, zĭmb *or* zīm (Ar., fly). A fly exceedingly destructive to cattle in Abyssinia. It probably belongs to the same family as the tsetse (q.v.) and is little larger than a bee, but thicker in proportion, the wings broader and without color or spot. The zimb is found only where the soil consists of a rich black loam; but all the inhabitants of the seacoast along the southern shores of the Red Sea, and southward beyond Cape Guardafui, are compelled to remove their cattle in the rainy season to the nearest sands, in order to prevent their destruction by this pest. The elephant and rhinoceros protect themselves from its attacks by rolling in mud, which, when dry, coats them as with a kind of armor.

ZIMBABWE, zĕm-bäb'wā (Bantu, stone houses). The name of the very remarkable ruins in Southeastern Mashonaland, in lat 20° 16′ 30″ S. and long 31° 10′ 10″ E., also called Great Zimbabwe, to distinguish them from the numerous minor Zimbabwes scattered through the country. The ruins, which cover a large area, are situated upon a high plateau, 3300 feet above sea level, and consist of a circular structure placed upon a moderate eminence and a strongly fortified acropolis on the top of a neighboring kopje, with a considerable mass of ruins in the valley between. The circular structure, which seems to have served as a fort, is 280 feet in diameter and is surrounded by a stone wall built of small granite blocks laid, as in all buildings of this type, without mortar. The height of the wall varies from 35 to 15 feet, and its thickness from 16 to 5 feet. It is pierced by three entrances and the interior is divided into compartments by inner walls. In an inclosure at the southeastern end stand two solid conical towers, one 32 feet high, the other much smaller. A small valley filled with a great mass of ruins and débris below the circular structure is probably what remains of a city. On the opposite side of the valley is a kopje crowned with the ruins of an ancient citadel or acropolis, approached by a narrow way strongly fortified at every step. The hill is of great natural strength, being protected on one side by gigantic boulders, and on the south by a precipice from 70 to 90 feet high, the only accessible side is protected by a massive wall, 13 feet thick at the top and 30 feet high in places. Like that of the circular structure below, the interior of the acropolis is divided by walls into labyrinthine compartments. From one of these a stairway leads to a series of caves in which were found a furnace for smelting gold, a number of small crucibles with particles of gold still adhering, and a soapstone ingot mold. These ruins are the most important of a long series of similar ruins along the whole length of the west side of the Sabi River. As to the date of these ruins there is much difference of opinion. On the one hand it is held that there is no reason to believe the ruins over a few centuries old, while on the other there are those who think that the builders were Orientals of a remote past. It can hardly be doubted, in the light of recent discoveries, that in this auriferous district was the biblical Ophir whence King Solomon is said to have derived large quantities of the precious metal. The strong fortifications of their ruined cities indicate that these colonies were surrounded by a hostile population. The archæological evidence tends to show that the ancient builders and miners were Semites, and probably South Arabians, though the country and its valuable products seem to have been known to the Phœnicians and Egyptians as well. At the present day mining operations are extensively carried on in the district, and a large amount of gold is produced. The ruins of Great Zimbabwe were discovered by Karl Mauch in 1871; they were explored by Theodore Bent in 1891, and since by several explorers. Consult: J. T. Bent, *The Ruined Cities of Mashonaland* (London, 1892); Peters, *Im Goldland des Altertums* (Munich, 1902);

Hall and Neal, *Great Zimbabwe* (New York, 1905); Randall-MacIver, *Mediæval Rhodesia* (London, 1906), and R. N. Hall, *Prehistoric Rhodesia* (New York, 1910).

ZIMBALIST, zim'ba-list, EFREM (1889–). A Russian violinist, born at Rostov on the Don. His first instruction he received from his father, an orchestral conductor. In 1901 he entered the Imperial Conservatory at St. Petersburg, where he studied the violin with Leopold Auer. In 1907 he graduated, winning the gold medal and a scholarship of 1200 roubles. In 1907 he made his début at Berlin with the Brahms concerto, creating a sensation, not so much by his remarkable technic as by the maturity of his art. Within a year he was enthusiastically received throughout Europe, and he had a like welcome in the United States, where he appeared for the first time in 1912 with the Boston Symphony Orchestra. In 1914 he married the singer Alma Gluck (q.v.).

ZIMISCES. See JOHN I, ZIMISCES.

ZIMMERMANN, tsim'er-män, JOHANN GEORG VON (1728–95). A Swiss philosopher. He was born at Brugg, in what is now the Canton of Aargau. He studied at Göttingen, and after traveling in Holland and France, settled at Brugg in 1754 as town physician. He wrote on experimental medicine (*Von der Erfahrung in der Arzneikunst* (1764), but is remembered chiefly for his treatises on solitude, *Ueber die Einsamkeit* (1755, revised 1784–85), and on national pride, *Vom Nationalstolz* (1758), both of which made a great impression in their time and were widely translated and admired. He became Court physician at Hanover in 1768 and attended Frederick the Great in his last illness (1786), publishing on this episode several books that throw more light on the doctor's vanity than on the royal patient's character. Among these is *Ueber Friedrich den Grossen und meine Unterredungen mit ihm* (1788). Consult: *Zimmermanns Briefe an einige seiner Freunde in der Schweiz* (ed. by Rengger, Aarau, 1830); Eduard Bodemann, *Johann Georg Zimmermann: ein Leben* (Hanover, 1878), and Rudolf Ischer, "Neue Mitteilungen über Zimmermann," in *Euphorion*, vol. viii (Leipzig, 1901).

ZIMMERMANN, ROBERT VON (1824–98). An Austrian philosopher, born at Prague. He was educated at the universities of Prague and Vienna, in 1852 he was called to Prague as professor of philosophy, and in 1861 to Vienna, where he became a member of the Academy of Sciences in 1869. He was the founder of the so called æsthetics of form, and an opponent of the Hegelian school. Among his works are: *Leibniz und Herbart* (1849); *Ueber das Tragische und die Tragödie* (1856); *Aesthetik* (2 vols., 1856–65), his chief work; *Anthroposophie im Umriss* (1882).

ZIMMERN, HELEN (1846–). An English author and translator. She was born in Hamburg, Germany, but was taken to England at the age of four. After 1887 she lived in Italy. In 1868 she began to write for various journals and reviews, and won almost immediate success. Many of her sketches were afterwards collected in book form, but it was rather as a translator and interpreter of Continental authors than as a story-teller that she became widely known. Her publications are: *Stories in Precious Stones* (1873); *Schopenhauer: His Life and Writings* (1878); *Half Hours with Foreign Novelists* (1880); *Tales from the Eddas* (1882); *The Epic of Kings* (1882), from Firdusi, *Maria Edgeworth* (1883); *The Hansa Towns* (1889); a translation of the *Comedies of Goldoni* (1892); the *Pentamerone*, translated (1893), translations from Nietzsche and Lessing; *Sir Laurence Alma Tadema* (1902), *Tripoli and Young Italy* (1912); *Italian Leaders of To-Day* (1915).

ZINC (Fr. *zinc*, from Ger *Zink*, zinc; connected with Ger. *Zinn*, AS., Eng *tin*, and OHG *zein*, twig, leaf of metal). A well-known metallic element. Isolated, it was unknown to the ancients, but coins of brass, of which zinc is a constituent, have been found dating 110 A.D. Basil Valentine mentions zinc in several of his writings, but it was not until 1520 that Paracelsus first described zinc as a metal and assigned it to the class of semimetals. Its character as a distinct substance was not fully recognized until the seventeenth century, and even Lemery, 1675, refers to zinc as identical with bismuth. The metal has been reported native in small quantities near Melbourne, Australia, and in the United States in northeastern Alabama. The principal ores are the carbonate, or *smithsonite;* the oxide, or *zincite;* the oxide in combination with iron and manganese oxides, or *franklinite;* the anhydrous silicate, or *willemite;* the hydrated silicate, or *calamine;* and the sulphide, or *sphalerite*, usually called *blende*. Less commonly zinc occurs as aluminate, arsenate, phosphate, and sulphate.

The sulphide is far more important as an ore in the United States than the oxidized ore minerals (commonly grouped together under the name *calamine*). About two and three quarters times as much *blende* as *calamine* was smelted in the United States in 1914. In the same year the principal zinc-producing States were, in the order of the recoverable zinc content of their ore, Missouri, New Jersey, Montana, Colorado, Wisconsin, and Idaho.

Zinc (symbol, Zn; atomic weight, 65.4) is a bluish-white metal with a density of about 7. in the solid state and 6.5 in the liquid state. It melts at 419° C. (786° F.) and boils in the neighborhood of 1000° C. (1832° F.). It is brittle at ordinary temperatures, but becomes malleable between 100° and 150° C. (212° to 302° F.). Commercial zinc has a coarse laminar texture; it is moderately hard, difficult to file, and when bent after fusion emits a crackling noise similar to tin. The metal is commonly known in the trade as spelter. It comes into commerce chiefly in the form of sheets and is used in the arts, especially in the manufacture of brass, German silver, and other alloys (see ALLOY); also for desilverizing lead by the Parkes process, for galvanizing iron sheets for roofing, etc., and iron wire for telegraphs (see GALVANIZED IRON); for electrical batteries, as a chemical reagent, etc. Zinc dust, the "blue powder" of the smelters, is metallic zinc in a very finely divided form. It is used chiefly as a reducing agent in the manufacture of dyestuffs or other organic compounds, and as a substitute for zinc shavings in the precipitation of gold. Zinc combines with oxygen to form a monoxide (the *nix alba*, "philosophical wool," or "flower of zinc" of the alchemists, and the *tutia* or *pompholyx* of the ancients). The commercial product, known as zinc white, is an almost white pulverulent solid used in large quantities as a pigment. In Europe it is made by burning metallic zinc, but in the United States it is made directly from zinc ore. Zinc oxide is also used in medicine for

special ointments. Among other commercial zinc compounds is the chloride (*oleum lapidis calaminaris*), first described by Glauber in 1648. It is prepared by treating scrap zinc with hydrochloric acid and evaporating the resulting solution to crystallization. This salt is used in medicine as a caustic, and is a disinfectant and deodorizer. It finds extensive application as a preservative of timber, the chloride in the form of a solution being forced by pressure into the pores of the wood; it is also employed for weighting cotton goods. The bromide and the iodide are both official in the Pharmacopœia, the former used in the treatment of epilepsy and the latter for scrofula. Zinc sulphate, originally known as "white vitriol," and found native as goslarite, was described by Basil Valentine. This salt may be obtained by roasting sulphide ores to form zinc sulphate, which is afterwards dissolved out with water, and then evaporated to crystallization. It is a white powder used in medicine as an astringent; it is also used in dyeing and calico printing, in the manufacture of varnishes and drying oils, for painting, and for the preparation of zinc-white and other zinc compounds.

Metallurgy. Commercial zinc is produced almost entirely by a smelting (dry) process, although there was in 1916 under construction at least one plant designed to produce a large yearly tonnage of metal by electrolysis of solutions leached from the ore. Zinc salts, the sulphate or the chloride, however, are extracted from ores or furnace products in the wet way, by chemical solution and subsequent crystallization. The salts so produced are largely used as such, and not treated for the metal. The underlying principle of the dry process, as applied to ores or oxidized furnace products, is to convert the zinc into the form of oxide or anhydrous silicate by calcination or roasting, and then to reduce these oxidized compounds by heating with carbon in retorts, the volatilized metal being condensed and collected in receivers attached to the retorts. Briefly summarized, the treatment of zinc ores consists of three separate and distinct operations: (1) concentration of the ore to yield a high-grade product; (2) roasting of the concentrated ore to yield a dehydrated or oxidized material; (3) reduction of the ore and distillation and condensation of the zinc vapor. In nearly all cases zinc ores require a preliminary concentration (see ORE DRESSING) before smelting, in order to remove the impurities that are mechanically associated with the ore.

Concentrates of the calamine type are usually calcined before smelting in order to remove water and carbonic acid, both of which exert an objectionable oxidizing action on the zinc vapor during the distillation. Formerly small shaft furnaces, similar to lime kilns, were used for calcination (of raw ore), but in modern practice reverberatory furnaces, equipped with rakes operated by hand or by mechanical devices, are used. Revolving cylindrical furnaces also have been used. Blende concentrates are roasted in order to expel the sulphur, which if left in the ore would not yield metallic zinc in the subsequent smelting operation. From the chemical relationships involved it is known that one unit weight of sulphur left in the ore holds back two units of zinc during the distillation. Hence it is important to roast the ore thoroughly. It has been found practicable to roast down to a sulphur content of about 1 per cent. Special kilns, reverberatory furnaces, revolving cylindrical furnaces, or special muffles are used for the roasting, the last named being specially valuable for the utilization of the expelled sulphur dioxide gases to make sulphuric acid. The zinc in the ore having been converted into oxide by calcination or roasting, the extraction of the metal is accomplished by strongly heating this oxide in retorts with carbon, which reduces the oxide to metal. This metal as soon as reduced is immediately volatilized and, passing from the retort, is condensed in suitable vessels attached to the exterior of the retort. The various types of distillation furnaces in use at the present day are all built in the form of long rectangular chambers of refractory brick covered with an arch springing from the long side walls. This chamber is generally divided by a longitudinal wall which permits the working of two groups of retorts, one on each side of the furnace. These side walls are built in the form of window frames, or pigeon holes, for the ready insertion or removal of retorts. In position, these retorts are nearly horizontal, having the front end slightly lower than the back, in order that the corrosive slags may drain to the cooler portion where the chemical action is diminished, also to facilitate charging and discharging of upper rows of retorts. Sufficient space is left between the retorts to allow the flames to circulate around them. Chief among the various retorts used for distilling the zinc are: (1) large Silesian muffles, "D" shape in cross-section; (2) medium-sized Westphalian "D"-shaped muffles; and (3) relatively small Belgian elliptical or circular tubes, the last named being the kind usually employed in the United States.

The size, number, and arrangement of retorts in a furnace vary greatly. An example of a modern furnace shows retorts 50 inches long and 8 inches in diameter to the number of 1008, arranged in six horizontal rows of 84 retorts on each side. Another example shows retorts of the same dimensions arranged in six rows of 72 on each side.

In the very old furnaces solid fuel was burned in direct contact with the retorts. Later, the solid fuel was first transformed into combustible gas in an exterior fireplace, or in a separate gas-producer, before being burned around the retorts. In modern furnaces gaseous fuel, either natural gas or manufactured gas, is used, which, together with the air needed for combustion, is first independently preheated in checker-work regenerators before being burned. Once in 24 hours a charge of ore, weighing about 50 pounds, is placed in each retort, together with the requisite quantity of coal or coke, to reduce the zinc oxide to metallic zinc. The volatilized metal is condensed in conical clay receptacles, which are luted to the front of each retort. In some cases metal prolongs are used to secure additional condensation. The molten metal is collected from time to time and cast into slabs, each weighing about 50 pounds. The purity of the metal is determined mainly by the character of the ore used and the temperature of distillation. Certain grades known to the trade are exceptionally pure by reason of the exceptional purity of the ore used. Furthermore, a selection on the basis of purity may be made by segregating the metal collected in different stages of the distillation process. The principal impurities in commercial spelter are lead and iron. The market price of the metal is based mainly upon its lead

and iron content, since only the purer grades can be used for making very ductile brass (such as is necessary in the manufacture of cartridge cases, etc.) and for certain other purposes.

In 1915 there was produced in the United States 489,519 short tons of primary spelter. In the same year the principal zinc-smelting States in the order of their output were Illinois, Oklahoma, Kansas, West Virginia, and Pennsylvania.

In Medicine. Zinc is represented in medicine by several salts, all of which are poisonous in some degree. Given in large quantities, zinc salts are actively emetic and are useful in cases of poisoning where it is desired to empty the stomach rapidly. In small doses they are tonic and astringent. Some of the most important preparations are: zinc acetate, a local astringent; zinc chloride, a favorite astringent in catarrhal diseases of the mucous membrane; zinc oxide, often applied locally in the form of a salve; and zinc sulphate, an emetic. Other preparations are the bromide, the carbonate, the iodide, the phenolsulphate, the sulphocarbolate, the stearate, and the valerate.

Consult: W. R. Ingalls, *Production and Properties of Zinc* (New York, 1902); id., *Metallurgy of Zinc and Cadmium* (2d ed., ib., 1906); id., *Lead and Zinc in the United States* (ib., 1908); C. D. Holley, *Lead and Zinc Pigments* (ib., 1909); Henry Wren, *Organometallic Compounds of Zinc and Magnesium* (ib., 1914).

ZINC ETCHING. See PHOTO-ENGRAVING, paragraph *Line-Cut Process*.

ZINC ETHYL. See ORGANOMETALLIC COMPOUNDS.

ZINCITE. A mineral zinc oxide crystallized in the hexagonal system. It has a subadamantine lustre and is deep red in color. It occurs with other zinc minerals, especially franklinite and willemite, at the various mines in Sussex Co., N. J. Artificial crystals of zincite have been found as furnace products in Silesia, and also at the zinc furnaces at Newark, N. J., and Bethlehem, Pa. It is a valuable ore of zinc when found in sufficient quantity, and is commonly known as red oxide of zinc. Zincite, when found with willemite and franklinite, has sometimes been made into paper weights and similar objects. It does not, however, take a high polish.

ZIN'DER, or SINDER. A town of French Sudan (Map: Africa, E 3). It is an important trading station on the route across the Sahara from Tunis through Air, and was occupied in 1899 by the French. Pop., about 10,000.

ZINGARELLI, zĕn'gä-rĕl'lē, NICOLO ANTONIO (1752–1837). An Italian composer, born in Torre del Greco, near Naples, where he studied at the Loreto Conservatory. In 1785 his opera *Alsinda* was produced with success, and in 1792 he was appointed maestro at the Milan Cathedral. He was maestro of St. Peter's, Rome, from 1804 until 1811, when, because of his refusal to permit a Te Deum to be sung in commemoration of the birth of Napoleon's son, he was arrested and taken to Paris. Napoleon received him very graciously, commissioned him to write a mass for the Imperial chapel, and permitted him to return to Italy. During his absence Janniconi had succeeded him at St. Peter's, and he went to Naples, where in 1813 he became director of the Royal College of Music, and (1816) succeeded Paesiello as maestro at the Cathedral. He wrote not less than 34 operas, 38 masses, 5 oratorios, and many smaller sacred and secular compositions.

ZINGARI, tsĕn'gä-rē, GLI (It., The Gypsies). An opera by Leoncavallo (q.v.), first produced in London, Sept. 16, 1912, in the United States, Oct. 30, 1913 (San Francisco).

ZINGERLE, tsĭng'ĕr-le, IGNAZ VINZENZ (1825–92). An Austrian poet and philologist. He was born at Meran and was educated at Trent and Innsbruck, and at the Seminary of Brixen. In 1848 he was appointed a teacher in the Innsbruck Gymnasium, and from 1859 to 1890 was professor of the German language and literature in the university. He published many works bearing on the history and literature of Tirol, of which the more important are: *Sagen aus Tirol* (1850; 2d ed., 1891); *Tirol, Natur, Geschichte und Sage im Spiegel deutscher Dichtung* (1852); *Kinder- und Hausmarchen* (1852–54); *Sitten, Brauche und Meinungen des Tiroler Volkes* (1859); and also wrote *Die deutschen Sprichworter im Mittelalter* (1864); *Die Alliteration bei mittelhochdeutschen Dichtern* (1864); and *Das deutsche Kinderspiel im Mittelalter* (1873); and issued an edition of *Konig Laurin* (1850). His verse includes: *Fruhlingszeitlose* (1848); *Von den Alpen* (1850); and *Gedichte* (1853). Of his tales in prose, *Der Bauer von Longvall* (1874) met with especial favor.

ZINGIBER, zĭn'jĭ-bĕr. See GINGER.

ZINGIBERACEÆ, zĭn-jĭb'ĕr-ā'sē-ē (Neo-Lat. nom. pl., from Lat. *zingiber*, from Gk. ζιγγίβερις, *zingiberis*, ginger). The ginger family. A family of tropical, mainly Asiatic monocotyledonous mostly perennial herbs, with fleshy rootstalks or tuberous roots, embracing about 25 genera and 275 species. Several genera contain plants of economic value, as ginger, curcuma, grains of Paradise, cardamoms, and various important fibres. See GINGER.

ZINGIS KHAN. See GENGHIS KHAN.

ZINJAN, zĭn-jan', or **ZENJAN.** The capital of the Province of Khamseh, northwest Persia, at an elevation of 5000 feet on the highroad from Teheran to Tabriz, over 200 miles northwest of the former city (Map: Persia, C 4). It is surrounded by gardens and has an extensive bazar. The town is the former stronghold of the Babi sectarians. (See BABISM.) Pop., 25,000.

ZIN'NIA (Neo-Lat., named in honor of J. G. *Zinn*, a German botanist of the eighteenth century). A genus of plants of the family Compositæ, comprising about 16 species indigenous to Mexico, and the southern portions of the western United States. They are chiefly annuals which flower freely until fall. The numerous branches are each terminated by a single head of flowers. The best-known species is the garden zinnia (*Zinnia elegans*), with variously tinted single and double flowers. Other species sometimes cultivated are *Zinnia pauciflora*, with red-purple rays, and *Zinnia angustifolia*, with showy orange-colored flowers. They prefer deep, rich, loamy soils, and sunny situations.

ZINTGRAFF, tsĭnt'gräf, EUGEN (1858–97). A German African explorer. He was born at Düsseldorf, where he studied first law and afterwards natural science. In 1884 he accompanied an Austrian expedition to the Lower Congo, and in 1886 he headed an expedition sent by the German government to explore Kamerun in West Africa. He established the station of Barombi on Elephant Lake in 1888, and from there undertook a remarkable march to the Binue, crossing for the first time the forests which separate Kamerun from the interior, establishing the station of Baliburg, and arriving again at Barombi in January, 1890. After a short rest in Germany

he returned to Kamerun, where he carried out a successful attempt to regulate trade. In 1893–94 he traveled in Zanzibar, German and Portuguese East Africa, and the Transvaal.

ZINZENDORF, tsĭn'tsen-dōrf, NIKOLAUS LUDWIG, COUNT VON (1700–60) Founder of the reorganized Moravian Church or United Brethren. He was born at Dresden, May 26, 1700, and was educated by his grandmother Spener, the head of the Pietists, was a frequent visitor at her house, and his conversation and the devotional exercises in which Zinzendorf took part influenced his character while a mere child. In 1710 he went to Halle, where he spent six years, under the special care of Francke, the philanthropist. (See FRANCKE, A. H.) In 1716 he was sent to Wittenberg, where pietism was in less repute than at Halle; but he adhered to his early religious impressions. From 1719 to 1721 he traveled through Holland and France, everywhere seeking those of religious sympathy with his views. On his return to Dresden he was appointed a member of the Saxon State Council But political life was little to his mind, and he purchased an estate in Upper Lusatia, where he wished to build up a quietistic community. While residing there he accidentally met a wandering carpenter named Christian David, a member of the old sect of Moravian Brethren. David described the persecutions to which the sect was exposed, and Zinzendorf invited them to settle on his estate; the colony received the name of Herrnhut. In 1734 Zinzendorf went under a feigned name to Stralsund to pass an examination in theology, and was ordained a minister of the Lutheran Church In 1736 he was banished from Saxony on a charge of introducing dangerous novelties in religion. He repaired to Holland, where he founded a Moravian colony, and afterwards to Esthonia and Livonia, where he also founded colonies In 1737, at the request of King Frederick William I of Prussia, he was ordained bishop of the Moravians. In the same year he went to London, where he was received with much consideration by Wesley. In 1741 he went to North America, and founded the celebrated Moravian colony at Bethlehem, Pa. He labored earnestly to promote unity among the German settlers in the colony, but unsuccessfully. He returned to Europe in 1743, and for the next twelve years he traveled through Great Britain, Holland, Germany, and Livonia, but made Chelsea, England, his headquarters. In 1747 he was permitted to visit Herrnhut, and in 1755 to return there permanently. He died at Herrnhut May 9, 1760. Zinzendorf was the author of more than 100 works in verse and prose. His writings are often incoherent or mystical. His *Diary* was published in Herrnhut (1907). A good collection of his hymns is by Knapp (Stuttgart, 1845).

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ZI'ON (Heb. *Ṣiyyōn*). The name of the acropolis of the Jebusites, taken by David, who made it his residence and strengthened and extended it (2 Sam. v. 6–9; 1 Chron. xi. 4–8). Christian tradition has located Zion upon the western and higher of the two hills on which Jerusalem is built, and this view is still adhered to by some scholars. But identification with the southern end of the eastern or temple hill, called the Ophel hill, agrees better with the natural conditions, the Old Testament references, and Jewish tradition, and excavations on this hill have made this view practically certain. In course of time the name Zion lost its narrower significance, and, in the prophets, often stands for Jerusalem, while "daughter of Zion" means the Jewish people. See JERUSALEM.

ZION CITY. A city in Lake Co., Ill., 42 miles north of Chicago, on the Chicago and Northwestern Railroad. There are manufactories of lace goods, electrical supplies, office supplies, candy, milling and baking supplies, and bricks. Pop., 1910, 4789.

ZIONISM. See ZIONIST MOVEMENT.

ZIONIST MOVEMENT. A movement which has for its object—to quote Dr. Theodore Herzl, the founder of modern Zionism—"the creation of a home secured by public rights for those Jews who cannot or will not be assimilated by the country of their adoption." It is in part a consequence of the anti-Semitic agitation. (See ANTI-SEMITISM.) The misery caused by the relentless policy of persecution adopted by Russia against a Jewish population now estimated at nearly 6,000,000 souls presents in itself a problem for which apparently the Zionists alone have proclaimed a comprehensive solution.

Ever since their dispersion faithful orthodox Jews have found consolation in the religious hope that the promises of the ancient prophets will finally be realized, that the Messiah will appear to lead the children of Israel back to the Holy Land of their fathers. The religious nature of this Messianic Zionism has, in fact, been the ground for strong opposition to the present movement on the part of those who, like Dr. Adler, late Chief Rabbi of England, have denounced it as an attempt to forestall Divine Providence.

The history of the Jews, however, shows that the Messianic faith was not incompatible with active attempts at repatriation. Thus Bar-Kokba (q.v.) (117–138 A.D.) based his all but successful revolt against the Romans on the Messianic prophecy, and was supported in his claims by the great Rabbi Akibah. At later periods a number of Pseudo-Messiahs were created by the restlessness or mysticism of their times, reacting upon the despair of the Jewish people. See MESSIAH.

The most remarkable of all the Pseudo-Messiahs was Sabbathai Zewi, whose self-proclamation at Smyrna (1660) threw the Jewish people into a state of hysteric excitement which long outlasted his downfall, and was not entirely allayed until the influence of Moses Mendelssohn (q.v.) a hundred years later turned Jewish hope into a new direction.

Under the influence of the Mendelssohnian

school, and the growing tendency towards toleration, the old Messianic mysticism gave way before the passion with which the Jews turned towards the acquisition of Occidental culture, in the hope of being permitted to become integral parts of the nations among which they lived. The new Jewish culture originating in this period developed, however, a new and broader race consciousness, and correspondingly an historical and sentimental interest in Palestine, which manifested itself in efforts at colonization by philanthropists such as Moses Montefiore and by associations such as the "Alliance Israélite Universelle," which efforts were encouraged by a number of British statesmen. After the Russian riots of 1881 and the enactment of the barbarous May Laws, a great impetus was given to the colonization movement by the formation of the international society Lovers of Zion (Chovevei Zion, Odessa, 1882), which, aided by the Rothschild family, and by Baron de Hirsch and his Jewish Colonial Association, succeeded to the extent that there were in Palestine 25 Jewish colonies by 1898 and 43 by 1915.

The planting of isolated colonies in Palestine failed to hold the general interest of the Jewish people. As a relief for the condition of the Eastern Jews, the colonies in Palestine and elsewhere are insignificant. The Mendelssohnian ideals of culture, too, had apparently failed as a solution of the vexed Jewish problem. Continental Judaism was in despair, when in the spring of 1896 there appeared from the pen of Dr. Theodore Herzl, a Viennese journalist and playwright, simultaneously in English, French, and German, a pamphlet entitled "The Jewish State." It was therein proposed that Palestine should be obtained from the Sultan of Turkey, the holy places made extraterritorial, and a Jewish autonomous state, the organization and government of which were set forth in detail, established under Turkish suzerainty and the guarantee of the Great Powers.

This was the beginning of the present Zionist movement. As a result of the profound sensation created by this pamphlet, the first Zionist Congress was held at Basel, Switzerland, in August, 1897, when 200 delegates represented Jews of all nationalities and all political and religious convictions. The political programme adopted at this congress, the basis upon which the movement now rests, begins as follows: "Zionism aims at establishing for the Jewish people a *publicly recognized* and *legally secured* home in Palestine." Among the means to be adopted for the attainment of this end, the programme specifies "the promotion of the settlement of Jewish agriculturists, artisans, and tradesmen in Palestine," and "preparatory steps for the attainment of those governmental grants which are necessary for the achievement of the Zionist purpose." Subsequent Zionist congresses were held in 1898 (when the Jewish Colonial Trust, the financial instrument of Zionism, was founded), in 1899, 1900, 1901, and thereafter biennially until 1913, all in Basel except those at London in 1900, The Hague in 1907, Hamburg in 1909, and Vienna in 1913.

Dr. Herzl, before his death in 1904, had a number of audiences with the Sultan of Turkey, who summoned him to Constantinople twice in 1902. Though sympathetically disposed, the Sultan did not offer such concessions as Dr. Herzl, standing firmly on the Basel platform, could accept. For a time, about 1908, Zionist leaders believed the Young Turk movement and proposals for larger autonomy for Turkish provinces promised success for their cause, but subsequent events showed a prevailing tendency towards stronger national control.

Before the 1903 congress an offer was made to the Zionists by the British government of a grant of land in British East Africa for the purpose of an autonomous Jewish settlement, under Jewish local administration and general British control. A committee appointed to investigate reported unfavorably to the seventh congress, which declared, "It [the congress] rejects either as an end or as a means all colonizing activities outside of Palestine and its adjacent lands." The element not accepting this principle formed, under the leadership of Israel Zangwill, the Jewish Territorial Organization. This investigated and rejected British grants in various places and now devotes itself to assisting Jewish immigrants to America.

The Zionist movement has aroused and continues to hold the devotion of a large part of the Jewish people. There are at present 500,000 paying members of the Zionist organization, which consists of more than 1000 constituent societies. The Federation of American Zionists, formed in 1898, reported (1915) the number of American Zionist societies as 412. The reformed clergy as a class and the great financiers have shown strong opposition to Zionism, on the other hand, many leaders of thought and literary men are prominently identified with the movement. The great war threw the active leadership of the movement into American hands. Direction was exerted by the Provisional Committee for General Zionist Affairs, with Louis D. Brandeis as chairman.

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ZIRCON, zĕr'kŏn (from Ar. *zarkūn*, cinnabar, vermilion, from Pers. *zargūn*, golden, yellow from *zar*, Skt. *hiranya*, gold + *gūn*, Av *gaona*, color). A mineral zirconium silicate crystallized in the tetragonal system. It is yellowish to brown in color, frequently ranging to shades of violet-gray, and is met with in crystalline rocks, especially granular limestone, various schists, gneiss, syenite, and granite. It is found

in the alluvial sands in Ceylon, in the Ural, and in various localities in Norway, Bohemia, France, Italy, and elsewhere in Europe, also in Australia. In the United States it occurs in Maine, New York, New Jersey, Pennsylvania, and largely in North Carolina, Colorado, and California. The mineral finds use in the manufacture of the incandescent mantles of Welsbach burners. The transparent varieties, especially those from Ceylon, are cut into gems and are called variously jargon or jargoon, jacinth, or true hyacinth

ZIRCO'NIUM (Neo-Lat., from *zircon*). A metallic element found as a new earth in the mineral zircon by Klaproth in 1789, and first obtained in the impure metallic state by Berzelius in 1824. It occurs in combination with silica in the mineral zircon, and also in certain rarer minerals, including eudialyte, fergusonite, and polymignite The impure metal, contaminated with oxide or carbide, is obtained by reducing the silicate with carbon in an electric furnace The amorphous form is obtained by heating potassium zirconifluoride with sodium under fused potassium chloride in an iron vessel. When 97–98 per cent metal is rolled into rods which serve as terminals of an electric arc in an atmosphere of hydrogen under reduced pressure, fusion takes place, yielding a product of 99 8 per cent purity. Zirconium is also produced by reducing zirconia with metallic calcium

Zirconium (symbol Zr, atomic weight, 90 6) is either a black amorphous powder or a lustrous gray brittle crystallized solid. The crystallized variety has a specific gravity of 6 40; its melting point is above 1300° C. (2372° F.) and resembles white cast iron. The amorphous variety readily combines with oxygen at ordinary temperatures to form the dioxide known as zirconia, while the crystalline type requires a white heat to effect the same combination. Zirconia, ZrO_2, is a white tasteless powder that has been used instead of lime in the oxyhydrogen flame, and with thoria, yttria, and other rare earths for the mantle of the Welsbach burner and the Nernst lamp. The oxide combines with strong bases to form zirconates

ZIRKEL, tsĭr'kel, FERDINAND (1838–1912). A German mineralogist, born at Bonn He was at first interested in mining, visited Iceland in company with Preyer in 1860, and after being employed for two years in the Geological Institution at Vienna, became professor, successively at the universities of Lemberg (1863), Kiel (1868), and Leipzig (1870), where he was also made director of the Mineralogical Museum. He traveled for study in France, Italy, and Scotland; came to America in 1874 to examine the great collections of minerals made during the exploration of the fortieth degree of latitude, and in 1894–95 pursued scientific investigations in Ceylon and India. He retired in 1909 and lived thereafter at Bonn. His more extensive writings include: *Reise nach Island im Sommer 1860* (with Preyer, 1862); *Lehrbuch der Petrographie* (1866; 2d ed., 1893–95); *Die mikroskopische Beschaffenheit der Mineralien und Gesteine* (1873); "Microscopical Petrography," in *Report of the United States Geological Exploration of the Fortieth Parallel* (1876); and *Ueber Urausscheidungen rheinischer Basalte* (1893). After the death of Naumann he edited the new issues of his *Elemente der Mineralogie* (14th ed., 1901).

ZIRKNITZER SEE, tsĭrk'nĭts-ĕr zā, or **CZIRKNITZER SEE.** A small lake in Carniola, Austria-Hungary, 28 miles east-northeast of Triest. It lies in a depression of the limestone plateau known as the Karst (q.v.), where distinct valley systems are wanting, the drainage being subterranean The lake, which ordinarily has an area of 10 square miles and a mean depth of 20 feet, communicates through openings with subterranean reservoirs or caverns, some of which are in hills above the lake level. In autumn, when the rainfall is slight, the lake is completely drained into the reservoirs lying below its level, and its bed is speedily covered with rich herbage. With returning heavy rains the surrounding higher reservoirs are filled and discharge suddenly through the subterranean passages into the lake, so that the latter rapidly regains its volume and may even inundate the country. These changes are, however, very irregular. Sometimes the lake does not disappear for several years; once (1834–35) it remained dry over a year. It is rich in fish, which disappear and return with the water.

ZISKA, zĭs'kà, Boh. **ZIŽKA,** zhĭzh'kà, JOHN (c 1378–1424). A famous leader of the Hussites. He was born at Trocnoy, near Budweis, Bohemia. He became a page to King Wenceslas of Bohemia, and spent his youth at Prague. In 1410 he took part as a volunteer on the side of the Teutonic Knights in the great battle of Tannenberg. Later he fought against the Turks and at the battle of Agincourt. Returning to Bohemia, soon after the burning of John Huss, he became prominent among the leaders of the Hussites. In 1419 the Hussites took up arms against the Emperor Sigismund, and Ziska displayed extraordinary activity in organizing their forces, soon becoming leader. He built a mountain stronghold which he named Tabor, whence the extreme party among the Hussites took the name of Taborites (q.v.). In 1420 he took up a strong position near Prague on an eminence since known as the Zizkaberg, and with a few thousand men beat off an army of 30,000 (July 14). On November 1 he won a victory over the Emperor Sigismund and again on Jan. 8, 1422, he was victorious at Deutschbrod. His course was everywhere marked by the destruction of monasteries, the burning of priests' houses, and the introduction of the communion with both elements. (See UTRAQUISTS) As the leader of the Taborites, Ziska waged a relentless war against the section of the Hussites known as the Calixtines. In 1424 it is said that Sigismund proposed an arrangement with the Hussites, by which full religious liberty was to be allowed and Ziska, who had an interview with the Emperor on the footing of an independent chief, was to be appointed Governor of Bohemia and her dependencies, but if this is true, the war-worn old chief did not live long enough to complete the treaty, for while besieging the castle of Přibyslav he was seized with the plague, and died Oct. 11, 1424. He was buried in a church at Czaslav, and his iron war club was hung up over his tomb. From early boyhood Ziska had been blind in one eye and he lost his other eye in 1421. As he has become a popular hero, it is difficult in many parts of his life to separate fact from fiction. Meissner was the author of an epic poem on Ziska which had more than a dozen editions; and George Sand wrote a prose *Life.* Consult W. W. Tomek, *Johann Ziska* (Ger. ed., Prague, 1882).

ZITELMANN, tsit'el-mân, KONRAD (1854–97). A German poet and novelist who wrote under the pseudonym of Konrad Telmann. He was born at Stettin, and studied law and political science at the universities of Leipzig, Heidelberg, Berlin, and Greif-swald. After 1878 he lived in Mentone and Rome, devoted to literary pursuits. He possessed a strong lyric and narrative gift. His works (about 80 vols.) include: *In der Einsamkeit* (1876), *Meeresrollen* (1884), and *Aus der Fremde* (1889), volumes of verse; *In Pommern* (1875), *Lichter und Schatten* (1884), *Sphinx und andere Novellen* (1886), *Dissonanzen und Accorde* (1888), collections of short stories, and *Götter und Götzen* (1884), *Moderne Ideale* (1886), *Dunkle Existenzen* (1886), *Vom Stamm der Ikariden* (1891), *Lucretia* (1896), *Gottbegnadet* (1897), etc., novels. *Unter dem Strohdach* (1892) is his best novel, while *Margarete* (1875), *Lebensfragmente* (1884), and *Auf der Sireneninsel* (1890) are among his best stories.

ZITH'ER (Ger. *Zither, Cither*, OHG. *zitera, cithar*, from Lat. *cithara*, from Gk. κιθάρα, *kithara*, lyre). A musical instrument, the modern representative of the ancient *cithara* (q.v.). In its modern form it is derived from a peasant instrument of the German Alps. It is a flat, stringed instrument, with a shallow resonance box, provided with a sound hole and 36 or more strings. On the side nearest the player is a fretted fingerboard, while near the right end is a low bridge. Above the fingerboard are five melody strings made of metal and tuned: a′, a′, d′, g, c. These are stopped with the left hand and plucked by means of a ring with a projecting spur, worn on the thumb of the right hand. The accompaniment strings, tuned in fourths, are made of gut or silk and are plucked by the first three fingers of the right hand.

ZITTAU, tsit'tou (Slav. *Zitava*). A town of the Kingdom of Saxony, 49 miles southeast of Dresden, near the Bohemian frontier, on the left bank of the Mandau, near its confluence with the Neisse (Map: Germany, F 3). The town has the notable Byzantine church of St. John, finished in 1837; a splendid courthouse, one of the finest in Saxony, finished in 1845; and a good library, in conjunction with a museum. Zittau is the centre of the linen and damask manufacture of Saxony. There are bleach fields, dye works, and paper, oil, and saw mills, and there are manufactures of machinery, bicycles, woolens, felt goods, window shades, chemicals, and wooden wares. The town also possesses valuable forests which yield a large revenue. Pop., 1910, 37,084.

ZITTEL, tsit'el, KARL ALFRED VON (1839–1904). A German geologist and paleontologist, born at Bahlingen, Baden. After studying at Heidelberg and in Paris, he was employed by the Geological Institution in Vienna, qualified there as docent at the university in 1863, and in the same year became professor of mineralogy at the Polytechnic School in Karlsruhe, whence he was called to the chair of paleontology at Munich in 1866. He took part in Rohlfs's expedition to Egypt and the Libyan desert in 1873–74. His publications comprise: *Palaontologische Studien über die Grenzschichten der Jura- und Kreideformation* (2 vols., 1868–70); *Aus der Urzeit: Bilder aus der Schopfungsgeschichte* (1872; 2d ed., 1875); *Handbuch der Palaontologie* (4 vols., 1876–93), with Schimper and Schenk, an important work on this branch of science; *Beiträge zur Geologie und Palaontologie der Libyschen Wüste* (1883); *Die Sahara* (1883); *Geschichte der Geologie und Palaontologie bis Ende des 19 Jahrhunderts* (1899). In 1899 he was made president of the Bavarian Academy of Sciences and head custodian of the scientific collections of Bavaria.

ZITUNI (*Mod. Gk. pron.* zī-tē'nī). See LAMIA.

ZIŽKA, JOHN. See ZISKA.

ZIZKOW, zhēzh'kōf. A town of Bohemia, Austria, an eastern suburb of Prague. It has manufactories of matches, metal goods, and ammunition. Pop., 1900, 59,326; 1910, 72,173. Zizkow was made a separate town in 1898.

ZLATOPOL, zla'tō-pōl. A town in the Government of Kiev, South Russia, about 50 miles southwest of Tcherkasy. It manufactures flour. Pop., 1910, over 12,000.

ZLATOUST, zlä'tō-ust'. A district town in the Government of Ufa, East Russia, situated in the Ural Mountains, 270 miles northeast of Ufa (Map: Russia, J 3). It lies in an extensive mining region and has large crown works for the manufacture of guns and ammunition. Pop., 1910, 34,245.

ZMAJ, zmāj. See JOVANOVIC.

ZNAIM, tsnīm. A town of Moravia, Austria, on the Thaya, 48 miles north-northwest of Vienna (Map: Austria, E 2). The town contains an old castle of the margraves of Moravia. There are manufactures of pottery and textiles. Pop., 1900, 16,261; 1910, 18,835. At Znaim an armistice was concluded between the Austrians and the French after the battle of Wagram (1809), leading to the Treaty of Schönbrunn.

ZO'AN. The Hebrew name of the Egyptian city of Tanis (q.v.).

ŻO'AR (Heb. *ṣō'ar*). One of the ancient cities of Palestine. In Gen. xiv. 2, 8 the present text reads: "The King of Bela, which is Zoar," and it has, therefore, been supposed that Bela was its original name. But it is probable that the text originally read: "Bela, the King of Zoar." According to the narrative in the fourteenth chapter of Genesis, it was attacked in the expedition of the four kings against five. (See AMRAPHEL.) It was one of the five "cities of the plain," and, with the others, was doomed to destruction, but was spared, at Lot's intercession, to afford him a refuge (Gen. xix.). In the account of the death of Moses it is mentioned as visible from Pisgah (Deut. xxxiv. 3). In Isaiah and Jeremiah it appears as a town of Moab (Isa. xv. 5; Jer. xlviii. 34). Zoar probably lay in the vicinity of the other four cities at the southern end of the Dead Sea, but its exact location is unknown. Eusebius and Jerome describe a place Zoara, at the south end of the Dead Sea, as a Roman garrison with many inhabitants. Stephen of Byzantium calls it a large village and fortress, and it is subsequently spoken of as the see of a bishop. It is given on the Madeba map (sixth century) southeast of the Dead Sea. The Crusaders found it under the name Segor, and describe it as pleasantly situated and having many palm trees. Abulfeda, the Arabic historian, also makes frequent mention of a place Zoara, adjacent to the Dead Sea. Consult Peter Thomsen, *Loca Sancta* (Halle, 1907); G. A. Smith, *Historical Geography of the Holy Land* (16th ed., London, 1910). Thomsen and others have identified it with *Hirbet* and *Kal'at el Safiye*, but this is doubtful. See SODOM AND GOMORRAH.

ZOAR COMMUNITY. A communistic so-

ciety established in America by a colony of Germans calling themselves Separatists. It was originally composed of about 400 members, who had suffered persecution in Wurttemberg as dissenters from the Established church, and who in 1817 emigrated to America, where they were kindly received by the Quakers of Philadelphia, who aided them in effecting a settlement in Tuscarawas Co., Ohio. The Separatist emigration had been primarily for the purpose of securing religious liberty. The idea of establishing a commune was not entertained until after the settlement in Ohio. Early in 1819 articles of agreement for a community of goods were signed. During the earlier years of the life of the society many new members were added from Württemberg; the community attained its greatest number of members, some 500, about 1832. About 1885 they owned over 7000 acres of land, a few shops and factories, and property valued at about $1,000,000, and carried on a considerable commerce with the outside world. The growth and prosperity of the society was, however, largely due to the ability and shrewdness of its leader, Joseph Michael Bäumeler (q.v.). Decline had begun with his death in 1837. In 1898 the question of dissolution was formally discussed, and on March 10 a decision was reached binding all to a division of the property among the 222 members This act of distribution abolished the communistic feature of the society, but the municipal incorporation of the Society of Zoar remains intact. The cause of the dissolution was the growth among the younger members of a desire for individual ownership. Consult Charles Nordhoff, *The Communistic Societies of the United States* (New York, 1875), and W. A. Hinds, *American Communities and Cooperative Colonies* (2d ed., Chicago, 1908).

ZOBEIR, zō-bār′, or **ZUBAIR,** zų-bār′, IBN AL 'AWAM. Cousin of Mohammed, and one of the earliest converts to Islam. He belonged to the 10 of whom Mohammed predicted that they would surely enter the garden of Allah, the other nine being Abu Bekr, Omar, Othman, Ali, Talha, Abdu'l Rahman, Sa'd ibn Abu Wakkas, Sa'id ibn Zaid, and Abu Obaidah ibn Jarrah. On the death of the prophet Zubair and Talha favored Ali, but through Omar's influence Abu Bekr was chosen. After Omar had been mortally wounded by the Christian assassin Firduz, he appointed Zubair as one of a council of six to elect a successor. He supported Ali during Othman's reign, but after the murder of Othman, he sided with Talha and Ayesha in attacking Ali. He fell in the "battle of the camel," so called because the struggle was fiercest around Ayesha's camel, on the 9th of December, 656; and his tomb is still shown 2 miles from the present Basra (q.v.), probably where the old city stood. His son Abdallah was a rival of the Umayyads, and was recognized for a while as a caliph by a large part of the Moslem world. See ABDALLAH IBN ZUBAIR. Consult Julius Wellhausen, *Das arabische Reich* (Berlin, 1902), and C. I. Huart, *Histoire des Arabes* (Paris, 1912).

ZOBEIR RAHAMA, zō-bār′ rä-hä′mä (1830–). An Egyptian pasha. In 1860 he had become one of the leading Arab ivory and slave traders on the White Nile and in the Bahr el Ghazal, in which territory he gathered about him a large army of blacks and practically ruled the country. He defeated an expedition sent in 1869 to the Bahr el Ghazal, and was himself made Governor of that district. For conquering Darfur in 1874 he was made a pasha, but when he went to Cairo in 1876 he was prevented from returning. Later he offered to restore order in the Sudan, and in 1884 General Gordon urged that he be sent back, as his successor, to stop the Mahdist movement. After the reconquest of the Sudan he was permitted to return in 1899.

ZO'BO (Tibetan *mdzopo*, male of the *mdzo*, zobo). A hybrid between the yak (q.v.) and the humped cattle (q.v.) of India. It is not unlike an English ox. It is common in the western parts of the Himalaya, and is valued as a beast of burden, as well as for its milk and its flesh.

ZO'DIAC (OF. *zodiac, zodiaque*, Fr. *zodiaque*, from Lat. *zodiacus*, from Gk. *ζωδιακός, zōdiakos*, zodiac, relating to animals, from *ζῴδιον, zōdion*, dimin. of *ζῷον, zōon*, animal, from *ζῆν, zēn*, to live; so called because the constellations were figured as animals). The name given by the ancients to an imaginary band extending round the celestial sphere, having as its middle line the ecliptic or apparent path of the sun. It was fixed at about 16° in width so as to include the orbits of the sun and of the five planets (Mercury, Venus, Mars, Jupiter, and Saturn) which were then known; and as, of these planets, Mercury has by far the greatest inclination of orbit to the ecliptic, and the value of that element in his case is only 7°, the width given to the zodiac was amply sufficient for the required purpose. But when the era of planetary discovery commenced in the beginning of the nineteenth century, the first three which were discovered (Ceres, Pallas, and Juno) at once destroyed the idea which had been long seated in men's minds, that no planets existed beyond the limits of the zodiac, by exhibiting orbits inclined to the ecliptic at no less angles than 11°, 35°, and 13°; and a large number since observed have been found to wander beyond the zodiac, from which circumstance they have, along with the three above mentioned, been denominated ultra-zodiacal planets.

The stars in the zodiac were grouped into 12 constellations, to each of which 30°, or $\frac{1}{12}$th of the whole circle, was assigned, though it often did not fill up that space, but was only situated in it; and this equable division into signs was of great advantage in defining the positions of the sun and planets at any epoch.

The constellations, with the appropriate symbols of the corresponding signs, are as follows:

Aries (*Ram*) ♈	Libra (*Balance*) ♎
Taurus (*Bull*) ♉	Scorpio (*Scorpion*) ♏
Gemini (*Twins*) ♊	Sagittarius (*Archer*) ♐
Cancer (*Crab*) ♋	Capricornus (*Goat*) ♑
Leo (*Lion*) ♌	Aquarius (*Water-bearer*) ♒
Virgo (*Virgin*) ♍	Pisces (*Fishes*) ♓

As one half of the ecliptic is to the north, and the other to the south of the celestial equator, the line of intersection of their planes is a diameter of each, and the two points in which this line meets the celestial sphere are known as the equinoctial (q.v.) points. The comparative immobility. with respect to the ecliptic, of these points, suggested at once the employment of one or other of them as a point from which to reckon celestial measurements of stars' positions, and accordingly that point at which the sun crosses the equinoctial from south to north was fixed upon, and called the first point (or commencement) of Aries (q.v.). After the sun had advanced eastward through this sign—i.e., 30° along the ecliptic—he entered the sign of Taurus, continuing his course onward through the others

in the order in which they are given above, again crossing the equinoctial southward at the point where he emerged from Virgo and entered Libra. This was the case with the sun during the time of Hipparchus (q.v.), but though the equinoctial points move very slowly, yet they do so with great uniformity, and the westerly motion of 50" annually which they describe along the ecliptic has at the present time separated the sign Aries from the constellation Aries, and caused the former to correspond almost to the constellation Pisces. This gradual retrogression of the signs through the constellations of the zodiac will continue till they accomplish, in about 25,800 years, a complete circuit, after which period the sign and constellation of Aries will again coincide, as they did in the time of Hipparchus. The zodiac and its constellations afford merely a convenient mode of reference to the positions of the stars.

The zodiac is probably Babylonian in origin. The figures seem to have been based on the resemblance of the lines connecting the stars in the zodiacal constellations to certain pictorial outlines which form the substratum of the Assyro-Babylonian cuneiform alphabets (see CUNEIFORM INSCRIPTIONS), while animal figures and outlines were chosen for animistic reasons. The greater number of the modern zodiacal constellations are identical with the Babylonian, although two or three seem to be of Occidental origin. The signs of the zodiac were carried from Babylonia to Greece, whence they spread throughout the ancient civilized world, and found their way back, along with much other astronomical science, to India and the Far East. Consult: P. Jensen, *Die Kosmologie der Babylonier* (Strassburg, 1890); Morris Jastrow, *Religion of Babylonia and Assyria* (Boston, 1898); E. M. Plunket, *Ancient Calendars and Constellations* (London, 1903).

ZODI'ACAL LIGHT. A faint luminosity extending outward from both sides of the sun along the ecliptic. It is visible only after sunset or before sunrise. It is easily seen to reach 90° or 100° from the sun: and in favorable circumstances of observation in the tropics it has been recorded as encircling the sky completely. Where this latter observation has been made, a particularly bright spot has been noticed in the zodiacal light, located directly opposite the sun's position below the horizon. This bright spot is called by the German name *Gegenschein*, or counterglow, from its being opposite the sun.

No thoroughly satisfactory explanation has yet been found for this rather puzzling phenomenon. Some think it merely a very extended outer envelope of the sun, inclosing the corona (q.v.) and extending very far beyond it into space. A more plausible theory supposes the whole thing to be caused by a ring of small particles revolving about the sun nearly in the ecliptic plane. Such a ring would have an analogue in Saturn's ring, and in the zone of planetoids (q.v.). And solar light reflected from the countless particles of the ring would give the faint luminosity both of the zodiacal light and the *Gegenschein*. But the theory of this phenomenon is still debatable.

ZO'Ë (Lat., from Gk. Ζωή) (c.978–1050). A Byzantine empress, the last of the Macedonian dynasty. She was the daughter of Constantine VIII, by whom she was married to the patrician Romanus Argyrus. The latter came to the throne in 1028, but was assassinated by Zoë and her favorite chamberlain, Michael the Paphlagonian (1034). The Empress thereupon married her accomplice, who reigned as Michael IV until 1041. After his death the Empress elevated to the throne his nephew, Michael V, but was imprisoned by the latter. Released with her sister in 1042, Zoe deposed and blinded the young Michael. She then, after sharing the throne for a few months with her sister Theodora, gave the Imperial power to a third husband, Constantine IX Monomachus. Consult Edward Gibbon, *Decline and Fall of the Roman Empire*, edited by J. B. Bury, vol. v (London, 1912).

ZOËGA, tsō-ā'gȧ, GEORG (JORGEN) (1755–1809). A Danish archæologist and numismatist, born at Daler, in Jutland. He studied at the University of Gottingen, and after teaching and traveling in Italy became a Catholic in 1783, and settled at Rome, where he was appointed Danish Consul General in 1798, and died in 1809. His studies of coins and manuscripts were of great value. His publications include: *Nummi Ægyptii Imperatorii* (1787); *De Origine et Usu Obeliscorum* (1797); a work in Italian, *I bassirilievi antichi di Roma* (2 vols., 1808); and the notable *Catalogus Codicum Coptorum Manuscriptorum* (1810), which was his greatest work. Consult F. G. Welcker, *Zoegas Leben* (2 vols., Stuttgart, 1819); A. D. Jörgensen, *Georg Zoëga* (Copenhagen, 1881).

ZOËTROPE, zō'ĕ-trōp (from Gk. ζωή, *zōē*, life + τρόπος, *tropos*, a turning). An optical instrument most often seen in the form of a toy, to exhibit pictures with the appearance of motion. See KINETOSCOPE; MOVING PICTURES, and for illustration, Fig. 10 under ILLUSION. See also STROBOSCOPE.

ZOILUS, zō'ĭ-lŭs (Lat., from Gk. Ζώϊλος). A Greek rhetorician, born at Amphipolis, in the third century B.C. On account of the severity with which he assailed the fabulous element in Homer, he was called Ὁμηρομάστιξ (Homer's Scourge). Dionysius of Halicarnassus, however, ranks him among the best critics. None of his works is extant. Consult Spindler, *De Zoilo Homeromastige qui Vocatur* (1888–89); U. Friedländer, *De Zoïlo Aliisque Homeri Obtrectatoribus* (Königsberg, 1895); J. E. Sandys, *A History of Classical Scholarship*, vol. i (2d ed., Cambridge, 1906).

ZOISITE (named in honor of Baron von Zois, the discoverer of the mineral). A mineral hydrated silicate of aluminium and calcium crystallized in the orthorhombic system. It has a vitreous or pearly lustre, and is gray to brown, and sometimes green or red in color. It occurs chiefly in crystalline schists, especially those containing the amphiboles, and also in granite. It is found in Norway, Scotland, Austria, Saxony, Switzerland, and in the United States. A rose-red variety, sometimes used for ornamental purposes, is found in Norway, and is called thulite, after Thule, an ancient name for Norway.

ZOLA, zō'lȧ', EMILE (1840–1902). A French naturalistic novelist, born in Paris, April 2, 1840. His father was a Venetian with Greek blood in his veins. Zola studied at the Lycée Saint-Louis, but after twice failing to get his bachelor's degree, he entered in 1862 the publishing house of Hachette in Paris, and began to write for the newspapers. He had written a number of novels and tales, his first book being the *Comtes à Ninon* (1864), when in 1869 he undertook to relate in a series of connected volumes what he called the "Physiological His-

tory of a Family under the Second Empire." To this family he gave the name of Rougon-Macquart The first novel of the series, *La fortune des Rougon,* was not published until 1871, after the fall of the Empire. Other novels of the series, *La curée* (1870), *Le ventre de Paris* (1873), *La conquête de Plassans* (1874), *La faute de l'Abbé Mouret* (1875), and *Son Excellence Eugène Rougon* (1876), succeeded each other until 1876 without arousing much attention. But the seventh novel of the series, *L'Assommoir* (1878), achieved instantaneous success. It was a powerful picture of life among the working class of Paris and of the evil effects of alcoholism.

Zola's pictures were realistic beyond anything hitherto known in French literature. The ugly side of life was presented with fullness and a boldness of vocabulary from which French masters of realism had always shrunk. Zola was attacked as well as praised. In defending himself he claimed to have ushered in a new literary school, which he called naturalistic. His novels were described by him and the followers whom he soon gathered about him as documents intended to give to the public a complete picture of French contemporary society. The success of *L'Assommoir* was repeated in 1880 by *Nana,* and later by several other novels of the series, notably by *Germinal* (1885). The whole series consisted of 20 volumes, the last two of which, *La débâcle,* dealing with the unreadiness of France for the Franco-German War, and *Le Docteur Pascal,* were published in 1892 and 1893.

This series contains Zola's most remarkable productions. It is very uneven; it must be admitted that some of the volumes, *Pot-Bouille* (1882), e.g., which claims to be a picture of the life of the middle class, present hardly anything that is not nauseating and at the same time tedious. Others, *Germinal, La terre* (1887), *La bête humaine* (1890), *L'Argent* (1891), *La débâcle* (1892), are works of power. Not one of these is free from features known as objectionable. Passages which seem to be quite unnecessary to the development of the story would indicate that Zola took pleasure in introducing descriptions no other writer would have dared attempt. While presenting to the public the productions of his creative imagination, Zola considered it his duty to develop his literary theories and to attack those of his opponents; this was done in a number of volumes of literary criticism, the most important of which were *Le roman expérimental* (1880) and *Les romanciers naturalistes* (1881), so that it is not very difficult, through a comparison of his theoretical utterances with his practical performances, to see whether Zola achieved exactly what he claimed to do. The enemy against which he directed his sharpest attack is romanticism; the intellectual faculty he seems most to descant against is imagination; and yet any one who analyzes the literary elements of his style, and carefully examines the successive events in the development of his plots, is led to the conclusion that Zola never entirely shook off the influence of the romantic school, and especially of its master, Victor Hugo. He was himself carried away by his creative imagination more often than he kept it under control.

After concluding the series of the Rougon-Macquart, Zola undertook successively two new series: the Three Cities, *Lourdes, Rome, Paris,* published between 1894 and 1898, and finally the Four Gospels, *Fécondité* (1899), *Travail* (1900), *Vérité* (1902), and *Justice. Justice* remained unfinished at his death. Zola was ambitious also of winning success on the stage, but this ambition was not fully gratified

Had Zola died before the year 1898, he would be remembered solely as a literary character. The date which marks the beginning of his career as a public man is that of the letter to President Faure by which he threw himself into the thickest of the fight connected with Alfred Dreyfus (q.v.) Zola was convinced not only that Dreyfus had been unjustly sentenced, but also that the methods employed to secure his conviction and to shield others, whom Zola considered the real criminals, constituted in themselves crimes deserving of the highest punishment. His letter of January 13, known by the title "J'Accuse . . ." (I accuse), words which were repeated a number of times in the body of the letter, denounced these acts and called for their speedy and exemplary punishment. He at the same time dared the French government to prosecute him Prosecution was begun, however, and his trial by jury in Paris lasted from February 7 to Feb. 23, 1898. Zola was convicted of libeling the military authorities, and sentence was passed upon him imposing a fine of 5000 francs and six months' imprisonment Zola appealed to the Court of Cassation, which on April 2 quashed the proceedings and ordered a new trial. This new trial took place at Versailles in July, and Zola was again condemned, but meanwhile he fled to England, where he remained hidden till June 4, 1899, writing *Fécondité.* A few months later, a bill granting amnesty to all offenders connected with the Dreyfus case having been brought forward by the Waldeck-Rousseau cabinet and passed by the two houses, Zola, who had kept up his fight, returned to France, where he was received by his friends and admirers as one of the greatest and most eloquent defenders of human rights. On Sept. 29, 1902, Zola was suffocated by gas from a defective flue. He received a public funeral. His remains were transferred, with great pomp, to the Pantheon in 1908. Most of Zola's works can be had in an excellent English translation by Vizetelly.

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ZÖLLNER, tsĕl'nĕr, HEINRICH (1854–). A German composer and musical conductor, born at Leipzig, son of Karl Friedrich Zöllner. He studied jurisprudence and from 1875 music at the Leipzig Conservatory under Reinecke, Jadassohn, Richter, and Wenzel. In 1878 he became musical director at the University of Dorpat, and in 1885 was appointed conductor of the Cologne Männergesangverein, the Wagner-Verein,

and the Musical Society. With a picked male chorus, in 1889, he made a most successful tour through the principal cities of Italy. In 1890 he was elected conductor of the New York Deutscher Liederkranz. He accepted a call to Leipzig in 1898 to succeed Kretzschmar as musical director of the Paulinerchor, a university male choral union. In 1907 he went to Berlin as professor at Stern's Conservatory, and in 1908 to Antwerp as conductor of the Flemish opera. His works include the operas *Frithjof* (1884), *Faust* (after Goethe, 1887), the "Kriegstrilogie" *Im Jahre 1870*, consisting of two two-act operas, *Bei Sedan* (1895) and *Der Ueberfall* (1895), the musical comedy *Das holzerne Schwert* (1897), *Die versunkene Glocke* (1899); and *Der Schutzenkonig* (1902), *Zigeuner* (1912). His choral works are *Die Hunnenschlacht* (1889); *Das Fest der Rebenblute*, *Columbus; Hymnus der Liebe; Heldenrequiem*, for soprano solo, male chorus, and orchestra, the cantata *Die neue Welt*, which won the international prize at Cleveland, Ohio, in 1892, and a symphony.

ZÖLLNER, JOHANN KARL FRIEDRICH (1834–82). A German astronomer and physicist, born in Berlin. He studied at the universities of Berlin and Basel, and became in 1866 assistant professor and in 1872 professor of physical astronomy in Leipzig. In 1872 Zöllner developed the theory that comets are not incandescent through heat, but glowing with electricity. He also made observations in regard to the solar constitution, and was one of the first with Huggins to apply the open-slit method to the study of solar prominences (1869). In 1870 he made observations for determining the solar temperature by investigating the intensity of the solar radiations at their source. He also made photometric observations of the Mercurian phases, determined the albedo (reflective capacity) of several of the planets, and observed their thermal conditions. He wrote. *Grundzuge einer allgemeinen Photometrie des Himmels* (1861); *Photometrische Untersuchungen* (1865); *Ueber die Natur der Kometen* (1871; 3d ed., 1883); *Principien einer electrodynamischen Theorie der Materie* (1876); *Wissenschaftliche Abhandlungen* (4 vols., 1878–82). He also edited Schuster's *Gibt es unbewusste und vererbte Vorstellungen?* (1879). In the latter part of his life he also turned his attention to spiritualistic and hypnotic studies. For his astronomical discoveries, consult F. Körber, *Karl Friedrich Zollner* (Berlin, 1899), and A. M. Clerke, *History of Astronomy during the Nineteenth Century* (London, 1908).

ZÖLLNER, KARL FRIEDRICH (1800–60). A German composer, born at Mittelhausen, Thuringia. He studied music under Schicht at the Thomasschule in Leipzig, became an instructor of vocal music at the Ratsfreischule in 1820, and two years later established a musical institute with his friend Hemleben. In 1833 he founded the Zöllner-Verein, a male chorus society. In 1859, 30 of these societies held a grand musical festival at Leipzig, and after his death united and formed the Zöllner-Bund. In 1868 a monument was erected to his memory in the Rosenthal, Leipzig. He deserves to be especially remembered for his compositions for male chorus, but his works include motets, songs for mixed chorus, and songs with piano accompaniment.

ZOLLVEREIN, tsôl'fĕr-īn' (Ger., customs union). Any customs union between several countries, for the purpose of establishing uniform customs tariffs between imports to and exports from the countries within the union and countries outside, while duties between the several contracting countries are reduced below the usual rate or abolished altogether. The term as generally used has reference to the German Zollverein, which was initiated in 1818 and culminated in 1871 in the general customs union of the new German Empire.

The necessity of meeting English competition in manufacture induced Prussia to take the lead in a movement to suppress the burdensome tariffs between the German states. By the law of May 26, 1818, Prussia abolished all internal customs, and enacted a general tariff, to be levied only at the boundaries of the kingdom. On Jan. 18, 1828, Bavaria and Wurttemberg agreed to adopt a single tariff system, and to divide the net proceeds of the duties in proportion to their respective populations. A little later, Feb. 14, 1828, Prussia and Hesse-Darmstadt entered into a union based on the same principle. On Sept. 24, 1828, the Middle German Handelsverein was formed by Saxony, the Saxon duchies, Hesse-Cassel, Brunswick, Oldenburg, the minor Thuringian states, Hanover, Bremen, and Frankfort, for the purpose of preventing the union of the two former. This Middle German Union differed greatly from the two other unions, in that it allowed each of the contracting states to levy such import duties as it chose, except on some enumerated articles which were admitted free.

This movement suggested to Prussia the bold plan of uniting the three unions of the south, north, and middle into a single German Zollverein. On May 27, 1829, a commercial treaty was effected between the North German and the South German unions. Each granted to the other mutual free trade for products of the several states, a uniform duty of 25 per cent on certain manufactured articles, and it was agreed that there should be a gradual approximation of both systems of duties. On the 22d of March, 1833, the union of the North and the union of the South adopted a system of complete customs and commercial union, which was to go into effect Jan. 1, 1834, for a period of eight years, and might be renewed every 12 years, unless denounced by either party to the agreement. Saxony and the states of Thuringia united in 1833 into a Zollverein having a common tariff of export, import, and transit, and establishing free trade between the contracting states except for certain enumerated articles.

In 1834 Hanover, which had taken an active part in the formation of the union of the Middle German states with Brunswick, Oldenburg, and some other states, organized a rival association to the Prussian Zollverein under the name of the Steuerverein, which fixed duties much lower than those of the Zollverein. The rivalry of the Steuerverein did not check the growth of the Zollverein. In 1835 Baden and Nassau came into the union; in 1836, Frankfort; in 1841, Brunswick, which seceded from the Steuerverein; and in 1842, Luxemburg. The Zollverein concluded treaties during these years with England, Holland, and Belgium.

Austria had consistently opposed the increasing power of Prussia by trying to block every commercial union proposed by the latter Power. Prussia on its part wished to exclude Austria

from any part in the proposed all-German Zollverein to be formed by the union of the Zollverein and the Steuerverein. Several states became dissatisfied with the attitude of Prussia, and at length Bavaria, Saxony, Wurttemberg, and Baden made the ratification of the treaty between the Zollverein and the Steuerverein contingent upon the admittance of Austria into the new customs federation. After much negotiation, during which Austria threatened to form a rival union with the states of the South, Prussia was induced to sign on the part of the Zollverein a treaty granting certain commercial concessions to Austria. This treaty was to go into effect Jan 1, 1854, for 12 years

In 1861 a new difficulty arose when France proposed to the Zollverein complete reciprocity and freedom of transit, freedom from export duties, and treatment as the most favored nation. Prussia alone conducted the negotiations, without consulting the other states of the Zollverein On March 29, 1862, Prussia signed the convention with France, and some time after invited the other members of the Zollverein to stand by the treaty. Saxony, by reason of its commercial interests, accepted the treaty. Bavaria, Wurttemberg, Hanover, Nassau, and Hesse-Darmstadt, on the contrary, refused to accept the treaty and went with Austria, which renounced all idea of commercial union in 1864, and in 1865 Prussia definitely excluded that state from the Zollverein. During the war between Austria and Prussia in 1866, the political allies of Austria—Bavaria, Wurttemberg, Baden, Nassau, and Frankfort—kept the terms of the Zollverein with Prussia, so that there was exhibited the curious spectacle of countries engaged in open hostilities living under the same tariff system and maintaining free exchange. After the War of 1866 Prussia forced upon Wurttemberg, Baden, and Bavaria a new pact which substituted for the conference of delegates from the sovereign and independent states (Zollkonferenz) an in-and-out assembly consisting of a Zollbundesrat, representing the states, and a Zollparlament, composed of the North German Reichstag and representatives from the South German states. Instead of the unanimous vote for enacting new regulations, a mere majority of each assembly was made sufficient. The representation of the states was not equal, Prussia having 17 out of 58 representatives in the Zollbundesrat and a preponderating influence in the Zollparlament. Besides, Prussia had the presidency of the Zollbundesrat, with the right to make treaties of commerce in the name of the union with foreign Powers. This union was replaced by the Zollverein, the German Empire of 1871

In 1872 Alsace-Lorraine was included in the German Zollverein under the Imperial government, and in 1888 the free cities of Hamburg and Bremen joined. The new German customs union embraces all the states of Germany, though its limits do not conform exactly to the limits of the Empire, the so-called free ports (parts of Bremen and Hamburg) being excluded, while the Grand Duchy of Luxemburg and the Austrian communities of Jungholz and Mittelburg form part of the union. Duties on exports were abolished in 1873.

Among other instances of customs unions may be mentioned the South African Customs Union established in 1889 and including Cape Colony, Orange Free State, Basutoland, and British Bechuanaland. More recently attempts have been made to bring about a closer commercial union between the several parts of the British Empire. In 1887, at the colonial conference, Hofmeyr, of Cape Colony, for the first time developed a scheme for a uniform extra-differential duty upon all foreign imports into Great Britain. In 1891 this idea was brought before the House of Lords by Lord Dunraven. In 1894 the Ottawa Conference discussed the matter at some length. Beginning in 1899 Mr. Joseph Chamberlain strongly advocated cementing the bonds of the Empire by a system of preferential tariffs. This movement for colonial preference became a definite Unionist policy in 1906 and was advocated by all the colonial premiers at the Imperial Conference of 1907. Actual legislation, however, had not been reached in 1916. It has been suggested that the United States form a customs union with the South American states, Mexico, and Central America, and Mr. Blaine while Secretary of State, 1889–92, attempted to bring about closer commercial relations by means of reciprocity treaties. No appreciable results have thus far been accomplished.

Consult: Dittmar, *Der deutsche Zollverein* (Leipzig, 1867); Worms, *L'Allemagne économique ou histoire du Zollverein allemand* (Paris, 1874); *Cambridge Modern History*, vols. x, xi (New York, 1907–09); W. L. Ashley, *Modern Tariff History. Germany, United States, France* (2d ed., London, 1910).

ZOMBOR, zōm'bōr. A royal free town of Hungary, capital of the County of Bács-Bodrog, situated on the Francis Canal, about 120 miles south of Budapest (Map: Hungary, F 4). The chief industries are the manufacturing of flour and matches. Pop, 1910, 30,552.

ZONA, zō'na. See HERPES.

ZONA LIBRE, thō'na lē'brā (Sp, free zone), or FREE ZONE. A name formerly applied to a strip of territory extending across the northern boundary of Mexico. Its purpose was to meet the competition of the American towns across the border, by remitting all Federal duties and reducing tariff rates for certain classes of goods consumed within the territory.

ZON'ARAS, JOANNES (Lat, from Gk. *Ἰωάννης Ζωναράς*). A Byzantine annalist of the first half of the twelfth century. He lived at Constantinople, where he was commander of the Imperial guard and private secretary to Alexius I. In the reign of John Comnenus he became a monk at Mount Athos, where he devoted himself to writing. His most important work is the *Chronicon* or *Annales*, which relates the history of the world from the creation to 1118, the date of the death of Alexius I. He drew upon Josephus, Xenophon, Plutarch, and many other sources; but the chief value of his works, in view of the fact that his contemporary record is meagre, is in that he follows the first 20 books of Dio Cassius, which are known to us only in this way. He also is supposed to have written an *Exposition of the Apostolical Canons*. A *Lexicon*, edited by Tittmann (1808), is falsely attributed to him. The *Chronicon* was edited by Dindorf (Leipzig, 1868–75). Consult Karl Krumbacher, *Geschichte der byzantinischen Litteratur* (2d ed., Munich, 1897).

ZONE (Fr. *zone*, from Lat. *zona*, from Gk. *ζώνη, girdle*). A subdivision of the earth's surface, determined by certain astronomical conditions. The boundary lines of the zones are parallels of latitude, so that a zone includes

all of the earth's surface lying between two given parallels of latitude. The torrid zone lies between the parallels of 23° 28′ N. and 23° 28′ S. This number corresponds to the inclination of the earth's equatorial plane to the equatorial plane, the sun is always vertically overhead over some point within that zone.

The polar or frigid zones lie between the poles and the parallels of 66° 32′ N. and S. Within them the solar rays always strike the earth very obliquely, and great cold results. The temperate zones lie between the polar and torrid zones. See CLIMATE; EARTH; ECLIPTIC; SEASONS; SOLSTICE; TROPIC.

ZONE. See COSTUME, ECCLESIASTICAL, *Eastern Vestments*.

ZONE, IN MATHEMATICS. See SPHERE.

ZONTA, zon'ta. See GILDA.

ZO'ÖGEOG'RAPHY, or GEOGRAPHICAL ZOÖLOGY. See DISTRIBUTION OF ANIMALS, GEOGRAPHY.

ZO'ÖLOG'ICAL GARDEN. The rapid decrease of wild life throughout the world, and the increasing desire of mankind to know the living wild animals, has led to the development of three distinct types of vivaria. The term "zoo" commonly indicates a small and unpretentious menagerie, located in a public park. A zoölogical garden usually is a compact establishment occupying from 20 to 60 acres of park land in a city, easy of access, but with relatively limited areas for its animals. A zoological park usually occupies from 100 to 260 acres of picturesque land and water in the suburbs of a city, where the hardy animals are provided with areas amid natural surroundings appropriate to their wants, and the tropical species are housed in heated buildings. The movement which began in Paris in 1804, in the Jardin des Plantes, has culminated in the magnificent gardens of Berlin, London, Amsterdam, Antwerp, Vienna, Copenhagen, Hamburg, Frankfort, Cologne, Dresden, Breslau, Hanover, and Rotterdam. Even remote cities, such as Cairo, Calcutta, Tokyo, Melbourne, Buenos Aires, and Rio de Janeiro, have established zoological gardens for the free exhibition of living animals. Excepting the Jardin des Plantes, in Paris, and the Royal Garden at Vienna, all European gardens are owned, maintained, and operated by zoological societies, or stock corporations, which pay no dividends, and charge admission to all visitors not members. In most cases, however, the cities benefited have furnished public park lands free of rental, and free of control other than respecting the cutting of trees. Funds are derived from the annual dues of members, gate receipts, lease of restaurants and other privileges, and the sale of animals. The Zoölogical Society of London had in 1915 a membership of more than 4800 fellows who paid annual dues of $15. The Amsterdam Society contained 4500 members who paid $10 each, and the Royal Zoölogical Society of Antwerp led all with a membership of 7000, yielding an annual income of $70,000.

In America the public desire for better acquaintance with wild creatures had, up to 1903, resulted in two regularly established zoölogical gardens, at Philadelphia and Cincinnati; two zoölogical parks, at New York and Washington; and municipal zoos in the public parks of nearly 20 other cities. The establishments in Lincoln Park, Chicago, and in Highland Park, Pittsburg, are the largest and most important of the municipal zoos. Of the four most important zoological institutions in the United States, that of the Philadelphia Zoological Society was the pioneer, having been founded in 1871. The equipment of buildings and other improvements in this fine garden, and the animal collections there, rank very high. The Cincinnati garden is a great credit to Cincinnati, and is as large a garden as can expect adequate support in a city below the size of a great metropolis.

The New York Zoological Park represents one of the latest and greatest undertakings in vivarium development and maintenance. A private corporation, called the New York Zoological Society, having in 1915 about 2000 members, made in 1895 an agreement with the city of New York to expend $250,000 of its own funds on buildings and other installations for live animals, to supply perpetually all the animal collections, and admit the public without charge on all days save Mondays and Thursdays. In return the city gave a free site, agreed to pay for all ground improvements and additional buildings, furnished free water and police protection, and an annual maintenance fund, but gave the society absolute freedom in management. The land granted by the city consists of 264 acres in Bronx Park, by far the largest area occupied anywhere in a city for exhibition of live animals. The funds of the Zoölogical Society are derived from the annual dues of members ($16,000), and larger membership fees, and special subscriptions. The park is a fair illustration of the American idea of an institution for the exhibition of wild animals, which in space and comfort for the collections should stand midway between the zoological garden and the great private game preserve. Its outfit of buildings, dens, aviaries, and open ranges is magnificent, and its landscape effects are beautiful. For the hardy animals green turf, water, rocks, shade, and sunlight have been liberally provided. This experiment has been regarded as successful, and its influence is noticeable. The institution was in 1916 conceded the foremost place in the line of zoological gardens, the London Zoo occupying the second place and the garden at Berlin the third.

The National Zoölogical Park, at Washington, was established by Congress in 1889 through the initiative of William T. Hornaday, and the joint efforts of G. Brown Goode, S. P. Langley, James B. Beck, then United States Senator from Kentucky, and Senator Knute Nelson, then a member of the House of Representatives. It is under the direction of the Secretary of the Smithsonian Institution, and is supported by Congressional appropriations. Through the lack of a comprehensive general plan of development, the Congressional sympathy and support, which only such a plan and its gradual fulfillment can enlist, have been weak, and development has been retarded. Its animal collections, however, are in admirable condition, and contain many rare and valuable species.

Consult: F. G. Aflalo, "Some Private Zoos," in Smithsonian Institution, *Annual Report, 1901* (Washington, 1902); F. E. Beddard, *Natural History in Zoological Gardens* (Philadelphia, 1905); Gustave Loisel, "Zoölogical Gardens and Establishments of Great Britain, Belgium, and the Netherlands," in Smithsonian Institution, *Annual Report, 1907* (Washington, 1908); Carl Hagenbeck, *Beasts and Men* . . ; abridged translation by Elliot and Thacker (New York,

1911); Ellen Velvin, *From Jungle to Zoo* (ib., 1915).

ZOÖLOGICAL PARK. See ZOOLOGICAL GARDEN.

ZOÖLOGICAL PARK, NATIONAL. See SMITHSONIAN INSTITUTION; ZOOLOGICAL GARDEN.

ZOÖLOGICAL STATION. An institution for the study of living animals. Such stations are of three principal sorts: marine, fresh water, and inland. The first to be developed was the marine station, the great importance of the study of marine animals and the comparative expensiveness of apparatus for marine investigation leading to the establishment of great laboratories on the seashore. The most famous and finest of the marine laboratories is the one founded by Anton Dohrn (q.v.) at Naples in 1870. The Berlin Academy of Sciences and the German government aided in building this institution, and granted it an annual subsidy of $40,000. Tables are rented by various European governments and societies and by the many educational institutions. In the United States the earliest zoological laboratory was that founded in 1873 by Louis Agassiz on the island of Penekese, in Buzzard's Bay, Mass. Later Alexander Agassiz founded a private laboratory at Castle Hill, Newport, R. I., and in 1877 Prof. W. K. Brooks, of Johns Hopkins University, opened a provisional laboratory first at Fort Wool, Va., then at Crisfield, Md., and in 1880 at Beaufort, N. C. In 1889 the United States Fish Commission established a station at Beaufort. The Marine Biological Laboratory was founded at Woods Hole, Mass., by the Woman's Education Association of Boston, and in 1890 a large public marine laboratory was founded by the Brooklyn Institute at Cold Springs Harbor, L. I., and the Tortugas Zoölogical Laboratory under A. G. Mayer was founded later. On the Pacific coast the Leland Stanford University has established a laboratory at Pacific Grove. In Europe there are laboratories in the Isles of Solovetsky in the White Sea, at Tromsö, Norway, and at other points on the Scandinavian peninsula; at Copenhagen, at Helgoland, at Kiel, at St. Andrews, Scotland, at Port Erin (Isle of Man), at Plymouth, at Wimereux (near Boulogne), at Saint-Vaast-le-Hogue (Tatihou Island), at Roscoff (Finistère), at Villefranche (near Nice), and at many other points. Fresh-water zoölogical stations in America include those established at Havana, on the Illinois River, by the Illinois State Laboratory of Natural History; on Winona Lake, by the University of Indiana; at Sandusky, Ohio, on Lake Erie, by the Ohio State University; and at Put-in-Bay, on Lake Erie, by the United States government. In 1915 the New York Zoölogical Society founded under the direction of C. W. Beebe, at Georgetown, British Guiana, the first tropical zoölogical station for the investigation of evolutionary problems. See LABORATORY.

ZOÖLOGY, zō-ŏl'ō-jĭ (from Gk. *ζῷον, zōon,* animal + *-λογία, -logia,* account, from *λέγειν, legein,* to say). The science which treats of animals. It is divided into morphology and histology, physiology and psychology, reproduction and embryology, systematic zoölogy or classification, paleontology, zoögeography, evolution, and bionomics.

The earliest zoölogist was Aristotle (384–322 B.C.). Down to the period of Ray and Linnæus he was the only naturalist worthy of the name. His works, *The History of Animals, The Generation of Animals,* and *The Parts of Animals,* contain, besides errors of fact or opinion, many singularly correct statements. He recognized some of the more important groups, which he called genera. Such were the Malakia or cephalopods, Malacostraca or soft animals with shells (the higher crustacea), Entoma (insects, arachnids, myriapods, and the higher worms), etc. He also dissected the cuttlefish, octopus, and other animals.

Zoölogy as a descriptive science dates from the time of Linnæus (q.v.), but it was not until the rise of comparative anatomy, embryology, morphology, paleontology, and the evolution theory that it became a well-grounded science. The predecessors of Linnæus were Malpighi, Leeuwenhoek, Swammerdam, Redi, and W. Harvey (q.v.). Harvey in 1616 discovered the use of the heart and the mode of the circulation of the blood in arteries and veins, and from his observations on the development of the chick declared that all living things arise from an egg by a gradual process of growth and differentiation (epigenesis). The invention of the microscope by the Janssens (1590–1600) and its improvement during the seventeenth century enabled Malpighi to discover the organs named after him. Leeuwenhoek (q.v.) discovered the blood corpuscles, striated muscle fibres, dentinal canals, epidermal cells, and described certain infusoria, rotifers, and Hydra. Swammerdam dissected insects and snails, and worked out the metamorphosis of certain insects. Redi was the first to combat the notion of spontaneous generation (q.v.), while Hamen (1677) discovered the sperms of animals. The history of zoölogy may be roughly divided into four periods:

(1) Towards the end of the seventeenth century Ray, basing his ideas of the classification of animals mainly on the work of Aristotle, was the first to arrive at some conception of species and of specific characters. But it is Linnæus to whom we are indebted for binomial nomenclature; and the first genuine though very imperfect classification of animals (q.v.) dates back to the *Systema Naturæ,* the tenth edition of which appeared in 1758. He recognized genera, orders, and classes, dividing the animal kingdom into six of the latter. As the result of his influence, his own pupils, and also Pallas, did much to advance zoölogy, while the anatomists and physiologists of this period were Camper, Wolff, Spallnazani, Hunter, and Vicq d'Azyr, the latter of whom proposed the term "comparative anatomy," also previously used by Leibnitz. Lamarck (1744–1829) divided animals into vertebrate and invertebrate, and reorganized the latter division, founding the classes of Infusoria, Radiata (Echinodermata), Annelida, Arachnida, and Crustacea. He was far in advance of any other zoölogist from the time of Linnæus to that of Cuvier. Geoffroy Saint-Hilaire also advanced our knowledge of the vertebrates by establishing the orders Monotremata and Marsupialia, the latter forms having been distributed among the rodents and primates.

(2) Cuvier (q.v.) was the founder of comparative anatomy and vertebrate paleontology, while Lamarck founded invertebrate paleontology. Cuvier's work as a comparative anatomist, showing the importance of structure as the basis of all classifications, was most important. In dividing the animal kingdom into four branches,

he led the way for the recognition of the more numerous phyla constituting the animal world. Early in the nineteenth century Geoffroy Saint-Hilaire advanced embryology, and founded the doctrines of the unity of organization and of homologies, which paved the way for the theory of descent Vicq d'Azyr established the principle of serial homology. Bichat was one of the founders of histology. France at this time led the scientific world, though Germany had her Blumenbach, who founded anthropology, her Döllinger, the teacher of later embryologists, Tiedemann, Bojanus, and Carus. Meckel, in his time the leading German anatomist, studied at Paris with Cuvier, as did Milne-Edwards, while Owen felt his influence.

The great activity shown by Cuvier in building up the Jardin des Plantes led to the French exploring expeditions sent out from 1800 to 1832 to all parts of the globe, resulting in enlarged views regarding the number and distribution of species, and their relations to their environment The zoologists of these expeditions were Bory de Saint-Vincent, Savigny, Péron, Lesueur, Quoy, Gaimard, Le Vaillant, Eydoux, and Souleyet. From 1823 to 1850 England fitted out exploring expeditions under Beechey, Fitzroy, Belcher, Ross, Franklin, and Stanley, the naturalists of which were Bennett, Owen, Darwin, Adams, and Huxley Russian explorations (1803–29) were accompanied by Tilesius, Langsdorff, Chamisso, Eschscholtz, and Brandt, all of them of German birth and education. The United States Exploring Expedition under Wilkes (1838–42) was, in scientific results, not inferior to any previous ones, the zoologists being Dana, Couthuoy, and Peale. Of a later voyage under Ringgold, Stimpson was the naturalist, but the rich final results were lost by fire. At or near the close of this period, from Germany, Humboldt, Spix, the Prince of Wied, Natterer, Perty, Reugger, Tschudi, Schomburgk, Burmeister; from France, De Azara, D'Orbigny, Gay, Castelnau; and from Denmark, Lund, traveled at their own expense, an evidence of the spirit of scientific research then dominating the centres of civilization. Their followers were Wallace, Bates, Semper, Belt, Miklucho-Maclay, Przhevalski, the brothers Sarasin, and many others. The voyage (1872–76) of the *Challenger* (q.v.) was momentous in its results, which are published in 30 quarto volumes, mostly containing reports on the zoological results contributed by the leading systematic zoologists of the nineteenth century

(3) A third period has been distinguished (1) by the discovery by Schleiden and by Schwann (1838) that all organisms are formed of cells, and by the studies of Dujardin, of Mohl, and of Schultze on the nature of protoplasm (q.v.), proving that the cell is the unit of organization, and that protoplasm is the basis of life; (2) by the application of histological discoveries and methods to embryological research; and (3) by the use of the doctrine of evolution as a working theory to account for the common origin of animals from a single simple primitive organism. The first great steps in the explanation of the mode of reproduction and development were the discovery of spermatozoa by Hamen, a student of Leeuwenhoek, and that of the mammalian egg by De Graaf in 1673. The old theory of preformation was overthrown and that of epigenesis, or formation by the differentiation of the egg-protoplasm, was established by Wolff in 1759. In 1829 Von Baer showed that all mammals develop from eggs, while Coste, Valentin, and Jones proved that these eggs are homologous with those of the lower vertebrates. The real nature of fertilization was not finally settled until Barry in 1843 observed the union of ovum and spermatozoön in rabbits, and Kolliker in 1846 proved that spermatozoa develop from the cells of the testes. The next important advance was the discovery in vertebrates by Von Baer of the germ layers, Huxley identified two of these layers in the cœlenterates. Later steps were the recognition by the brothers Hertwig of the mesoblast and the cœlomic cavity, the observations of Lang and Sedgwick on metameric segmentation, and the homology of the blastopore in the embryos of all many-celled animals. All these discoveries gave an impetus to morphology (q.v.) and established it on a thorough and broad basis of facts Von Baer also showed that the tissues arise from embryonic cells, their formation going on simultaneously with the process of differentiation and development of organs He thus discovered what is known as Baer's law, i.e., that the development of the individual is an epitome of that of the class to which it belongs; and that while the embryos of the animals he studied are at first very similar, they diverge more and more as growth and differentiation advance. These laws did not suggest to him the theory of the blood relationship of the vertebrate and other classes, but led him, as it afterward did Agassiz, to support Cuvier's view that the animal kingdom was divided into four distinct, unrelated branches or subkingdoms, and that consequently there was no unity of type, as Cuvier asserted in his famous debate with Geoffroy Saint-Hilaire before the French Academy of Sciences.

The school of transcendental anatomists founded by Oken (1807) and Goethe (1739–1832), succeeded by Carus and Owen, resulted in the so-called vertebrate theory of the skull; which, though crude and speculative, yet had its philosophical raison d'être. Although the skull of vertebrates, as first shown by Huxley, is not truly a series of modified vertebræ, yet, as in worms and especially in arthropods, the head of vertebrates is segmented, as shown by the serial homology of the embryonic gill arches and of the cranial nerves Moreover, Goethe, as did Lamarck, recognized the significance of vestigial structures, and Goethe made the truly scientific prediction of the presence of the premaxillary bone in the head of man, the supposed absence of the homologue of that bone having been before his time supposed to be a decisive feature separating man from the apes. Owen's *Report on the Archetype and Homologies of the Vertebrate Skeleton* (1846) was the outcome of this pre-evolutionary method and point of view. The old doctrine of archetypes and plans of creation reached its culmination in this book, in which, without reference to the lowest vertebrates and to the early mode of development of animals of this type, Owen (q.v.) considered that the shoulder and pelvic arches were modified ribs, the shoulder arch belonging to the occipital vertebra, and the limbs themselves being diverging appendages or uncinates. Yet this theory was the fault or erroneous way of thinking of the period in which he lived, and Owen was the greatest of English comparative anatomists, his works giving a great impetus to zoölogy.

The first epochal step in unraveling the mor-

phology of the arthropod classes was taken by Savigny (1816), who showed that the mouth parts of insects, crustaceans, etc., were modified limbs, and this gave a clue to the segmental nature of the head of these animals, which is composed of a number of segments, different in each class, as shown by the later researches of embryologists. Savigny also taught that as a rule a segment bears but a single pair of appendages, while Audouin showed that the form of the arthropodan body was due to the atrophy of certain segments, or parts of segments, and the correlated hypertrophy of others. Other important advances in classification and anatomy were made by the labors of H Milne-Edwards, the successor of Cuvier, who established the principle of the division of physiological labor, separated the Tunicata from the Mollusca, divided vertebrates into those with and without an allantois, and confirmed De Blainville's separation of amphibians from reptiles.

During the middle of the nineteenth century the great German anatomist, Muller, made extensive investigations on the embryology and metamorphoses of the echinoderms, revolutionized the classification of the fishes, and placed physiology on a new and higher basis. Meanwhile Vaughan Thompson (1836), by his discovery of the nauplius larva of the barnacles, had shown that instead of being worms they were genuine, but greatly degraded, crustaceans. In 1848 Leuckart broke up the Radiata of Cuvier, and separated the Cœlenterata from the echinoderms, regarding them as a distinct branch or type. Wiegman transferred the Rotifera from the Protozoa to Vermes; Siebold (1848) having established the group of Protozoa, showed their one-celled structure, and founded the type of Arthropoda; while Rudolphi, Leuckart, and Siebold pointed out the wormlike nature of the flatworms, now referred to a separate phylum.

The animal nature of sponges was not proved until after the middle of the nineteenth century, through the researches of Lieberkühn, Carter, Clark, and finally Haeckel, who, however, placed them with the cœlenterates, while their true position as a distinct phylum was assigned them by Hyatt. Through the investigations of Morse the Brachiopoda were removed from the Mollusca, as also were the Molluscoidea, and regarded as more nearly allied to the Annelida. Louis Agassiz (q v.), one of the foremost zoölogists of his time (1807–73), greatly advanced our knowledge of the cœlenterates, among his discoveries being that of the hydroid nature of Millepora. He worked on the embryology of the fishes and reptiles, his great work on fossil fishes bringing order out of a chaotic mass of unclassified material. He also indicated the chief faunal divisions of North America. From the middle of the nineteenth century there has been published an uninterrupted series of monographic anatomical and embryological works on single animals in the line of those of Réaumur, Lyonnet, Strauss-Durckheim, and Herold, among which should be indicated those of the numerous students of Johannes Müller and Leuckart; the works of Agassiz and his students; of Huxley and his pupils; and of Lacaze-Duthiers and his successors.

Among the most remarkable and fruitful advances in embryology is Kovalevsky's (q v.) discovery (1866) of the presence of the notochord and hollow nervous system in the embryo and larva of ascidians, which resulted in the removal of the Tunicata from the Molluscoida, and afterward from the worms, to the neighborhood of the vertebrates; and in the establishment of the phylum of the Chordata, as well as the breaking down of the distinction between vertebrates and invertebrates; these, with the later researches of Semper, indicating the origin of vertebrates from some primitive annelid worm. The fact that the embryos of all animals above the Protozoa pass through a gastrula stage led Haeckel to suppose that this hypothetical gastrea was the ancestral form of all the many-celled animals.

The two founders of modern histology were Kölliker and Leydig. The former, besides his early discovery of the mode of development of sperm cells, and the proof he afforded of the existence of animal cells destitute of a cell wall, gave a great impulse to the general histology of vertebrates, and the latter to that of the invertebrates, especially the sense organs Their pupils and successors, by the invention of refined methods and the use of reagents, especially by the invention of the microtome, have pushed fruitful investigations in embryological and morphological directions, greatly extending our knowledge of reproduction and cell division, and laying the foundation for future special research in comparative physiology, especially of the brain, and in psychology, bearing especially on reflex, instinctive, and mental actions.

The studies of the earlier histologists and embryologists led to the foundation of cytology, or cell science, and to a realization of the complex nature of protoplasm; work in which Fleming, Strasburger, E. Van Beneden, the two Hertwigs, Roux, Boveri, Conklin, Lillie, Wilson, and others took a leading part. On the results of their labors are based the theory elaborated by Weismann that the particles of the chromatin of the nuclear substance (chromosomes) are the bearers of heredity. A new department of cytology is that of the mechanics of development (q.v.), which is in the line of mechanical or dynamic evolution, taught by Lamarck, H. Spencer, Ryder, Cope, Hyatt, Roux, and others.

The metamorphoses of animals, especially those of insects, were in the beginning described by Lyonnet, Roesel, De Geer, Réaumur, and others, and in recent times by Fritz Müller, who pointed out the fact that the caterpillar and maggot form of larva are secondary, the most generalized and primitive insects not undergoing a metamorphosis. Müller also worked out the metamorphosis of certain Crustacea, and our knowledge of the larval forms of these animals has been greatly extended by Dohrn, Brooks, Smith, and others, with the result that the nauplius stage is now regarded as also an acquired one, and not a primitive feature. The most notable advance in our knowledge of the exact mode of metamorphosis in the most highly specialized insects, especially the flies, was made by Weismann in 1864. His demonstration of the making over of the body by the histolysis of the larval tissues, and the formation of the tissues of the adult from imaginal buds, brought about the final overthrow of the preformation notion. Through the labors of Barrande, Beecher, and others, the larval stage of trilobites and of *Limulus* is recognized to be a third arthropod larval type, the protaspis, perhaps the most primitive and trochosphere-like of all.

The problem of the ancestry of insects, the

solution of which is based on our knowledge of larval forms and of the anatomy of primitive types, has been attacked by Brauer, Packard, Lubbock, Sylvestre, and others. Indeed, the latest results of work on the arthropods tends to show that this vast assemblage of forms is polyphyletic, and recently it has been subdivided into several phyla, each having a separate origin from some unknown worm allied to existing annelids, and each with a different type of structure. The heterogeneous group of Vermes has also been disintegrated into several phyla. These changes have in great part been necessitated by the advance made by the two Hertwigs, Lankester, and others in our knowledge of the coelomic or body cavity of different zoological groups.

Fresh attention is now being paid to a study of the life history of the Sporozoa (q.v.). The story of the manner in which the germs are conveyed from one host to another, told by Grassi, Ross, and others, is one of the triumphs of modern zoölogy and medical skill. Here likewise the discovery of phagocytes by Metschnikoff, also by Kovalevsky, and of their action in destroying disease germs or bacteria, and Metschnikoff's theory of inflammation, are among the most notable advances made in the nineteenth century.

As to vertebrate morphology the most important advances made during the last half of the nineteenth century are those contributed by Huxley, Gegenbaur, O. Hertwig, and others. While Huxley demolished the old view that the vertebrate skull consists of modified vertebræ, the skull elements being in reality dermal bones derived from scales, the German anatomists named, as well as Dohrn, Locy, and others, have shown that the head of vertebrates is made up of segments, as proved by the actual segments revealed in the embryo of the lower vertebrates, by the segmental arrangement of the muscles (myotomes), of the arteries, and of the cranial nerves. Apropos of the segmental arrangement of the organs of the vertebrate head, Loeb, as well as Schrader, from the point of view of experimental physiology, claim that no localization of functions exists, either in the brain or in the spinal cord of the cold-blooded vertebrates, and that the reactions observed are "only segmental reflexes, just as in the annelids and arthropods."

Another problem attacked by morphologists in late years is that of the origin of vertebrate limbs. Gegenbaur derived them from the archipterygion or primitive portions of the shark's fins; while Thatcher, Mivart, Balfour, Dohrn, and Wiedersheim have traced them back to the two primitive fin folds of the lowest vertebrates. Here also belongs Dohrn's principle of change of function, one lying at the basis of the mechanical evolution of limbs and other organs. Another research started by Baldwin Spencer is the origin of the pineal gland and its nature as a third or median eye, a feature with little doubt inherited from amphioxus by the ganoid fishes, amphibia, reptiles, mammals, and even man, whose so-called pineal body or gland was by the ancient anatomists supposed to be the seat of the soul. Its complex homologies were indicated by Gaup in 1901. And here might be mentioned the great advances in the anatomy of the brain both of arthropods and of vertebrates, particularly the recent thorough-going researches of Golgi on the rods of Corti, and of Ramón y Cajal on the minute anatomy of the cerebellum; all such very special work laying the foundations for modern physiology and psychology, and resulting in the neurone theory established between 1890 and 1900.

On the whole the most remarkable single discovery in zoology, and one of great moment to anthropology, is the detection of the remains of the Pithecanthropus by Dubois (in 1891–92) in the late Tertiary strata of Java.

The aim and methods of modern paleontology, which is in reality the study of the ancestors of the forms now living, has come to be one of the main supports of the theory of descent. And this not only for the reason that it has revealed to us the remains of numerous extinct groups, families, and orders, connecting those previously supposed to be wide apart, but because our museums now contain rich series of forms illustrating not only the geological succession, but also the gradual, and at times sudden, modifications and evolution of series of types from the generalized to the specialized. The chief factors also of this process of divergent evolution are quite clearly seen to have been geological and climatic changes, and the use and disuse of organs. Examples are the genealogy of the horse family, partly worked out by Huxley, Gaudry, Kovalevsky in Europe, and more perfectly, owing to the greater completeness of the series, by Marsh and Osborn in America. Other groups, as the Camelidæ, etc., have had their ancestry elucidated by Cope, Osborn, Scott, Wortman, and others. The phylogeny of the ammonites and nautiloids has been elaborated by Hyatt, that of Brachiopoda by Beecher and others.

Among the Crustacea, two orders, the Phyllocarida and the Syncarida, have been recognized by Packard, and the latter group also recognized by Ortman, as being generalized forms which have given rise to the higher groups represented by the modern shrimps, lobster, and crabs.

Perhaps the most important paleontological discovery in the last half century, as regards arthropod animals, is that of the appendages of trilobites, which we owe to Walcott, Matthew, and especially to Beecher. Finally, the view has of late years been rendered clear that nearly every class of invertebrate animals originated in Precambrian times; the vertebrates with limbs and lungs, Amphibians and reptiles, appearing near the close of the Paleozoic age, while birds and mammals diverge from some reptilian stock in the early Mesozoic.

(4) The fourth period is that of evolution and bionomics. The history of evolution (q.v.) is now a twice-told tale. How much we are indebted to Darwin (q.v.), Wallace (q.v.), Herbert Spencer (q.v.), and others has been recounted elsewhere. It remains only to point out some salient features in the history of the theory of descent and its modifications during the nineteenth century. A noticeable circumstance in the history of the rise and spread of the doctrine is the way in which the once almost forgotten or misunderstood views of Lamarck (q.v.) have been either unearthed or hit upon independently by others, as Cope, Hyatt, Jackson, Eimer, etc., proving that the Lamarckian factors of change of environment, use and disuse, even if we throw out use-inheritance as applied to mutilations, etc, may be primary agencies in modifying organisms and in bringing about not only varieties and species, but also families, orders, classes, and even phyla.

Natural selection also has its foundation in the struggle for existence and competition And here it is interesting to observe that Darwin and Wallace, who independently thought out the selection idea, both acknowledge their indebtedness to Malthus's "Essay on Population" (1798) for the idea which dominates their theory. It is not, perhaps, generally known that Malthus on his part freely acknowledged in the opening pages of his essay his indebtedness to Benjamin Franklin for the motif of his work. In 1755, in his *Observations Concerning the Increase of Mankind and the Peopling of Countries*, Franklin enunciated the principle of struggle for existence, and the evil effects of overcrowding if any single species were allowed to multiply unchecked by competition with other forms. "There is, in short," he says, "no bound to the prolific nature of plants and animals, but what is made by their crowding and interfering with each other's means of subsistence. Were the face of the earth vacant of other plants, it might be gradually sowed and overspread with one kind only, as, e g, with fennel, and were it empty of other inhabitants, it might in a few ages be replenished from one nation only, as, e g., with Englishmen." (Sparks's edition of the *Works of B. Franklin*, vol. ii, p. 319.)

The theory of descent has aroused attention and given a decided impulse to the study of bionomics, ethology, or the habits and instincts of animals and their relations to the world around them. The pioneers in this captivating phase of biology were Huber, Réaumur, Reimarus, Siebold, and Leuckart, and, to come down to later times, Lubbock, Romanes, Wyman, Plateau, Forel, Fabre, Moggridge, Cook, G. W. and E G. Peckham, Loeb, Weismann, and Wheeler deserve special mention.

One great difference between plants and animals is that the latter move from one place to another; and how animals orientate themselves and the means or sense organs by which they move in reference to surrounding objects or organisms, find their food, or their mates, has engaged and is now engaging much attention. Here might be cited recent work on the otocysts of the invertebrates, and the views now held as to the origin of the vertebrate ear and the lateral sense organs of fishes and salamanders from organs of orientation in the worms. The mechanics of locomotion worked out by the older anatomists and physiologists have, by the ingenious inventions and use of photography, been greatly extended by Marey

Finally, our knowledge of the physiology of nerves and ganglia, as well as of the brain, of the more specialized animals and of man, has had its bearings on comparative psychology, and under the influence of the experiments of Loeb, Bethe, and others we are coming into a position to discriminate between simple physiological or reflex acts and instinctive acts, and to compare them with the acts of human reason. And here again we see that plants and animals approximate, in that the reflex acts of the lowest animals, those without nerves or ganglia, are akin to the restricted movements of certain plants.

As is well known, Darwin's theory of selection is based on his assumption of the universal tendency to variation, a phenomenon he did not at the outset attempt to explain. The Lamarckian factors of change of the conditions of life, of climate, and soil, are what we rely on to account for variations, as indicated by Darwin later in life, strongly insisted on by Herbert Spencer, by Sachs, Semper, Kerner, and their successors. Within the past few years the study of variation, from a general as well as statistical point of view, has already reached very considerable proportions. According to the results obtained by J. A. Allen, Wagner, Wallace, and others, a very large proportion of existing varieties and species are local, geographical, or climatic forms, due to migration, geographical changes, and resulting isolation. Bateson has collected all the known cases of discontinuous variations, and many species, as claimed by Galton, also by De Vries, owe their origin to sports or aberrations. Statistical variations, consisting of the minute measurements of multitudes of individuals, all tend to show that the variations are due to local differences in climate, soil, temperature, the nature of the medium, etc., with the result that the doctrine of the essential unfixity of species, the high degree of unstable equilibrium of organisms, is a fundamental fact, with which the biologist has more and more to deal.

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ZOÖPHYTE, zō'ō-fīt (Gk. *ζῳόφυτον, zōophyton*, zoöphyte, animal plant, from *ζῷον, zōon*, animal + *φυτόν, phyton*, plant). A term employed by Cuvier to designate the lowest primary division of the animal kingdom, which includes many animal organisms that are fixed to a definite spot or rock, shell, etc., and have the form of plants. The group was a very artificial one, and the term gradually fell into disuse and is no longer employed except as a semipopular term to describe hydroids, corals, sea anemones, and some other forms, which superficially bear some resemblance to flowers.

ZO'ÖSPORE (from Gk. *ζῷον, zōon*, animal + *σπορά, spora*, seed), or "swarm-spore." The ciliated, motile spores common among the algæ and aquatic fungi. See SPORE.

ZOQUE, sō'kā. A Mexican tribe of low culture occupying portions of eastern Tabasco and the adjacent districts of Chiapas and Oaxaca, and, together with the neighboring Mixe and one or two other tribes, constituting the Zoquean linguistic stock. They were formerly a numerous and formidable people, brave, savage, and addicted to cannibalism, but are now reduced to less than 3000, described as agricultural and industrious, but stupid, coarse featured, and great drunkards. Like other tribes of Mexico, they retain many of their ancient beliefs and customs under a thin veil of civilization. Consult Sánchez, *Gramática de la lengua Zoque* (Mexico, 1877), and Grasserie, *Langue Zoque et langue Mixe* (Paris, 1898).

ZORN, tsōrn, ANDERS LEONHARD (1860–1920). A Swedish figure, landscape, and portrait painter, and an etcher. He was born at Mora,

Dalarne, of peasant stock, and studied for six years at the academy in Stockholm, intending at first to become a sculptor. From 1882 to 1885 he was in London, where he studied etching with Axel Haig, and exhibited water colors at the Royal Academy and at the Royal Society of Painters in Water Color. In 1887 he was awarded a medal and the Legion of Honor at the Paris Salon, and in 1888 "Fisherman from St. Yves," his first oil painting, was purchased for the Luxembourg Museum. In 1889 he received a gold medal at the Paris Salon. Although he traveled extensively in Spain and Italy, and frequently visited America, he resided, for the most part, at the home of his birth, Mora. Here he devoted himself, with unsurpassed spontaneity and exuberant vitality, to painting his favorite subject, the female nude of the Swedish peasantry. He delights in portraying the unstudied, unsophisticated freedom of healthy and unconscious animalism. An Impressionist only in so far as he depicts the passing movement and the instantaneous play of light and shadow, he avoids the flat appearance, rendering tactile values in an almost sculptural manner. As a portraitist he stands among the foremost painters of his time, combining a sturdy uncompromising naturalism with an extraordinary power of characterization, and a masterly subservience of detail to a broad general effect. His many portraits include one of himself in the Uffizi (1888); King Oscar of Sweden (1898), King Charles of Sweden (1898); the remarkable "Harald Wieselgren"; "Maja" (1900, National Gallery, Berlin); the celebrated "Coquelin Cadet"; "Portrait of the Artist" (Stockholm Museum); and "The Toast." Well-known figure compositions are: "Baking in Mora" (1889); "Night Effect" (Gothenburg); "Summer in Sweden" (National Gallery, Berlin); "Midsummer Night Dance at Dalecarlia" (1897, National Museum, Stockholm). Later are: "Dagmar"; "Matins on Christmas Day"; "Watering the Horse"; "Nude" (Metropolitan Museum, New York); "Startled" (1912). As an etcher Zorn achieved an individual and lasting reputation, especially in his series of remarkable portraits, including those of Renan, August Strindberg, Paul Verlaine, Anatole France, Rodin, and the "Portrait of the Artist and his Wife." The two plates, "The Bather Seated" and "Edo," are nude studies of exquisite beauty and restraint. In the realm of sculpture also Zorn displays a masterly technique in such works as "Alma," a graceful nude; the statue of Gustavus Vasa at Mora; "Grandmother" (1892), and "Faun and Nymph" (1896, bronze statuette). Consult: Aloys Deltiel, *Le peintre-graveur illustré XIXe et XXe siècles*, vol. iv (Paris, 1909), J. N. Laurvik, *Anders Zorn* (New York, 1913); A. E. Gallatin, in *Whistler's Pastels and other Modern Profiles* (ib., 1913).

ZORNDORF, tsōrn'dōrf. A village of Prussia, in the Circle of Königsberg, noted as the scene of a victory gained by Frederick the Great of Prussia over a Russian army under General Fermor, Aug. 25, 1758. The battle was decided by two splendid cavalry charges under General Seydlitz and ended in a panic rout of the Russians, who lost nearly 24,000 men out of a total strength of 50,000. The Prussians, who numbered 37,000 men, lost somewhat more than 11,000 men.

ZOROASTER, zō'rō-ăs'tēr (Lat. *Zoroastres*, from Gk. *Ζωροάστρης*, from Av. *Zarathuštra*). The prophet of ancient Iran, a representative of the faith of the Magi (q.v.), and a great religious teacher of the East. The tenets of his creed are preserved in the Avesta (q.v.), in the Pahlavi literature (q.v.), and in later writings, and they are still kept up by the small community of Ghebers (q.v.) in Persia and by the Parsis (q.v.) in India. The fact that Zoroaster was a historical character, not a mythical personage, is now generally accepted.

Much uncertainty formerly prevailed regarding his date because of the statements of some of the classical authors that he flourished 6000 years before the Christian era, but these reports were due to a misunderstanding of the Persian chronology, which recognizes the existence of Zoroaster's spiritual essence or unborn substance at an era corresponding approximately to such a date in the world's history, although his birth did not take place till much later. On the basis of the traditional chronology of the Parsis, as found in the Bundahishn and elsewhere in Pahlavi literature, the probable dates of Zoroaster's birth and death may be reckoned as falling respectively about 660 B.C. and 583 B.C. Many scholars, however, accept 1000 B.C. as the approximate date when Zoroaster flourished.

The etymology and precise meaning of Zoroaster's name, *Zarathushtra* in the Avesta, is not wholly certain, although the last element (Av. *uštra*) means camel. The place of his birth is now generally accepted as being in the northwestern part of Persia, Azerbaijan (q.v.), to the west of the Caspian Sea, although a great part of his religious activity must have been in eastern Iran. Tradition makes Azerbaijan (corresponding to the *Airyana Vaējah* of the Avesta) the home of his father, Pourushaspa, and it connects incidents of Zoroaster's early life with Lake Urumiah, which answers to *Caēcista* in the Avesta, and associates the religious devotee also with Mount Savalan. Various cities, however, are mentioned directly or indirectly as his birthplace or as connected with him, and the ancient town of Rei (Av. *Raγa*, the Rhages of the Book of Tobit), near the modern Teheran, is said to have been originally the home of his mother, Dughedha. Legend has gathered a number of miracles about Zoroaster's birth and childhood, and tradition leaves space for a period of religious preparation from his fifteenth to his thirtieth year, when he received a revelation of the faith and came forward as an opponent and reformer of the superstitious beliefs and heresies that existed in the old creed. Seven visions of heaven, the divine being, and the archangels were revealed to Zoroaster in the following 10 years of his life. He then is said to have undergone the final test by a temptation from the evil spirit Ahriman (q.v.), but came off triumphant from the encounter with the archfiend. If we follow tradition we may identify, with some degree of likelihood, the scenes of these supernatural and actual experiences. They tend to show that Zoroaster traveled over a considerable part of Iran, for mention is made of his having been at one time in Seistan and even in Turan. The place where he made his first convert, his cousin Maidhyoi-maonha, or Medyomah, after the conflict with the spirit of evil, is probably the district of the great forest of reeds near the southwest shore of Lake Urumiah.

Zoroaster's first real success, however, was achieved when he converted King Vishtaspa (Av. *Kavi Vištāspa*). This was accomplished in the prophet's forty-second year, or 618 B.C., if we accept the traditional chronology. As it is generally believed that Vishtaspa ruled in eastern Iran, Bactria, Seistan, and Khorasan, fresh support is given for the claim that Zoroaster's teaching was largely in the east, even though he arose in the northwest of Persia, and his creed ultimately spread over all Iran. After the King's conversion the religion was adopted by the Queen, Hutaosa, who has the same name as Atossa, the wife of Hystaspes, father of Darius (qq.v.), although there is absolutely no historic ground for identifying Vishtaspa and Hutaosa with Hystaspes and Atossa, as has been done on the basis of identity of names. The nobles of the court likewise adopted the religion of Zoroaster, and we may trace the history and propaganda of the faith down to the time of the prophet's death, which occurred in 583 B.C., at the age of 77, if we accept and correctly interpret the traditional chronology. Zoroaster's end seems to have been a violent one, and to have taken place during the invasion of Iran by Turan when Arejat-aspa, or Arjasp, of the latter hostile country, waged a religious war against Vishtaspa. Firdausi (q.v.) and other later writers locate the scene where Zoroaster was slain at Balkh or Bactria (q.v.).

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ZOROASTRIANISM, zō'rō-ăs'trĭ-an-ĭz'm. The designation generally employed to denote the ancient religion of Persia prior to the Mohammedan conquest of Iran. Other terms are sometimes substituted, such as Mazdaism from its supreme god, Magism from its ancient priests, and Parsiism from its modern adherents. The historical development of the religion will be found briefly sketched under the separate titles AVESTA; GHEBERS; MAGI; PAHLAVI LANGUAGE AND LITERATURE; PARSIS; ZOROASTER.

One of the most striking features of Zoroaster's faith, as taught in his metrical psalms or *Gâthâs* (q.v.), is a pronounced but modified dualism. It is pronounced because belief in a constant warfare between the good and evil principles that pervade the world is everywhere present. Ahura Mazda or Ormazd (q.v.), the Lord Wisdom, the supreme god of Iran, created the universe and rules it; Angra Mainyu or Ahriman (q.v.), the Spiritual Enemy, or devil, invaded the world and ever disorders it. To the latter being, or rather to the evil principle whose wicked spirit he embodies, the name Druj, Deceit, Fiend, is also given. The dualism is modified because it regards the power of evil as limited in time. Although nature is divided and rent asunder by the two conflicting principles, nevertheless man, as a free agent, will bring about the ultimate triumph of right by choosing right and extending the power of good for the overthrow and annihilation of evil. This result in the end will establish the good kingdom (Av. *vohu xšaθra*), after the general resurrection. To accomplish this end is the aim of the prophet's teaching; and the views which he maintains of the contending forces of right and wrong, the empires of light and darkness, are remarkable for their sharpness and logical precision.

According to Zoroaster's belief the heavenly hierarchy that rules the realm of good is headed by the god Ormazd. Six attendant spirits, besides lesser divine beings, join with him in administering the kingdom. These six presiding divinities, who with Ormazd make up his court, are called Amesha Spentas, Immortal Holy Ones, the later Persian Amshaspands. They represent personifications of virtues, good thought, righteousness, wished-for kingdom, harmony on earth, salvation, immortality. The allegory beneath their names and the various domains in the physical world—animal life, fire, metals, earth, water, plants—over which they preside, are easy to recognize and not difficult to understand. Next in rank to these, and but little if at all below them, stands a company of angels, Yazatas, Worshipful Ones, who guide the force of nature and perform the duties incumbent upon their offices in the divine organization. Chief among these is Mithra (see MITHRAS), a personification of light and truth. Atar, the fire, Apo, the waters, and several idealized representations of the sun, moon, and stars, together with a variety of lesser divine creations, fulfill the heavenly decrees in the management of the universe. To offset these, on the side of evil, is a vast host led by Ahriman and composed of a disordered rabble of archfiends, fiends, demons, and evil spirits, who contend against the well-organized ranks of the good and strive to destroy the soul of man. Foremost among this troop is the demon Aeshma-daeva, whose name is generally considered to be reflected in the fiend Asmodeus (q.v.), of the Apocryphal Book of Tobit. The names and number of the hosts of evil are legion; it would be idle to try to enumerate them.

The struggle between these two conflicting kingdoms forms the history of the universe whose duration lasts for a world period of 12,000 years. The Pahlavi Bundahishn gives us a notion of the Zoroastrian ideas of cosmology and chronology. Ormazd and Ahriman are coexistent, though not coeternal, in the realm of light and darkness. Space primevally separated them. Time began with their conflict. During the first 3000 years the universe existed only in a spiritual state, everything was represented by its *fravaši*, or heavenly prototype, in a transcendental form. Ahriman, not knowing this, arose from the abyss of darkness, but when he beheld the light he was dazzled and driven back, baffled by its radiancy and splendor. He at once created the infernal hosts to wage war against the realm of light. In the second 3000 years Ormazd created the world and primitive man in a material form to fight against the powers of evil. During the third 3000 years, which is the historic period of the world known to Zoroaster, Ahriman invades the earth, mingles evil with good, marring all till the coming of Zoroaster drives him and the demons for a time away. The last 3000 years are millennial periods. Each of these three millennia is presided over by a prophet or savior, to be born from the seed of Zoroaster. The final one of these shall preside at the general resurrection, when the world shall be renewed and eternity shall begin. It is then that the powers of evil, united for a

final struggle, shall be utterly routed by the forces of good, wickedness shall vanish at this final crisis, and righteousness shall reign supreme as Zoroaster foretold. See SAOSHYANT.

The essence of Zoroaster's moral and ethical teachings may be summed up in the three cardinal Avestan words *humata, hūkta, hvarŝta*, good thoughts, good words, good deeds, which form the watchword of the faith of the modern Parsis and Ghebers. The idea of goodness implies largely the choice of the good religion of Mazda and following its precepts, in preference to devil worship, or the cult of the demon. Purity implies scrupulously preserving the purity alike of body and soul, and is chiefly to be obtained through religious observances and ceremonial rites that are extreme in their exactions. The elements of earth, fire, and water, moreover, must be carefully shielded from defilement, especially from contact with dead matter. It was this prescription which led to the peculiar Zoroastrian method of exposing the dead bodies on Dakhmas or Towers of Silence (q.v.), to be devoured by dogs and birds—a custom which the modern Zoroastrians quite strictly observe. Furthermore, the care of useful animals, particularly of the cow and the dog, is enjoined, and the importance of agricultural pursuits as a religious duty is strongly inculcated. There are many minor observances and beliefs found, especially in the Avestan *Vendīdād*, that recall the Pentateuch. These features and others were noticed by the classical writers, such as Herodotus, Plutarch, and Strabo, as characteristic of the Persian religion. The main points of Zoroaster's philosophy may be gathered from the Gathas and supplemented by other portions of the Avesta and Pahlavi literature. A summary of the orthodox beliefs of the ancient Zoroastrians will be found in Yasna 12, which is sometimes called the Avestan creed.

Comparisons of Zoroastrian with other religions show more resemblances to Judaism and Christianity than to other Oriental faiths, and the possibility of mutual influences, direct and indirect, has been the subject of much discussion. The affinities of the religion of Iran with the ancient faith of India, e.g., with regard to likenesses between the divine ideas of Mithra and Mitra, Verethraghna and Vritrahan, and the like, or in the cult of Haoma and Soma (q.v.), or in the differences between Ahura-Asura, Daeva-Deva, are striking, and point back to the period of common Indo-Iranian or Aryan unity. Parallels also have been sought between ancient Babylonian and Zoroastrian beliefs, which may be due in part to the proximity of the two peoples. With regard to primitive ideas, moreover, we may recognize in the Zoroastrian faith and in some of its ceremonies a few traits that recall possible survivals of primitive animism, spiritism, fetishism, and ancestor worship. As a rule, however, the ideality and lofty spirituality of Zoroaster's teachings have been generally recognized; and the efficiency of the faith as a working religion may be seen in the fruits which it has borne in various ways through history and in its present followers, the Parsis and Ghebers.

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ZORRILLA, FRANCISCO DE ROJAS. See ROJAS ZORRILLA.

ZORRILLA, thôr-rē'lyà, MANUEL RUIZ (1834–95). A Spanish statesman, born at Burgo de Osma. He studied at Valladolid, became an advocate, and in 1856 was elected to the Cortes, where he joined the Progressists. In 1866 he took part in an uprising which led to his banishment until the revolution of 1868. In that year he was made Minister of Commerce and Public Instruction under Serrano. In 1869 he became Minister of Justice and in 1870 president of the Cortes. He was instrumental in the election of Amadeus of Savoy to the throne, was Minister of Public Works in his first cabinet, and in 1871 formed a Progressist cabinet. He was the chief adviser of Amadeus till the latter's abdication in 1873. After the accession of Alfonso XII (December, 1874) he retired to France, and later to Geneva, whence for 18 years he directed the plots of the Republican conspirators. In 1884 he was sentenced to death, in contumaciam, for his part in the military rising of March, 1884. At last he tired of the struggle, gave up his leadership, and was permitted to return to Spain.

ZORRILLA Y MORAL, thôr-rē'lyà ē mō-räl', José (1817–93). A Spanish poet and playwright, born in Valladolid Feb. 21, 1817. He composed and published his incomplete poem, *Granada* (1852), in Paris. Always in straitened circumstances, he went to Mexico to try his fortunes in 1855, and, going back to Spain for a visit in 1866, was cut off from returning to Mexico by the disasters that befell Maximilian. From 1871 to 1883 he suffered want, though the theatres, as he complains in his *Recuerdos del tiempo viejo* (1880), were making fortunes by his plays. His last years were freed from want by a government pension of 30,000 reals. He died at Madrid Jan. 23, 1893.

The *Soledad del campo* and the *Indecisión* are his most important lyric works. But he shows

to greatest advantage in his various *leyendas*, in which he has embodied the history of Spain Poetic eloquence, descriptive force, patriotism, religious fervor, and strong idealism characterize his legends, and these qualities are found already in the *Cantos del trovador* (1840–41). The *Granada* (1852) would, if completed, be the great epic of modern Spain.

Zorrilla's first play, written in collaboration with García Gutiérrez, was the *Juan Dándolo* (1839). A long series of plays followed, and of these the best are *El zapatero y el rey; Traidor, inconfeso y mártir; A buen juez mejor testigo;* and *Don Juan Tenorio* The *Don Juan Tenorio* treats the tradition which Tirso de Molina's *Burlador de Sevilla* had made famous on the Spanish stage. Zorrilla's Don Juan differs from the general conception of that scoundrel in that he is made to die repentant. The *Don Juan Tenorio* is so great a favorite of the Spanish race that it is given an annual two-weeks' run at the Festival of All Hallows.

Consult the *Obras dramáticas y líricas de D. José Zorrilla* (4 vols, Madrid, 1895); *Galería Dramática: Obras Completas* (4 vols., ib., 1905); *Ultimos versos inéditos y no coleccionados* (ib., 1908); A. de Valbuena, *José Zorrilla, estudio crítico-biográfico* (ib., 1889); and Enrique Piñeyro, *El Romanticismo en España* (Paris, 1900).

ZOSIMUS (Lat, from Gk. Ζώσιμος). A Greek historian who flourished in the time of the Emperor Anastasius I (491–518 A.D). His *New History*, in six books, dealing with the history of the Roman Empire to the capture of Rome by Alaric, 410 A.D., is extant. Inasmuch as Zosimus's work is a continuation of that of his predecessor Dexippus, the earlier history, from Augustus to the year 270, is sketched briefly in the first 36 chapters of the first book. The rest of the period is treated in detail. From internal evidence it seems clear that Zosimus was still engaged on the work (which was not completed), after 501. Zosimus finds the cause of the decline of Rome's power in the neglect of the earlier faith of the Romans which attended the progress of Christianity. As a pagan he assails the various Christian emperors, especially Constantine. His work is our chief source for the history of the fourth century, and on the whole may be trusted. It is best edited, with prolegomena, by Mendelssohn (Leipzig, 1887).

ZOSIMUS. Pope 417–418. He was a Greek by birth. The main interest of his pontificate lies in his relation to the Pelagian controversy. The African bishops had condemned the opinions of Pelagius (q.v.), and this judgment had been ratified by Pope Innocent. In the interval, however, Pelagius appealed to the Pope; and his disciple, Celestius, came in person to Rome, where he presented a confession of faith in his own justification. Zosimus was induced by the specious explanations of Celestius to suspend judgment, and even to write to the African bishops, recommending a reconsideration of the case. On further examination of Celestius Zosimus became aware that he had been deceived; and, even before the reply of the African bishops, confirmed and renewed their original condemnation of the Pelagian doctrine. His letters are found in Migne, *Patrologia Latina*, xx.

ZOSTEROPS. See White Eye.

ZOUAVES, zōō-ävz'. A body of troops in the French army whose organization dates from 1830, when two battalions were formed by General Clausel from a tribe of Kabyles dwelling in Algeria. The name of the tribe was Zouaoua, which in French gave rise to the term "zouave" The organization of these tribesmen as a part of the French army was brought about to establish a friendly feeling between them and the conquerors, and inasmuch as they had been for years mercenary soldiers, they were considered an important addition to the army. French officers were placed in charge and a certain number of French soldiers were included in the companies, which were formed into two battalions. The mingling of the French and natives did not prove satisfactory, and after 1839 none of the latter were recruited, though regiments of Algerian tirailleurs were subsequently (1842) formed. The Moorish costume originally adopted was retained, and the zouaves, who were recruited from veterans of exceptional physique and courage, achieved a high reputation, serving not only in Africa, but also in the Crimea, Italy, Mexico, and more recently in Tunis and Tongking. The zouaves accordingly became an integral part of the French army and before the great war were organized into three regiments of five battalions each, divided into four companies, the total strength being somewhat in excess of 13,000 men. There were in addition 10 skeleton battalions of zouaves in the Algerian territorial reserves. The papal or pontifical zouaves, under the command of General Lamoricière, served in Rome from 1860 to 1870, and played an important part in resisting the Italian occupation of Rome. In the United States during the Civil War some northern volunteer regiments adopted the zouave uniform and were known as zouaves.

ZRINYI, zrē'nyĕ, Miklós (Nicholas), Count von (1508–66). A Hungarian general. He distinguished himself at the siege of Vienna (1529) and afterward in the campaigns against John Zápolya and Sultan Suleiman. After 1542 Governor of Croatia and Slavonia, he successfully defended that territory against the Turks for many years, and in 1563 was appointed commander in chief of the royal forces on the right bank of the Danube and commandant of Szigetvar. When Suleiman, at the head of an army of 65,000 men, attacked that fortress in 1566, Zrinyi offered almost stubborn resistance. Although his garrison consisted of only 2500 troops, he managed to hold his own from August 6 till September 7. Neither the Sultan's promise to make him Governor of the whole of Illyria and hereditary possessor of Bosnia, nor the threat to kill his only son George, whom Suleiman pretended to hold as a prisoner, could induce him to surrender. On September 5 the Turks succeeded in setting fire to the outer castle, whereupon Zrinyi took refuge in the inner castle, and when this also was fired on the 7th, met his death fighting heroically at the head of his force now reduced to 600. More than 20,000 Turks had been killed during the siege, and Sultan Suleiman died on September 4 in a paroxysm of rage at the terrible repulses he encountered. The tragic end of Zrinyi was graphically described by his great-grandson Miklós (1616–64) in the epic *Szigeti veszedelem* (The Fall of Sziget, 1651). It was also repeatedly made the subject of dramatic productions, notably by Theodor Körner.

ZRINYI, Miklós, Count (1616–64). A Hungarian hero and poet, born at Csákvár. He traveled in Italy in 1635–37, served on the Croatian frontier against the Turks, and in

1645 fought against the Swedes in Moravia In 1647 he was made Ban (Governor) of Croatia, and during the subsequent years of his life won fame by his successes against the Turks. His poetical works, *Adrian tengernek Sirenája* (The Siren of the Adriatic), appeared in 1651, but a famous epic was left in fragments. These were collected by Arany and Antal Vékony, and published as the *Zrinyiad*.

ZSCHOKKE, chŏk'e, HEINRICH (1771–1848) A German-Swiss novelist and miscellaneous writer, born in Magdeburg. He studied in the University of Frankfort-on-the-Oder, where he became privatdocent, and wrote his novel *Abällino* (1794), which was successfully dramatized. Then he traveled for a time and kept a boarding school at Reichenau, in Switzerland. In 1798 he removed to Aarau, where he filled with energy and sound judgment several public and diplomatic offices. Besides editing several popular periodicals, Zschokke published the lucid and rationalistic religious manual, *Stunden der Andacht* (1806, twice translated, 1843 and 1862), and several popular studies in Bavarian and Swiss history, of which *Des Schweizerlandes Geschichten* (1822) was translated in 1855 Zschokke wrote also many novels and tales, from which three selections have been translated (Philadelphia, 1845, New York, 1848; London, 1848). *Der tote Gast* (1817), *Das Goldmacherdorf* (1817), *Addrich im Moos* (1826), and *Der Freihof von Aarau* (1826), are his best stories. His *Works* have been collected in 35 volumes (1854). He published an autobiographical *Selbstschau* (1842, Eng. trans., London, 1845). Consult Emil Zschokke, *Heinrich Zschokke: ein biographischer Umriss* (3d ed., Berlin, 1876); Max Schneiderreit, *H. Zschokke: seine Weltanschauung und Lebensweisheit* (Berlin, 1904).

ZSIGMONDY, shĭg'mŏn-dē, RICHARD (1865–) A German chemist. He was born in Vienna, and was educated at the Technical School in Vienna and at the University of Munich (Ph.D., 1889). From 1897 to 1900 he was scientific associate in the famous glass works in Jena, and then for seven years was engaged in private study and writing. In 1908 he was called to the chair of inorganic chemistry at Gottingen. He made a special study of colloid chemistry, on which subject he is an authority. His books *Zur Erkenntnis der Kolloide* (1905) and *Lehrbuch der Kolloidchemie* (1912) are well known, the former having been translated into English as *Colloids and the Ultramicroscope* (1909).

ZSOMBOLYA, zhŏm'bôl-yŏ. See HATZFELD.

ZUBAIR. See ZOBEIR.

ZUBLY, zŭ'blē', JOHN JOACHIM (1725–81). A Swiss-American clergyman, born at Saint-Gall, Switzerland. He was ordained to the Presbyterian ministry about 1744, subsequently emigrated to America, and in 1760 became the first regular pastor of the Independent Presbyterian Church in Savannah, Ga. He was an active member of the Provincial Congress of Georgia in 1775, and was sent as one of Georgia's delegates to the Continental Congress that year. Though opposed to the acts of the British ministry in favor of armed resistance, he opposed independence and a Republican form of government, and, after being detected in a questionable correspondence with Sir James Wright, the royal Governor of Georgia, he fled from Congress, and became an open Loyalist in Georgia. In 1777 he was banished from Savannah, and his property was confiscated He then lived in South Carolina for a time, and after Wright was reinstated as Governor of Georgia returned to Savannah, where he remained until his death His publications include: *The Real Christian's Hope in Death* (1756), *The Stamp Act Repealed* (1766), *An Humble Inquiry into the Nature of the Dependency of the American Colonies upon the Parliament of Great Britain and the Right of Parliament to Lay Taxes on the Said Colonies* (1769), and *The Law of Liberty* (1775)

ZUBR, zōō'b'r. See BISON.

ZUCCARO, tsōōk'ka-rō, TADDEO (1529–66). An Italian painter, born at Sant' Angelo in Vado, near Urbino. In 1548 he began fresco painting for Julius III, Paul IV, and other notables. He was a mannerist of the post-Raphaelite school, and his frescoes in the Palazzo Farnese at Caprarola, near Viterbo, show him at his best

FEDERIGO (c.1542–1609), his brother and pupil, was born at Sant' Angelo, and became the most popular painter of his generation. He completed the "Last Judgment" begun by Vasari in the dome of the cathedral of Florence, and was commissioned by Gregory XIII to carry out Michelangelo's designs for the decoration of the Pauline Chapel. As the result of a quarrel he left this task and visited Flanders, Holland, and in 1574 England, where he portrayed Queen Elizabeth, Mary Stuart, and many high personages. In 1582 he painted several huge frescoes for the Doge's Palace in Venice, and on his return to Rome completed his work in the Pauline Chapel. From 1585 to 1588 he was engaged in decorating the Escurial for Philip II. In 1595 he founded the Academy of San Luca at Rome. His frescoes are exaggerated in effect, with enormous grotesquely contorted figures.

ZUCCHETTO, tsu-kĕt'ō See COSTUME, ECCLESIASTICAL, *Vestments, General.*

ZUEBLIN, zū'blĭn, CHARLES (1866–1924) An American sociologist, born at Pendleton, Ind. He attended the University of Pennsylvania (1883–85), graduated at Northwestern University (Ph.B., 1887) and at Yale (B.D., 1889), and later studied at Leipzig (1889–91). Zueblin founded the Northwestern University Settlement in 1891, engaged in university extension work in 1892, and until 1908 taught sociology at the University of Chicago, where he became professor in 1902. His writings include: *American Municipal Progress* (1902; rev. ed., 1916); *A Decade of Civic Development* (1905); *The Religion of a Democrat* (1908); *Democracy and the Overman* (1910).

ZUG, zōōg *or* tsuG. A small canton of Switzerland (Map: Switzerland, C 1). Area, 92 square miles. It is mountainous in the southeast and mostly flat in the northwest. The canton comprises the Lake of Aegeri and the larger part of the Lake of Zug. The chief occupations are stock breeding, dairying, and the manufacturing of cotton, silk, and paper products. The constitution provides for an elected Legislative Assembly (one member to every 350 inhabitants) and an elected Executive Council. Proportional representation, the initiative, and the referendum are in force. Pop., 1910, 28,013, largely German-speaking Roman Catholics. Capital, Zug (q.v.). The town of Zug with a part of the surrounding territory was acquired by the house of Hapsburg in 1264 and was annexed by the Swiss Confederation in 1352 At the forma-

tion of the Helvetic Republic (1798) it became a part of the Forest Cantons. It was constituted an independent canton in 1803

ZUG. The capital of the Canton of Zug, Switzerland, 19 miles by rail south of Zurich, at the northeast corner of the Lake of Zug (Map: Switzerland, C 1) The town, a pleasant summer resort having an elevation of about 1400 feet, affords a fine view of the Bernese Alps and is quaint in appearance There are a fifteenth-century Gothic church of St. Oswald, the church of the Capuchins, an historical museum, a museum of antiquities, and a fine late-Gothic town hall. Cotton goods, enamel wares, and wood carvings are shipped, and there is an important fish-breeding establishment. In the vicinity of Zug is the Bee Museum of Switzerland. Pop., 1900, 6508; 1910, 8038.

ZÜGEL, tsü'gel, HEINRICH (1850–). A German genre and animal painter He was born at Murrhardt, Württemberg, studied at the art school in Stuttgart, and worked independently at Munich from 1869. In 1894 he was appointed professor in the Karlsruhe Academy, and the next year in the Academy of Munich. Zügel came to be recognized as the foremost German cattle painter of his day. Beginning with soft harmonious tones, he gradually adopted a broad powerful technique. Among his principal paintings are: "Sheep in the Woods" (1872, Leipzig Museum); "Sheep in an Alder Grove" (1875, National Gallery, Berlin), "Runaway Steer"; "Summer Sun" (1888, Rudolfinum, Prague); "Expectation" and "Cows on the Moor" (Pinakothek, Munich); "The Outcast" (Dresden); "Oxen Fording a Stream" (Metropolitan Museum, New York) He received great gold medals at several international expositions, and was made honorary member of the principal German academies.

ZUHAIR, zu-hâr', IBN ABI SULMA RABIA AL MUZANI. One of the great Arabic poets before Mohammed. He lived in the sixth century. His son, Ka'b ibn Zuhair, was also a poet, and a panegyrist of Mohammed. Zuhair is distinguished by his serious character, the moral tendency of his poetry, his contempt for extravagant eulogies, and his avoidance of rare and unintelligible words much affected by his contemporaries One of his poems found a place in the Moallakat (q.v.), others have been published by Ahlwardt, *The Diwans of the Six Ancient Arabic Poets* (London, 1870); with the commentary of al Alam by Carlo Landberg, *Primeurs arabes* (Leyden, 1889); and by K Dyroff, *Zur Geschichte der Ueberlieferung des Zuhairdiwans* (Munich, 1892).

ZUIDER ZEE, zoi'dĕr zā. See ZUYDER ZEE.

ZUKERTORT, tsuk'ĕr-tôrt, JOHANNES HERMANN (1842–88). A Polish chess-master, born at Lublin, Russian Poland In 1867 he began to edit the *Neuen Berliner Schachzeitung*, with the German expert Anderssen. Zukertort's first notable public chess playing was in London, in 1872, and in 1878, at the Paris International Tournament, he won the first prize. He defeated Rosenthal in 1880, Blackburne in 1881, and at the London Tournament of 1883 he won first place over Steinitz and a large field of other chess-masters. Steinitz defeated him, however, in America, in 1885. He displayed at all times remarkable skill in simultaneous games and in play without the board. Besides conducting the English *Chess Monthly*, he wrote *Sammlung der auserlesensten Schachaufgaben* (1869); and published, with Jean Dufresne, *Grosstes Schachhandbuch* (2d ed., 1873), and *Leitfaden des Schachspiels* (1869; 5th ed., 1897).

ZULOAGA, sōō'lō-à'ga, FÉLIX (1814–76) A president of Mexico, born at Alamos, in Chihuahua. In 1854 he was sent against the rebels in Ayutla, and in the following year was captured, but gained the favor of Comonfort, the Liberal leader, who, when he became President, intrusted to him the military operations in the Sierra de Querétaro, employed him in the two campaigns of Puebla, and made him Councilor of State In 1857 he declared against the new constitution and in favor of giving Comonfort dictatorial power, but as Comonfort hesitated, Zuloaga's troops occupied the capital (January, 1858). Comonfort went into exile and Zuloaga was declared President. Soon afterwards began the "War of Reform" between his followers of the Church and military parties and the Liberals under Juárez (q.v.). In December, 1858, Zuloaga was overthrown, and though he was afterward reinstated, he was at length declared an outlaw. When the French invaded Mexico Zuloaga did not assist them but went to Europe. He returned in 1864, and in the following year joined in an unsuccessful plot to overthrow Maximilian and establish Santa Anna.

ZULOAGA, thōō'lō-a'gà, IGNACIO (1870–). A Spanish figure and portrait painter. He was born at Eibar in the Basque Province of Vizcaya, the descendant of a noted family of craftsmen. His father, PLACIDO ZULOAGA, a damascener of international reputation, founded a school for the revival of that industry in Eibar. DANIEL, his uncle, revived the art potteries at Segovia, and his great-grandfather was director of the Armory of Madrid At 18 he went to Paris for five years. He did not, however, attend any of the academies, and practically taught himself, but he studied with passionate devotion the old Spanish masters, of which he acquired a representative collection In 1898 he exhibited at the Salon for the first time, and in 1899 won instant fame with his portrait group "Daniel Zuloaga and his Daughters" (Luxembourg Museum, Paris). He traveled much, usually in the most remote regions of Spain, portraying with remarkable individuality and keen characterization, unexcelled since Goya, popular Spanish types—gypsies, bull fighters, beggars, fruit vendors, water carriers, and dancers. His work is vivacious, nervously alert, striking in composition, and powerful, even brutal, in the interpretation of human emotions. His color scheme is rich and varied, excelling especially in sombre harmonies. His effects are obtained with a broad, sure brush. With Sorolla (q.v.) Zuloaga ranks as the most important and influential representative of the Spanish art of his time. He is represented in most public European collections, and at the Hispanic Society, New York, by a portrait of himself, by "The Gypsy Bull Fighter's Family," and by "Mlle. Lucienne Brēval as Carmen" (on loan at the Metropolitan Museum of Art). In 1909 a representative collection of his paintings was exhibited at the Hispanic Society. Consult: Christian Brinton, *Modern Artists* (N. Y., 1909); Miguel Utrillo and Others, *Five Essays on the Art of Ignacio Zuloaga* (ib., 1909); *Catalogue of Paintings by Ignacio Zuloaga, Exhibited at the Hispanic Society of America* (ib., 1909).

ZULU, zōō'lōō. Kaffir tribes of Bantu stock, South Africa, divided into five groups: Ama-

Ponga, Ama-Azwezi, Ama-Zulu, Ama-Ponda, and Ama-Kosa. They are a well-proportioned, muscular, powerful, and active people above middle height (See Colored Plate DARK RACES OF AFRICA, with article AFRICA.) They depend for their sustenance both on the cultivation of millet and on cattle raising. The house is a framework of poles, beehive in form, thatched and plastered. These huts are grouped together in a circular *kraal*, with the cattle in the centre. Among other arts, they make millet beer, tan hides, smelt iron, and weave basketry. Their weapons are the assegai, knobkirri, and shield. Polygamy and wife purchase are customary. They have an extensive folklore. For history, see ZULULAND. Consult Fritsch, *Die Eingeborenen Sud-Afrikas* (Breslau, 1872); Kropf, *Das Volk der Xosa-Kaffern* (Berlin, 1889); Grout, *Isizulu, Revised Edition of a Grammar of the Zulu Language* (London, 1893); Roberts, *Zulu-Kafir Language Simplified for Beginners* (3d ed., ib., 1895); id., *English-Zulu Dictionary* (2d ed., ib., 1895); also Callaway, *Nursery Tales, Traditions, and Histories of the Zulus* (Natal, 1868).

ZULULAND, zōō'lōō-land. A country forming the northeast part of the Province of Natal, Union of South Africa (Map Cape of Good Hope, K 6, 7). The area of Zululand is stated at 10,424 square miles. The country is about 185 miles in greatest length and 105 miles in greatest breadth; its coastline of 210 miles possesses no harbors. Behind coastal sandhills is a low plain in which are several shallow lagoons (5 to 30 miles in width), which communicate with the sea. Inland from the coastal plain is a region of hills and plateaus, which ascend to the Drakensberg, and which in Zululand attain an altitude of about 5000 feet. The country is well forested and well watered. The chief streams include the Pongola, Umkuri, Umgavuma, Umfolosi, and Umlatusi. The climate is semitropical along the coast, where malaria is prevalent, and temperate in the highlands. The fauna includes many of the common South African mammals as well as venomous snakes and crocodiles. The inhabitants are chiefly the brave Zulu (q.v.), who are primarily herdsmen, raising large numbers of cattle and sheep, but who also cultivate the soil to some extent, producing crops of maize, millet, sweet potatoes, tobacco, and beans. Along the coast sugar, tea, and coffee are raised by whites. The total area under cultivation in 1911 was reported at 49,645 morgen (105,076 acres). Some anthracite is mined and various ores have been found, but the mineral resources are still undeveloped. Pop., 1911, 219,606. Whites numbered 2120 (0.97 per cent); Bantu, 214,969 (97.89); mixed and other colored 2517 (1.14). There are no large towns. Zululand is governed in respect of provincial matters by the provincial council of Natal, and otherwise by the Union Parliament, in the Lower House of which it is represented by one member. Administration of their own affairs by the natives is permitted as far as possible by the British. The local British executive is a civil commissioner resident at Eshowe.

Towards the end of the eighteenth century the Zulu tribes, to the number of a few thousand, inhabited the valley of the Umfolosi. About that time a strict military organization was introduced among them by the paramount chief Dingiswayo, and his successor, Chaka, introduced an irresistible mode of attack, in which the old missile weapon was replaced by the short stabbing assagai. Chaka became master of the greater part of southeastern Africa, extending from the Limpopo to Cape Colony, and including Natal, Basutoland, and a large part of the Orange River and Transvaal colonies. He was anxious to establish a political connection with the Cape and English governments, and made, in 1825, a grant of land in Natal to an English officer. He was murdered in 1828 and was succeeded by his brother, Dingaan, who became involved in a war with the Boers by causing a party of settlers to be massacred in February, 1838. In December of the same year he was decisively defeated, and subsequently murdered. He was succeeded by his brother, Panda, during whose reign peaceful relations prevailed between the Zulus and the Natal government. In 1872 he was succeeded by his son, Cetewayo, who soon became a grave danger to the neighboring British colonies. At the beginning of 1879 the British made war on him. On January 22 a British army met with a great disaster at Isandlana (Isandula). Prince Louis Napoleon, who had entered the British service, was slain in a reconnoissance on June 1. On July 4 the Zulus were completely defeated at Ulundi and on August 28 Cetewayo was captured. He was restored to his rank in 1883. The district south of the Tugela, however, Great Britain reserved for itself, and another part on the northeast was also set off, so that the King was limited to the middle portion of the land. Cetewayo was deposed again before the close of 1883. He died the next year and was succeeded by his son, Dinizulu, who granted a strip of land in the west to the Boers, in which they established the "New Republic," and extended their control to the Umlatusi and St. Lucia Bay. In 1886 the British recognized the New Republic. In return the Boers pledged themselves to vacate the rest of Zululand and renounce recognition of Dinizulu's protectorate. The New Republic was annexed to the South African Republic in 1888, the remainder of Zululand having been declared a British crown colony in 1887. In 1888 Dinizulu attempted an insurrection, but was taken prisoner and exiled to St. Helena. He was later, however, sent back to his country. In 1907 he was charged with treason and murder and was sentenced to four years' imprisonment, but was released by Premier Botha in 1910. He was pensioned by the government and moved to the Transvaal. After 1889 small districts in the north, including those of the chiefs Sambana and Umtegiza, were added to British Zululand. On Dec. 30, 1897, the whole Province of Zululand, including Tongaland, was annexed to Natal.

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ZUMALACÁRREGUI É IMAZ, thōō-mä'lä-kär'rā-gē ā ē-mäth', TOMÁS (1788–1835). A Spanish Carlist leader. He was born at Ormáiztegui, in the Basque Province of Guipúz-

coa. He served against Napoleon, leaving the study of law at Pamplona to enter the army. He was loyal to Ferdinand VII, but in 1832, being suspected as a Carlist, was dismissed from the army. In October, 1833, he was called to lead the Carlist forces in the Basque provinces. He was the ablest of the Carlist leaders, and won many successes against the Cristinos, displaying marked talents as a guerrilla leader, as well as fine capacity for leading large bodies of men. On June 15, 1835, while besieging Bilbao, he received a gun-shot wound and died 10 days afterward. Consult M. A. S. Hume, *Modern Spain* (ib., 1906)

ZUMBUSCH, tsum'bush, KASPAR VON (1830–1915) A German sculptor, born at Herzebrock, Westphalia. He studied in Munich and in Rome under Halbig. He won the competition for a monument to Maximilian II of Bavaria (unveiled 1875) and in 1873 was called to Vienna as professor in the academy His most important works are a statue of Count Rumford, Munich; and the monuments to Prince August of Prussia (Bellevue Park, Berlin), Beethoven (1880, Vienna), Maria Theresa (1889, ib), Field-Marshal Radetzky (1892, ib), and to Emperor William I (1896, Wittekindsberg, Westphalia). He also modeled many funeral monuments, decorative works, and portrait busts, including one of Wagner.

ZUMPT, tsumpt, AUGUST WILHELM (1815–77) A German classical scholar, born at Königsberg, nephew of the following. Educated at the University of Berlin, he spent his life in teaching at the Joachimsthal (1837–38), the Friedrich Werder (1838–51), and the Friedrich Wilhelm (1851–77), gymnasia of that city. His work dealt chiefly with Roman epigraphy. His publications include an edition of *Rutilius Namatianus* (1836–46); *Honorum Gradus sub Imperatoribus Hadriano et Antonino Pio* (1843); *Ueber die Entstehung und historische Entwickelung des Kolonats* (1843); an edition of the *Monumentum Ancyranum* (with Franz, 1845); *Commentationes Epigraphicæ ad Antiquitates Romanas Pertinentes* (2 vols., 1850–54); *Studia Romana* (1859); *Das Kriminalrecht der römischen Republik* (1865–69); *De Monumento Ancyrano Supplendo* (1869); and *Der Kriminalprozess der römischen Republik* (1871).

ZUMPT, KARL GOTTLOB (1792–1849). A German classical scholar, born in Berlin. After studying at Heidelberg and Berlin, he was appointed professor of the classics in the Joachimsthal Gymnasium, and later became professor of history in the military school. In 1827 he was appointed extraordinary professor of Roman literature in the University of Berlin, and in 1837 became professor. His *Latin Grammar*, first published in 1818, passed through many editions; he also edited Quintilian (1831), Quintus Curtius (1849), certain of Cicero's writings, and published, among other works, the following: *Annales Veterum Regnorum et Populorum, Imprimis Romanorum* (1819; 3d ed., 1862); *Ueber den Stand der Bevölkerung und die Volksvermehrung im Altertum* (1841); *Ueber die bauliche Einrichtung des römischen Wohnhauses* (2d ed., 1851); *Ueber den Bestand der philosophischen Schulen in Athen und die Succession der Scholiarchen* (1843); and *Die Religion der Römer* (1845). Consult A. W. Zumpt, *De C. Zumptii Vita et Studiis Narratio* (Berlin, 1851).

ZUMSTEEG, tsum'shtāk, JOHANN RUDOLF (1760–1802). A German composer, born at Sachsenflur, in the Odenwald. Under the instruction of the kapellmeister Poli and others, he developed into a brilliant 'cellist and composer. He succeeded Poli, in 1792, as court kapellmeister at Stuttgart, where he produced eight operas, of which *Die Geisterinsel* and *Das Pfauenfest* are best known A schoolmate and intimate friend of Schiller's, he composed choruses to the poet's *Rauber*. He is known chiefly as the first German composer of ballads and the precursor of Löwe. His *Leonore, Des Pfarrers Tochter von Taubenheim, Ritter Karl von Eichenhorst, Die Bussende,* and *Ritter Toggenburg* are of lasting merit, as are also his songs and romances.

ZUÑI, zōō'nyē. The largest of the Pueblo villages, situated on a small stream about 40 miles southwest of Fort Wingate, near the west boundary of New Mexico. The inhabitants, who constitute a distinct linguistic stock, call themselves Ashiwi and are identical with the people of Cibola of the earliest Spanish explorers. They are peaceable, industrious in their native arts, agricultural, and extremely tenacious of their ancient beliefs. In their house building, agriculture, pottery, weaving, social organization, and ceremonial observances they resemble the Pueblos generally, of whom they and the Hopi (q v.) may be considered the most typical tribes. Their authentic history began in 1539, when they were first visited by Estevan, the negro vanguard of Marcos de Nizza. Estevan was killed and the Spaniards fled southward. At a later period they were brought under subjection and missionary influence, but in the great Pueblo revolt of 1680 they drove out or massacred the missionaries and other Spaniards and remained independent of Spanish authority until 1692. They numbered in 1910 about 1667. Consult M. C. Stevenson "The Zuñi Indians," in Bureau of American Ethnology, *Annual Report*, vol. xxiii (Washington, 1905), and F. H. Cushing, *Zuñi Folk Tales* (New York, 1901). See PUEBLO, and accompanying Plate showing Zuñi Pueblo. For examples of their handicraft see Colored Plates under BLANKET and POTTERY

ZUNZ, tsunts, LEOPOLD (1794–1886). A distinguished Jewish scholar. He was born at Detmold, and after studying in Göttingen and Berlin, accepted in 1820 a post as preacher in Berlin; while there he was also one of the editors of the *Spenersche Zeitung*. In 1835 he became preacher in Prague, but in 1839 returned to Berlin to take charge of the normal school there, and in 1845 was a member of the commission appointed for the investigation of the congregational and educational interests of the Jews. In 1818 he published *Etwas über die rabbinische Litteratur*, which was the inauguration of the scientific study of the Jewish rabbinical writings, and exerted a wide influence. He founded the *Zeitschrift für die Wissenschaft des Judentums* (1822–23). His most important work was *Die gottesdienstlichen Vorträge der Juden* (1832; 2d ed., 1892), an investigation of the religious homily and of biblical exegesis as embodied in rabbinical literature. Other important works were: *Die Namen der Juden* (1836); *Zur Geschichte und Litteratur* (1845); *Die synagogale Poesie des Mittelalters* (1855); *Die Ritus des synagogalen Gottesdienstes geschichtlich entwickelt* (1859); and *Litteraturgeschichte der synagogalen Poesie* (1865; appendix, 1867). Consult S. Maybaum, *Aus dem Leben von Leopold Zunz* (Berlin, 1894).

ZURBARÁN, Francisco de (1598-1662). A Spanish religious and portrait painter. He was born at Fuente de Cantos, Estremadura, and studied with Juan de las Roelas at Seville. Independently he developed a strong realistic style, with solid modeling and fine draft-manship, and marked light and shade effects. His earliest known works are a "Conception" (1616) and a series of pictures for the Convent of Santa María de las Cuevas, now in the Seville Museum, including the "Virgin Extending her Mantle over a Group of Carthusian Monks," "St. Bruno Conversing with Pope Urban II," and the remarkable "St. Hugo Surprising an Unlawful Feast in the Refectory," which, however, bears evidences of having been completed at a later date. A series of "Scenes from the Life of St. Peter," painted in 1625 for the cathedral of Seville, established his reputation. Other important paintings of this period are: the four panels representing scenes from "The Life of St. Buenaventura," in the Louvre, Berlin, and Dresden museums, showing him at his best; "The Ecstasy of the Beatified Alonso Rodríguez" (1630), perhaps his masterpiece; the "Apotheosis of St. Thomas Aquinas" (1631, Seville Museum), a grandiose altarpiece, rich and effective in color; the series for the Carthusian Monastery at Jérez, and the 13 paintings in the monastery of Guadalupe (1639), including the splendid "Portrait of Padre Gonzalo de Illescas." Through the friendship of Velazquez Zurbarán received the title of Painter to the King in 1638, and in 1650 he was employed to decorate a room in the palace of Buenretiro with the "Labors of Hercules"; but only four panels, now in the Prado, were completed. Important paintings by Zurbarán, other than those named, are "The Crucifixion," the "Beatified Enrique Suzon," and "St. Francis of Assisi," all in Seville Museum, a series of saints, including the fine "St. Anselm," in the Cadiz Museum; the "Immaculate Conception" (Budapest). What Velazquez (q.v.) did for the court Zurbarán did for the cloister, in his religious pictures and his splendid series of monks' portraits. Excellent examples of the latter are in the Academy of San Fernando, Madrid, the Louvre, the Berlin Gallery, and other European galleries, in the Hispanic Society, New York, and in other American collections. In later life his work shows a tendency to become hard and dry in execution. Consult: C. G. H. Gallichan, *Record of Spanish Painting* (New York, 1904), Narcisso Sentenach y Cabañas, *Painters of the School of Seville*, Eng. trans. by Mrs. Steuart Erskine (London, 1911); José Cascales y Múñoz, *Francisco de Zurbarán: su época, su vida y sus obras* (Madrid, 1911).

ZURICH, zōō'rĭk (Ger. *Zürich*). A canton of Switzerland (Map: Switzerland, C 1). Area, 666 square miles. The northern part of Zurich is mostly undulating. The southern part is traversed by several parallel ranges of mountains running from northwest to southeast and inclosing deep and narrow valleys. The canton belongs to the basin of the Rhine and is watered by the Thur, the Töss, and the Sihl. It comprises a large part of the Lake of Zurich. The soil is not very fertile, but is carefully cultivated and supplies about one-half of the cereals needed for domestic consumption. The vine is cultivated extensively in the northeastern as well as in the lake region. The manufacturing industries give occupation to about 50 per cent of the population. Especially developed are the cotton and silk industries, but the manufactures of machinery, paper, leather, straw goods, and embroideries are also important. The government of Zurich is democratic. The legislative power is vested in the legislative assembly, elected in the ratio of one member for every 1500 inhabitants. The executive council is also elected directly. The initiative and referendum are in force. Pop., 1900, 431,036; 1910, 500,679, almost entirely German-speaking Protestants. Capital, Zurich.

ZURICH. The capital of the Canton of Zurich, and the largest city in Switzerland, situated at the northern end of the Lake of Zurich, 25 miles north-northeast of Lucerne (Map: Switzerland, C 1). Altitude, 1506 feet. The site is exceptionally attractive. The beautiful lake, the richly gardened shores, and the snow-crested Alps in the background, afford a great variety of inspiring scenery. The Limmat, which discharges from the lake, separates the larger town on the right—the Grosse Stadt—from the smaller on the left—the Kleine Stadt. Bordering the latter on the northwest is the Sihl, a small stream which empties into the Limmat within the city.

The old, traditional town, with its narrow, steep streets and its high, dark houses, lies on both banks of the Limmat. The rest of the city has spacious thoroughfares and splendid buildings. The lake quays in the Kleine Stadt are very attractive. Near their northern end is the fine Tonhalle, a popular modern concert building and pleasure palace. In the vicinity of their southern end is the beautiful Belvoir Park. Near the Tonhalle, the stately main street of the city—the Bahnhofstrasse—leads from the lake north to the railway station. Adjacent to the fine Munster Bridge is the Wasserkirche (1479–84) on the right bank, containing the city library with 130,000 volumes and over 5000 manuscripts. It preserves many valuable objects, including the Codex Vaticanus. The Grossmünster, chiefly built about 1090–1150 and 1225–1300, is close by. It is Romanesque, with Gothic features. Zwingli was pastor of this church, and his statue stands here. Farther north is the Ruden, with the national educational exhibition and the Pestalozzi cabinet. The Frau Münster, chiefly of the thirteenth and fourteenth centuries, is on the left bank of the Limmat; its high altar was consecrated in 1170. The modern church of Our Lady is a magnificent basilica. The church of St. Peter (in part thirteenth century) holds the tomb of Lavater, who was its pastor. The town hall, in German Renaissance, dates from 1694. The university (see Zurich, University of) and the famous federal polytechnic school are in the northern part of the Grosse Stadt. The splendid polytechnic building was erected in 1861–64 from designs by Semper. Towards the south is the Künstlergut, with some good pictures of the local Artists' Union.

On the tongue of land, formed by the confluence of the two rivers, are the decorative grounds of the Swiss National Museum. The Platz Promenade is here—a majestic avenue lined with trees, and bordering the Limmat. The museum is of great interest. The magnificent edifice, in mediæval style, dates from 1898 and is filled with historical and art-industrial objects from all ages. It is the chief museum of Switzerland. Its collection of stained glass is considered the best in the world.

Zurich also possesses a gymnasium, an industrial school with a museum, an agricultural school, a school of forestry, the cantonal high school, an ethnographical museum, a botanic garden with a fine collection of Alpine plants, and an astronomical observatory. The cantonal hospital, an orphan asylum, and numerous other charitable institutions are found here Zurich is the most important commercial and manufacturing city of Switzerland. Its chief product is silk, but it produces also large quantities of cotton goods and machinery Pianos, paper, soap, and candles are also manufactured. Pop., 1900, 150,726; 1910, 192,011.

The district which now forms the Canton of Zurich passed from the rule of the Romans to that of the Alemanni about the beginning of the fifth century. About a century later the Alemanni were subdued by the Franks. After the partition of the Frankish dominions in the Treaty of Verdun in 843, the district was included in the Kingdom of Germany. The town of Zurich early became prosperous as the seat of richly endowed ecclesiastical foundations and early in the thirteenth century, after having been for a time under the rule of the house of Zähringen (q.v.), appears as a free Imperial city. The peoples of Zurich allied themselves with Schwyz and Uri in 1291, and in 1351 their state became a canton of the Swiss Confederation. Zwingli began here his reformation in 1519. Zurich was the scene of two battles in 1799, in which the French under Masséna were first defeated and then victorious. The Treaty of Zurich between Austria, France, and Sardinia was signed in 1859. See ITALY, *History*

ZURICH, LAKE OF. A lake of north Switzerland, chiefly within the Canton of Zurich (Map: Switzerland, C 1). It is crescent-shaped and very elongated, with a length of 25 miles and a maximum width of 2½ miles, narrowed in one place to less than 1 mile. It has a depth of 470 feet, receives the Linth at its southeastern end, and discharges into the Aar through the Limmat. Its banks rise in gently sloping hills covered with vineyards and dotted with numerous villages, and the scenery is very charming.

ZURICH, UNIVERSITY OF. A Swiss university founded in 1832. Its endowment amounts to over 1,500,000 francs. In 1872 a law was passed legalizing the attendance of women. Since 1892 women have been allowed to teach in the university. The university consists of the following faculties: (1) theology, (2) law, (3) medicine, (4) veterinary medicine, (5) philosophy, the last divided into the sections of philosophy-philology-history and mathematics-natural sciences. The university had in 1913 an attendance of 1504 students. The university library, including the city, canton, law, and medical libraries, contains over 116,000 volumes, 600 MSS., and 190,000 dissertations and pamphlets.

ZURITA Y CASTRO, thōō-rē'tȧ ē käs'trō, JERÓNIMO (1512–80). A Spanish historian and humanist, born at Saragossa. He was sent in 1543 by the Inquisitor General on a mission to the Emperor Charles V, then absent in Germany, was made a secretary to the Inquisitor in 1547, and in 1548 was nominated contador general of the inquisition in Aragon, and also historian of the kingdom. In the meantime he began publishing his monumental *Anales de la corona de Aragón* (6 vols., 1562–80). This work was remarkable for its departure from the old uncritical method of the chroniclers. It was reedited in 1585, 1610, and 1669, and in 1604 a volume of indexes was published. Zurita published also *Indices Rerum ab Aragoniæ Regibus Gestarum ab Initus Regni ad Annum MCDX* (1578 and 1582, including an account of the Normans in Sicily).

ZUTPHEN, zŭt'fĕn. A town in the Province of Gelderland, Netherlands, situated at the confluence of the Berkel and the navigable Yssel, 19 miles by rail northeast of Arnheim (Map. Netherlands, E 2). Portions of the mediæval fortifications may still be seen. The twelfth-century Gothic church of St. Walpurgis well merits attention. The old chapter house has a small but valuable library dating from mediæval times. There is an active trade in grain, but the chief trade is in the timber floated down the rivers from southern Germany. Zutphen has some tanneries and manufactures of textiles, and there are paper and oil mills. Pop., 1910, 20,673. North of Zutphen is the interesting and successful Nederlandsch Mettray, a Protestant agricultural and reformatory colony for boys, founded in 1851.

ZUYDER ZEE, zoi'dĕr zā, or **ZUIDER ZEE.** A large arm of the North Sea, penetrating deeply into the northwestern part of the Netherlands (Map: Netherlands, D 2). It consists of an oval inner portion 44 miles long and about 30 miles broad, separated by a strait about 10 miles wide from the horn-shaped outer portion, which in turn is separated from the North Sea by a line of sandy islands. Northeast of Ameland Island the sea is connected by the shallow channel known as the Wadden with the estuary of the Ems. The total area of the sea, including the Wadden, is 2027 square miles. The largest river flowing into it is the Yssel, an arm of the Rhine. The Zuyder Zee was originally an inland lake, the outer portion being dry land connecting the present peninsulas of North Holland and Friesland, and having a continuous coast line now indicated by the outer line of the Friesian islands. The lake received the river Yssel, and had a narrow outlet between the present islands of Vlieland and Terschelling. Several severe storms, the principal occurring between the years 1219 and 1287, caused the North Sea to break through the line of dunes at several places and inundate the lowlands between it and the lake This origin explains the remarkable shallowness of the Zuyder Zee, especially of the outer portion, where large sand and mud flats are exposed at low tide. The mean depth of the inner portion is under 12 feet and the maximum 19, while over large areas the depth is 3 feet or less at low tide. The strait connecting the inner and outer portions, and the main channels leading into the open sea have, however, a depth of 30 to 40 feet. Since the Zuyder Zee is accordingly unimportant for navigation, the main ship route to Amsterdam being through canals leading directly from the North Sea, since the fisheries have also declined, and since the character of the bottom promises fertile soil, it has been proposed to reclaim the inner sea by damming and draining it Commissions have investigated it at various times and bills have been introduced providing for it, but in 1916 the work had not been started.

ZVENIGORODKA, zvå'nyĕ-gȧ-rōt'kȧ. A district town in the Government of Kiev, Russia, 125 miles south of Kiev (Map: Russia, D 5). Pop., 1910, 21,442.

ZWEIBRÜCKEN, tsvī-brük'en (Fr Deux-Ponts). A town of the Rhenish Palatinate, Bavaria, on the Schwarzbach, 66 miles southwest of Mainz (Map: Germany, B 4). It is well built, its principal building being the Alexander kirche, with the ducal burial vaults. The chief manufactures include silk plush, steam engines, and agricultural machinery, paper, chains, and leather. Pop., 1910, 15,250. It was the capital of the Duchy of Zweibrücken, which arose in the Middle Ages and existed down to 1799.

ZWEMER, zwā'mėr, Samuel Marinus (1867–). An American missionary, traveler, and scholar, born at Vriesland, Mich. He graduated at Hope College, Holland, Mich. (1887), and at New Brunswick (N. J.) Theological Seminary (1890). Ordained to the Reformed Church ministry, he was a missionary at Busrah, Bahrein, and other stations in Arabia from 1891 to 1905. He also traveled extensively in Asia Minor, and was elected a fellow of the Royal Geographical Society of London. Besides editing the *Moslem World* and the *Quarterly Review* (London), he wrote: *Arabia, the Cradle of Islam* (1900); *Topsy Turvy Land* (1902), with his wife, Mrs. Amy E. Zwemer; *Raymond Lull* (1904); *Moslem Doctrine of God* (1906); *The Moslem World* (1908); *The Unoccupied Mission Fields* (1910); *The Moslem Christ* (1911); *Zigzag Journeys in the Camel Country* (1912); *Childhood in the Moslem World* (1915); *Mohammed or Christ?* (1916).

ZWICKAU, tsvik'ou. A town in the Kingdom of Saxony, situated on the left bank of the Zwickau Mulde, 20 miles by rail southwest of Chemnitz (Map: Germany, E 3). It is a quaint old city. The Gothic church of St. Mary, dating from 1453 and restored in 1885, is a notable structure. Other features of Zwickau are the house where Schumann was born, several fine old edifices, and the ancient château used as a penitentiary. There are a mining school and a collection of paintings. Machinery, automobiles, paper, and glass are among the varied productions. The adjacent coal mines are extensively exploited. Pop., 1900, 55,825; 1910, 73,538.

ZWIEDINECK VON SÜDENHORST, tsvē'dē-nėk fon zü'den-hōrst, Hans (1845–1906). An Austrian historian, born in Frankfort. He was educated at Graz, where in 1885 he was appointed professor of history. He completed Adam Wolf's *Oesterreich unter Maria Theresia, Josef II. und Leopold II.* (1882–84). Independently he published *Dorfleben im 18. Jahrhundert* (1877); *Die Politik der Republik Venedig während des dreissigjährigen Krieges* (1882–85); *Die öffentliche Meinung in Deutschland im Zeitalter Ludwigs XIV.* (1888); *Deutsche Geschichte im Zeitraum der Gründung des preussischen Königtums* (2 vols., 1890–94); *Deutsche Geschichte von der Auflösung des alten bis zur Grundung des neuen Reichs* (3 vols., 1895–1905). The last two appeared in the *Bibliothek deutscher Geschichte*, which the author began to issue in 1887. He also wrote *Venedig als Weltmacht und Weltstadt* (1899); *Maria Theresia* (1905); and edited the *Zeitschrift für allgemeine Geschichte* (Stuttgart, 1884–88).

ZWINGLI, tsving'lē, Ulrich or Huldreich (1484–1531). The leader of the Protestant Reformation in Switzerland. He was born at Wildhaus, in the Toggenburg valley, where his father was the magistrate of the village, a man of substance, who gave his son the best available education. Zwingli was directed from an early stage to the liberal humanistic methods of study, and formed his taste and judgment in this enlightened school. He spent two years at the University of Vienna and then studied at Basel, where he took his bachelor's degree at 20 and his master's degree at 22. In 1506 he was made parish priest at Glarus and held this place for 10 years. Glarus was one of the most important centres for the recruiting of young men for the various armies of Europe, and Zwingli entered into this foreign service as a field chaplain. This experience gave him at once an intimate acquaintance with Swiss public life and a settled conviction that the service in foreign armies was ruining the character of his countrymen. His opposition to this service, and to a proposed French alliance, at last forced him to leave Glarus. At Einsiedeln, where he became priest in 1516, he found new opportunities for study and began to shape his views on the questions afterward to be of most importance in the Reformation. His conclusions on these matters were reached quite independently and before Luther had begun to express himself publicly.

In comparison with other Reformation leaders Zwingli appears primarily as the man of plain common sense, repelled by the abuses of the Church, inclined to remove from the daily practice of religion whatever seemed to interfere with the purity of original Christianity as he understood it, but, on the other hand, steadily opposing every form of fanaticism. His first opportunity to express his views of reform came, as it did with Luther, on the preaching of an indulgence. Zwingli was requested by the Bishop of Constance to preach against the abuse, and he did it with such effect that the commissioner was obliged to leave the canton. In 1519 he accepted a call to become priest of the people at the Grossmunster in Zurich, a place of much importance, where his novel method of preaching according to the Scripture itself rather than according to formulas derived from the Fathers attracted the widest interest. Thus supported by the temporal authorities, Zwingli was enabled to continue his studies and to enlarge the circle of his connections in such ways as would best contribute to the advance of the ideas of the Reform. No thought of a permanent separation from Rome seems to have occurred to him as yet, but his language in regard to the papal power and the usages of the Church became increasingly liberal. An exhortation to support the position of Luther, written in 1520, is probably his work, and may be regarded as the first open declaration of hostility to Rome. Instead of laying down certain general principles and bringing the issue directly on these, Zwingli began to suggest definite measures of reform, speaking of the diminution of tithes, the revision of the breviary, the folly of fasts, the evils of image worship, and above all the right and duty of the priests to marry openly, rather than to live, as he frankly confessed he was himself doing, in secret concubinage. The Swiss Diet was slow to accept these suggestions, but they commended themselves at once to the great body of the people, and this approval was soon reflected in the action of the cantonal and general governments.

As a theologian Zwingli did not make any pretense to special originality. He believed himself to be in substantial agreement with Luther, and accepted heartily the efforts of Philip of Hesse and others to bring about an effective alliance of

the two movements; but Luther was unsympathetic, for he had convinced himself that the Swiss reformers were moving along the line which had led already to the social upheaval in Germany and to the extravagances of the Anabaptist party. The famous conference at Marburg in 1529 between the leading theologians of the German and the Swiss parties failed, because, on the test question of the Eucharist, Luther refused to make any admission which might have seemed to commit him to a spiritual or figurative interpretation of the doctrine of the sacraments. Zwingli was not afraid to trust the common sense of men to make a sound use of their right of interpretation, so long as they should admit the supreme authority of Scripture. Moreover, he did not dread, as Luther did, the formation of alliances to strengthen the position of the reformed faith. He saw Switzerland surrounded by eager enemies who were doing all they could to foment the dissent between the Catholic Forest Cantons and the other members of the Confederation, and he felt that these two objects, the integrity of the Confederation and the reform of religion, must go hand in hand. It was on this account that, man of peace as he was, he threw himself with all his energy into the internal quarrel Zurich became the active agent of the Confederation in combating the Forest Cantons, and Zwingli took the side of the war party. Twice, in 1529 and in 1531, bloody encounters ensued, the first time to the advantage of the Confederation, but the second time to their total defeat Zwingli had supported his principles by his action and had gone into the campaign of Kappel (q.v.) as a fighting chaplain. His death on the field of battle, Oct. 11, 1531, was the logical outcome of his teaching and was the seal of the permanent religious cleavage between the Catholic and the Protestant cantons.

Bibliography. The *Life* of Zwingli was written shortly after his death by his friend and associate, Myconius (ed. Neander, in *Vitæ Quatuor Reformatorum*, 1841). His complete works were published by Schuler and Schulthess (Zurich, 1828–61); a new edition, *Latin Works and Correspondence*, is edited by S. M. Jackson, translated by H. Preble and others (vol. i, New York, 1912). Consult also: Raget Christoffel, *Huldreich Zwingli: Leben und ausgewahlte Schriften* (Elberfeld, 1857; Eng. trans. by John Cochran, Edinburgh, 1858); Rudolf Stähelin, *Huldreich Zwingli: sein Leben und Wirken nach den Quellen dargestellt* (2 vols., Basel, 1895–97); G. Finsler, *Zwingli-Bibliographie* (Zurich, 1897); Samuel Simpson, *Life of Ulrich Zwingli, the Swiss Patriot and Reformer* (New York, 1902); S. M. Jackson, *Huldreich Zwingli, the Reformer of German Switzerland*, in "Heroes of the Reformation" (2d ed., ib., 1903); J. P. Whitney, "The Helvetic Reformation," in *Cambridge Modern History*, vol. ii (ib., 1903).

ZWOLLE, zwŏl'e. The capital of the Province of Overyssel, Netherlands, on the Zwarte Water, 53 miles east-northeast of Amsterdam (Map: Netherlands, E 2). Its most notable structures are the Gothic St. Michael's Church (1406), with a famous organ, and the town hall. The town is an important centre of railway and canal trade, with manufactures of iron, rope, salt, and cotton. Pop., 1910, 34,224. The neighboring monastery of Agnietenberg was for 64 years the home of Thomas à Kempis (q.v.). Zwolle was an important Hanseatic town and joined the United Provinces in 1580.

ZYGADENUS, zĭg'a-dē'nŭs *or* zī'ga- See EUTHYMIUS ZYGADENUS.

ZY'GOMYCE'TES. One of the two great divisions of Phycomycetes (q.v.), distinguished from the other group (Oömycetes, q.v.) by being isogamous. See ISOGAMY.

ZYG'OPHYLLA'CEÆ (Neo-Lat. nom. pl., from *Zygophyllum*, from Gk. *ζυγόν, zygon*, yoke + *φύλλον, phyllon*, leaf). A family of dicotyledonous plants, containing about 150 known herbs, shrubs, and trees, chiefly natives of subtropical countries. The most important genus is *Guaiacum* (q.v.). The abundance of species of *Zygophyllum* and some other genera constitutes one of the most striking features of North African and Arabian deserts. The flowers of *Zygophyllum fabago* are employed as a substitute for capers, under the name of bean capers. The best-known representative of this order in the United States is the creosote bush (*Larrea mexicana* or *Covillea glutinosa*), common from Texas to California.

ZYGOTE, zī'gōt *or* zĭg'ōt. A general name applied to the cell which is the product of fertilization in plants. It includes both zygospore (the product of similar sexual cells) and oöspore (the product of dissimilar sexual cells).

ZY'MASE (from Gk. *ζύμη, zymē*, leaven) An enzyme, or more probably, a system of enzymes, that carries on alcoholic fermentation. Büchner first established the enzymotic nature of alcohol fermentation in 1897 and suggested the term zymase. Zymase includes at least a thermolabil colloidal enzyme, a thermostable coenzyme, and primary or secondary phosphates. In fact, detailed study is showing that the factors involved in zymase action are numerous and very complex. Alcoholic fermentation is carried on by many plants besides yeasts. It is common even among flowering plants under anaërobic conditions. It is not known whether the systems of enzymes producing it are identical in all cases.

ZYMOGEN, zī'mō-jĕn See ENZYME.

ZYMOT'IC DISEASE (Gk. *ζυμωτικός, zymōtikos*, causing to ferment, from *ζύμωσις, zymōsis*, fermentation, from *ζυμοῦν, zymoyn*, to ferment, from *ζύμη, zymē*, leaven, from *ζέειν, zeein*, to boil). An old term for a disease supposed to be caused by fermentation of a substance received into the body, and formerly applied to smallpox, typhoid fever, plague, influenza, etc. Under the influence of the new science of bacteriology the zymotic was transformed into the zymotoxic theory of infectious disease, and the former term has largely fallen into disuse See DISEASE, GERM THEORY OF; MIASMA; NOSOLOGY.

ZYR'IANS. A Finno-Ugrian tribe, numbering 30,000, living on the headwaters of the Dvina and Petchora, in Russia, where they are settled along the navigable streams. They are brachycephalic, the index being 82.2. Hunting is the chief occupation, but as traders they visit the fairs of North Russia over a wide radius. They are now Russianized, and the old nature worship formerly practiced has almost passed away, one trace of it being the sacrifices of animals before the churches.

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